BUILDING REGS

Ground floors: general 2

For the first time, insulation standards are being set for the ground floors of all new buildings. We look at the issues which relate to all forms of ground floor construction

The new requirement to be introduced in April this year is for a U-value of 0.45 for ground floors. Unlike exposed floors, it is considered that, provided the floor dimensions are large enough, this U-value can be achieved without adding extra insulation material to the floor. This is because the greatest proportion of heat from a ground floor is lost around the perimeter.

In most cases, this solution will apply only to non-domestic buildings and large blocks of flats, since it is unlikely that a square plan detached house for the mass market will have ground floor dimensions greater than 15 m by 15 m, or a 30 m long terrace of houses will be deeper than 10 m (Fig 1).

Once insulation is to be added to the floor one trade-off option is to increase its thickness to achieve a U-value of 0.35, and keep the roof U-value at its current level of 0.35 (Fig 2).

What thickness of insulation?

For the reason given above, the required thickness of thermal insulation depends on the shape and size of the ground floor. Tables in the Approved Documents to Part L give minimum thicknesses for insulation materials with a range of thermal properties. Two examples, one for a solid floor in contact with the ground and the other for a suspended floor, show the implications.

For a solid ground floor, the minimum thickness of expanded polystyrene insulation given in the Approved Document for a small building with ground floor dimensions less than 10 m by 10 m is given in Table 1, together with the typical product thickness likely to be needed. For suspended ground floors, the corresponding thicknesses are given in Table 2.

To meet the higher U-value options of 0.35, the minimum thicknesses of expanded polystyrene shown in the tables must be increased by 20 mm. In effect, this would make it necessary to use a 50 mm thick board as a minimum. In detached houses, an even greater thickness would be necessary which might make it uneconomical with solid ground floors.

For timber suspended floors, it is much easier to use thicknesses of insulation, whether of mineral fibre or plastics material, to achieve the higher 0.35 U-value standard. Timber construction may therefore be preferred when it is difficult to accommodate the extra thickness of insulation as well as the ventilation path within the roof structure, for example with room in-the-roof designs.

In such cases, it may also be an advantage to use the same insulation product for both roof and ground floor.

Details of individual types of floor construction will be dealt with in subsequent articles in this series.

Construction points to consider

The BRE report Thermal Insulation: Avoiding Risks includes a number of points that designers and builders need to be aware of when constructing to higher insulation standards.

For ground floors, there are a number of issues that apply to most types of ground floor construction.

These include:

- ☐ Condensation where there are cold bridges through the construction
- ☐ Damage to floor finishes from construction moisture.
- ☐ Freezing water in pipes as they pass through the floor.

Avoiding cold bridges

As outlined in the first article in this series, cold bridges occur where there is a break in the required level of thermal insulation. In the case of floors, this occurs mainly at junctions with external walls, but sometimes at service entries.

Where possible, the insulating layer of the floor and wall should be continuous, but this is likely to be possible only when the main wall insulation is provided by the inner leaf (or by an internal lining) and the floor is insulated above a concrete slab or within a timber suspended floor (Fig 3).

In all other cases, the aim should be to extend the cold bridge path as much as possible, by overlapping insulation layers and by using materials of the highest possible thermal resistance, for example aerated concrete blocks (Fig 4).

Avoiding moisture damage to floor-finishes

BRE's experience has shown that where the damp proof membrane is located below a concrete slab, sufficient time must be allowed for the concrete to dry out, or the remaining moisture will migrate to the surface and may damage vulnerable floor finishes.

As a general rule, a minimum of one month should be allowed for each 25 mm thickness of concrete slab. Thus, a 150 mm thick slab would need at least six months to dry out sufficiently to avoid problems.

If this period of time cannot be allowed, an additional moisture resisting membrane must be placed above the slab, either immediately below the floor finish, or below the screed. The moisture in the screed must, of course, be allowed to dry out before the finish is applied.

Avoiding water freezing in pipes

Water in the supply pipes to houses can freeze if the pipes are not sufficiently well insulated. BRE Defect Action Sheet 109 and the BRE report Thermal Insulation: Avoiding Risks identify how pipes should be insulated for both suspended and ground bearing floors, making reference to the thicknesses shown in BS 6700: 1987.

The standard distinguishes between indoor and outdoor standard and gives a different thickness of pipe insulation for each. In the case of ground floors, the designation is as follows: pipes passing through ground bearing floors in a position less than 750 mm from the outside face of the external wall — indoor standard; and pipes passing through ventilated suspended floors — outdoor standard.

A table in the BRE report gives the minimum thickness of pipe insulation for different pipe sizes and insulation materials. It is important to note that pipe insulation needs to be of a much greater thickness than is generally available off the shelf in builders' merchants. For example, insulation of polyurethane foam or similar foamed plastics needs to have a wall thickness of 22 mm to meet the indoor standard and 27 mm to meet the outdoor standard. ○

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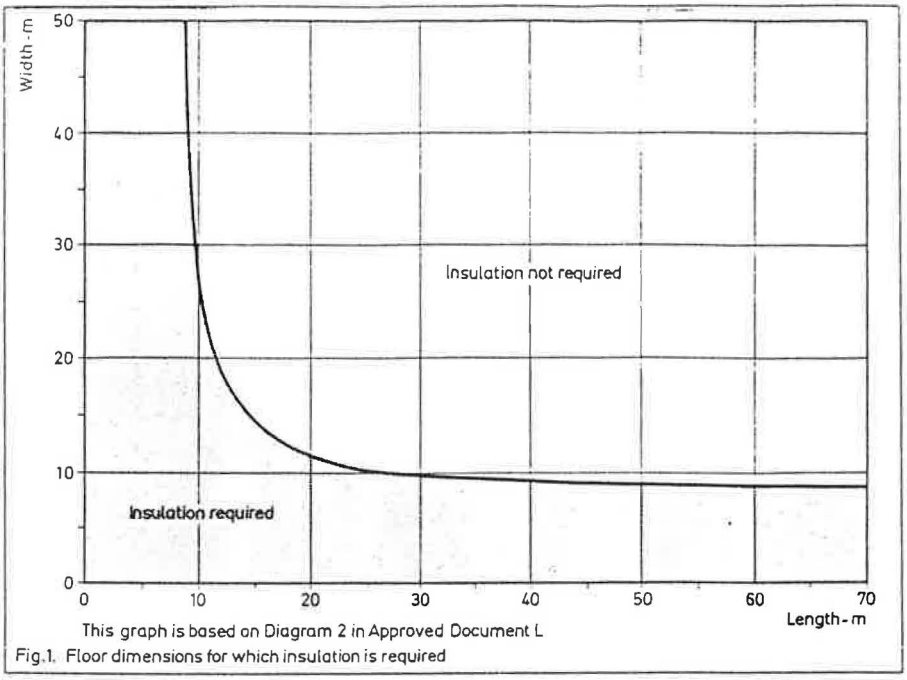

Fig.1. Floor dimensions for which insulation is required

Note to Fig. 1.
For detached buildings the dimensions relate directly to the building. In the use of semi-detached and terraced buildings and blocks of flats the dimensions relate to the floor area under the whole building

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Type of house	Thickness to meet a U-value of 0.45 W/m²K Minimum thickness	Product thickness
Detached house	44	50
Semi-detached or end terrace	35	40
Mid-terrace	22	25

Table 1: Solid ground floors — thickness of expanded polystyrene insulation

Type of house	Thickness to meet U-value of 0.45 W/m²K Minimum thickness	Product thickness
Detached house	36	40
Semi-detached or end terrace	30	40
Mid-terrace	23	25

Table 2: Suspended ground floors — thickness of expanded polystyrene insulation

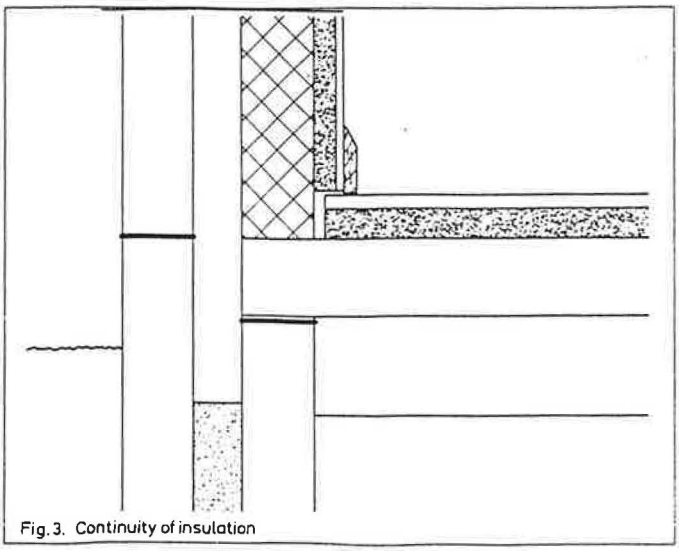

Fig.3. Continuity of insulation

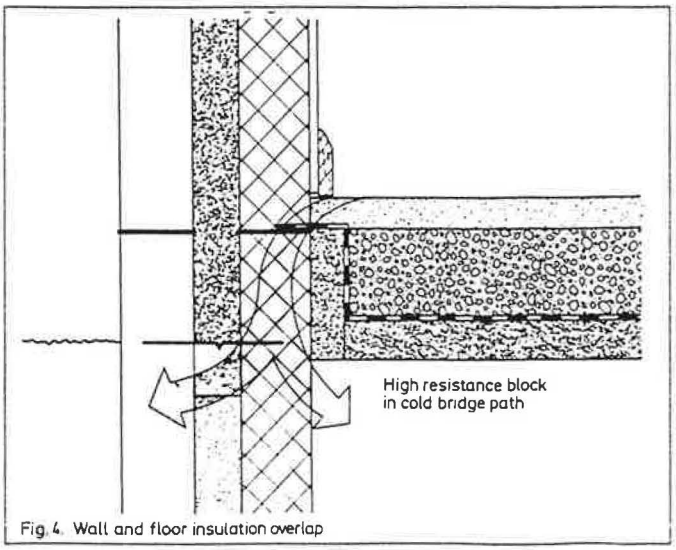

Fig.4. Wall and floor insulation overlap

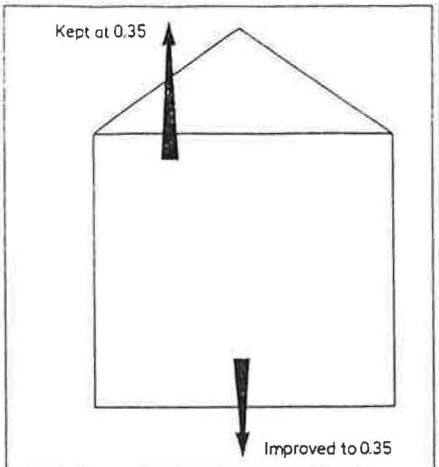

Fig. 2. Trade-off option where ground floor is insulated to 0.35

Insulation for the 1990s

Building Today is publishing a series of 11 articles to explain in detail how to meet the new thermal insulation standards. The articles cover:

How to meet the new thermal regs
Ground floors — general
Supported concrete floors
Suspended concrete floors
Suspended timber floors
Walls — general
Solid and unfilled cavity walls
Walls — detailing to avoid cold bridging
Windows
Pitched roofs
Flat roofs

Further information on building to higher insulation standards and related topics is available from the Enquiries Bureau, BRECSU, BRE, Garston, Watford WD2 7JR. Tel: (0923) 664258. Copies of the BRE report **Thermal Insulation: Avoiding Risks** are obtainable, price £10 each, from Publications Sales, BRE, Garston, Watford, WD2 7JR. Tel: (0923) 664444.