BRE Housing Defects Prevention Unit

Defect Action Sheet (Design)

CI/SfB 1976
8 (21) (L2)

DAS 6

July 1982
Minor revisions February 1985

External walls: reducing the risk from interstitial condensation

FAILURE: Rot in timber; corrosion of steel framing, reinforcement, fixings; wetting of insulation

DEFECTS: House poorly ventilated; vapour checks omitted, poorly sealed, wrongly sited; walls not ventilated or drained

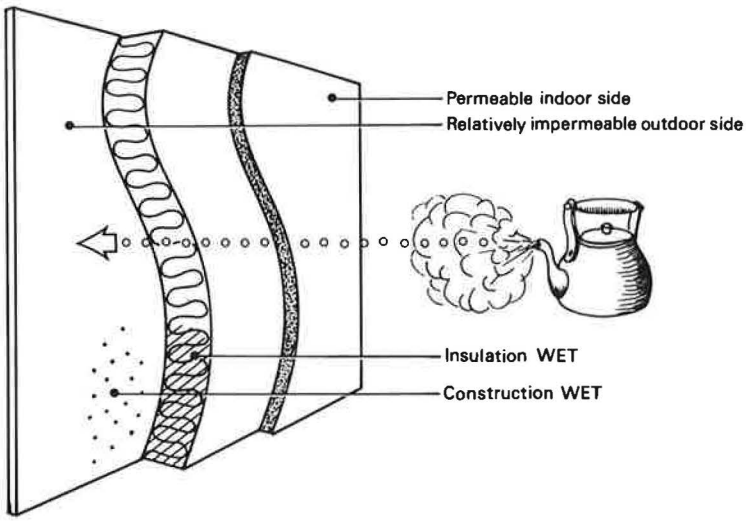

Figure 1
Interstitial condensation

Condensation is likely to occur within the thickness of most types of external wall under some conditions (interstitial condensation Figure 1). In traditional masonry construction it may not matter, but some other types of wall construction may be adversely affected. Appropriate design can minimise the risk of damage, but BRE surveys have shown that proper precautions are not always taken.

Activities in houses, particularly in kitchens and bathrooms, add large amounts of ***water vapour*** to that already present in incoming air. Much of this water vapour can, and should, be removed near its source by ventilation or extraction, but some is likely to find its way ***into the structure of the external walls;*** it can permeate through porous materials such as plasterboard, or be carried by air movements through cracks and holes. Even if a vapour check has been provided the practical difficulties of installation make it likely that some vapour will leak into the wall.

If vapour, from indoors, ***reaches a relatively cold and impermeable layer*** of, say, cladding or sheathing, or a wrongly sited vapour barrier, it is likely to ***condense*** unless there is good ventilation at that point. Water which condenses may drain harmlessly away or, if it soaks into porous materials, be subsequently dried out by ventilation without causing any damage. ***However, if no such drainage or ventilation has been provided and the water accumulates in or around timber or metal components, rot or corrosion may occur.*** Insulation also may become wet, reducing its effectiveness even to the point where condensation and mould growth appear on the indoor surface of the wall.

Building Research Establishment
Department of the Environment

Housing Defects Prevention Unit
Building Research Station
Garston, Watford WD2 7JR
Telephone: 0923 674040
Telex: 923220

PREVENTION

Principles — Restrict the entry of water vapour from the house to the external walls to levels which can be adequately dispersed from the walls by diffusion, ventilation and drainage.

Practice

- Provide for good, controllable ventilation to the house and particularly to kitchens and bathrooms (Figure 2).
- Whenever possible, design external walls having materials of increasing permeability towards the outside (Figure 3).
- Provide a vapour check on the warm side of the insulation for all external walls containing materials liable to be adversely affected by damp (Figure 4). No vapour check is required for traditional masonry cavity walls.
- Do not rely on a vapour check to prevent interstitial condensation if there is another relatively impermeable layer in the wall, (for example, a fairly impermeable cladding material). Provide in addition ventilation and drainage from its inside face to the outside (Figures 5 and 6). If the construction materials can absorb water, ventilation is more important than drainage.
- If a water-shedding layer is needed behind cladding such as vertical tiling, use a breather paper to BS 4016:1972[1]. Do not use polythene or building paper.
- The greater the risk of interstitial condensation, and the greater the difficulty in providing ventilation or drainage where condensation may occur, the greater the efforts that should be made to ensure that the vapour check is as effective as possible. Pay particular attention to maintaining the continuity of the vapour check at joints and at difficult details such as the junctions between elements of the building, and where services penetrate. Try to locate services so that they do not penetrate the vapour check.

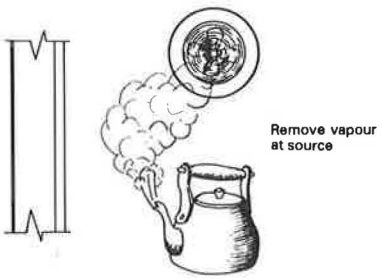

Figure 2

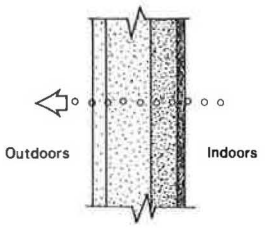

Figure 3

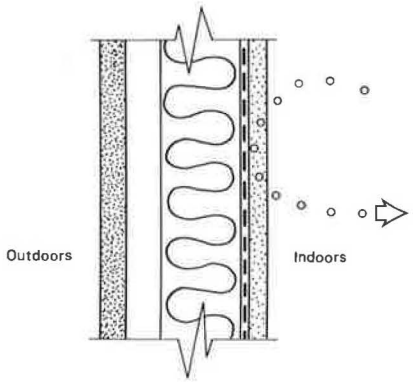

Figure 4

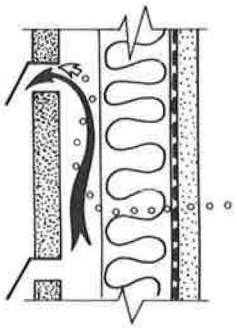

Figure 5

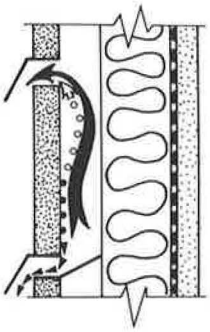

Figure 6

REFERENCES AND FURTHER READING

1 *British Standard* 4016:1972 'Building papers (breather type)'.

British Standard 5250:1975 'Code of basic data for the design of buildings: the control of condensation in dwellings'.

BRE Information Paper IP 1/81 'Vapour diffusion through timber framed walls'. Obtainable from Distribution Unit, Building Research Establishment, Garston, Watford WD2 7JR.

Defect Action Sheets are produced by the BRE Defects Prevention Unit. A Technical Committee including representatives appointed by DOE and the Local Authority Associations advises upon the general approach and priorities for the Unit's work. *Defect Action Sheets* are intended to remind and inform designers and site supervisory staff of ways of avoiding some of the most troublesome defects which have beset Local Authority housing in recent years. The advice is based on the most authoritative information available at the date of issue and frequently also on field assessments, but it is inevitably generalised and users should ensure that it is relevant to the specific circumstances in which they seek to apply it. For technical enquiries arising from this sheet please contact the DPU at the address overleaf.
Local Authority users may be able to obtain further copies of this and other sheets in this series from the nominated contact point in their authority. Alternatively further copies may be obtained from Publications Sales Office, Building Research Establishment, Garston, Watford WD2 7JR (Tel. 0923 674040).

Price group 1 Also available by subscription

Printed in the UK for HMSO. Dd.8245114, 3/90, C5, 38938.