

Insulation

This issue's detail – junctions between an insulated masonry wall and an intermediate floor, and a window Fig 1.

This detail merges together the wall construction from the last two issues with an intermediate floor and with a window.

Once again, the wide masonry cavity is cheap, the width giving extra resistance to driving rain, although of course good exposure detailing is still needed: good use of overhangs, cavity trays with stop ends, avoiding engineering bricks or recessed pointing. The fill is restricted to non organic insulation at present, such as mineral fibre or glass fibre, but these can either be installed as batts or post filled by injection. Wet plaster acts as an air barrier.

The intermediate ground floor detail is based upon a timber floor, but could easily be replaced with a concrete beam or plank floor with structural loadings checked. The most important issue is that the joist end detail is airtight. When using timber joists the most important point is not to build them into the inner leaf - as the timber ages it shrinks and leaves a wonderful air leakage route. I have been in terraced houses where when the floorboards are lifted, the muffled conversations from the house next door suddenly become as clear as a bell. Concrete floors require the same air tightness – some detailing needs to be carried out to ensure that the beams or planks are bedded in on sufficient grout to provide a basic seal – later to be enhanced by the plaster. (In commercial buildings using suspended ceilings, missing out the wall plaster in the ceiling void has led to some high leakage rates). There are no problems with thermal bridging as the insulation passes right over the joint detail. This is an advantage of cavity fill compared with the use of insulated (lightweight) masonry inner leaf, where the thermal bridging can be significant.

The window detail is less straight forward. The basic problem is that as the width of the cavity increases, the window is not deep enough to act as a closer. As we increase our cavity widths (I expect we will all be building 300mm full fill cavities in the future), this becomes more of an issue. From the weatherproofing point of view we need to ensure that the window is set back from the front face of the wall. Indeed, in severe exposure areas it is normal to allow the outer leaf to overlap the window frame. Thermally we want to ensure that the window is set within the thickness of the insulation to minimise thermal discontinuities.

In practice there are two solutions: firstly as illustrated here to use a proprietary cavity closer. The advantage of this method is that the site work is quick and easy, but can be expensive and care needs to be taken to check the material specification – 'is it PVC?' or 'foamed with HCFC's?'. An alternative is to use the plywood box method, where the window is fixed to plywood on all sides, and then this whole assembly lifted in to the hole in the wall and fixed to the inner leaf. Insulation then simply fills the cavity up to the plywood box.

In either case the method of sealing the window to the wall joint is critical.

Please do send your comments on this detail to me at the address on the opposite page.

This is the third in a series that hopes to bring informed debate and understanding into the incorporation of insulation into buildings, be they timber frame or masonry. The idea is based on Cecil Handyside's "Everyday Details" [1], a delightful book listing many common building details together with a useful analysis, and in the later editions a summary of alternatives from architects who have written in response.

In this series, we are looking at details of constructions and their joins, trying to suggest methods of construction that provide the perfect detail (!) The criteria are:

- Materials must have minimal adverse effect on the environment, and ecological materials are preferred.
- Costs must be about the norm for domestic construction, or only slightly higher
- The detail must be easily buildable, and have a long life.
- The thermal performance must be very good –comfortably better than the Building Regulations and there must be no significant thermal bridges.

- The detail must be easy to make very airtight to avoid draughts and rot in organic materials.
- The detail should exhibit good moisture control: condensation / breathability / driving rain shedding

Comments on last issues detail

– the wall/floor detail:

Comments have included the following: see Fig 2.

Tony Cowling (Berks) raised several issues. He pointed out that the further the insulation was placed down the cavity, the better the effect of the thermal mass of earth trapped under the building. He also suggested taking the floor insulation down on the inside of the inner leaf, to aid this principle. He pointed out that the position of the DPM as shown could possibly act as a vapour barrier on the cold side of the insulation, and suggested instead placing it on top of the polystyrene, where it could act as a DPM and vapour barrier, (and radon barrier!) in one. This latter point is one that I have met often, and my standard response is to say that if it is all masonry construction, i.e. no timber, then the

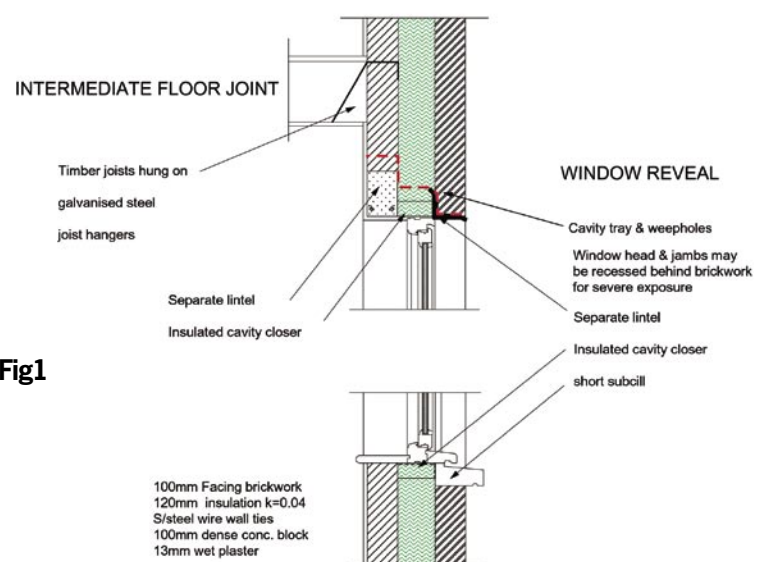


Fig1

WALL TO FLOOR DETAIL

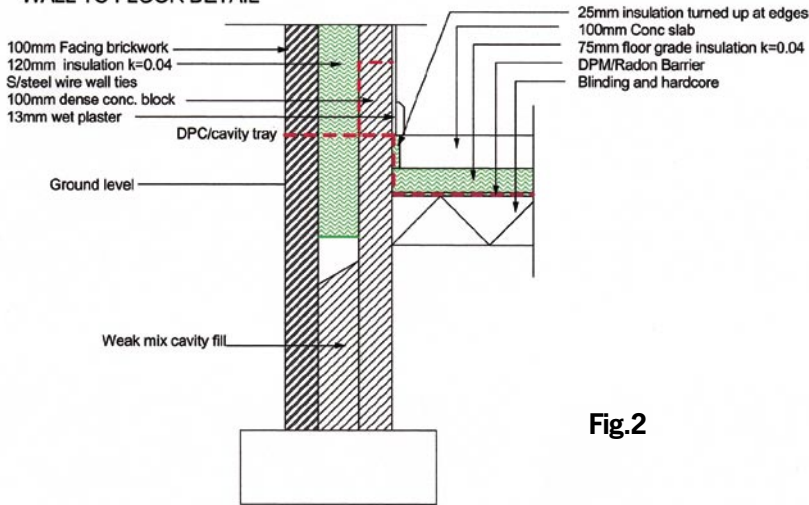


Fig.2

small amount of condensation does not matter, compared to the problem on site with high groundwater movement, where even a tiny water flow can rip the heat from on top of the insulation. Perhaps we should all do as Tony suggest and put an additional membrane under on wet sites?

Nick Martin (Hockerton, Notts) suggested using an aerated block instead of cavity wall with the weak mix infill. This would minimise the thermal bridging and increase heat storage, much as Tony Cowling pointed out above. He also said he preferred to use thicker insulation (say up to 150mm) and would consider using well compacted type 1 infill to increase the thermal mass. He points out that this would give a warm floor without the cold tiles and no necessity to fit carpets or underfloor heating. All good stuff, but not sure I agree about the underfloor heating bit – underfloor heating will give a local rise in temperature that insulation can only achieve in a conservatory with the sun out.

Edward Walker (Leeds) points out that the new regs. For "Access for All" means that a good detail will need adjusting locally at openings to give ground levels at finished floor levels, so we don't need ramps but level thresholds, and that

this can involve a bit of tanking on the DPC. Personally I would want to make sure the Radon barrier was not dependant on this but for damp that's OK. He also asked where my recommendation to avoid engineering bricks in full fill cavity walls came from, as he couldn't find it in the ubiquitous "BRE- Thermal Insulation, avoiding risks". The answer to that one is that it comes from early work by Newman et al at BRE, and in my notes I have written: "it would not be wise to rely on an absorbent brick to prevent rain penetration, but it could help in a marginal case".

Edward also points out that the NHBC do not recommend solid floors if the infill is more than 600mm, which can be a problem on sloping sites.

But what everyone really wanted to know was how serious was the thermal bridging? Edward asked if I had carried out a En ISO 14683:1999 calculation on thermal bridging, and the answer is – I have now.

Below are the results of calculations on this construction detail using the Canadian "FRAME" V4 which is a two dimensional thermal analysis package. I analysed two cases, first the case where the insulation was not taken down so low, and where the floor screed insulated

turn up was omitted. I then lowered the cavity fill as in the original, and changed the two concrete blocks between the cavity insulation and the floor insulation to medium weight concrete blocks – i.e. with some slight insulation value, and reinstated the thermal turn up at the edge of the floor screed. The results of the modelling are shown in fig.3, with the minimum surface temperatures at the skirting point. What I hope is obvious is how a little attention to detail can minimise the potential for condensation, let alone heat loss.

Enough of masonry! Next issue starts to look at timber frame, and the thermal bridges that can make real performance so much short of the theoretical with this type of construction.

Peter Warm

Thanks all of you, mentioned here or not, who sent in comments on last issue's detail. Please feel welcome to send in your comments on this issue's suggested detail. Initially you can send comments by email, but fax is best for drawings, unless you can send pdf files.

Please send to Peter Warm: peterwarm@aecb.net; fax (01453) 834065. Please write a short note explaining why you think your suggestion is an improvement on the detail shown. All suggestions will be very welcome!

Thanks to BRECSU for allowing material produced for the workshop series on insulation detailing to be used. Any errors are down to me. Peter Warm.

1. Everyday Details, Handyside, Butterworth, 1976 ISBN 0-85139-213-X

fig.3

