#2514

AIVC

CONDENSATION CODE BS REVISIONS

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TECHNICAL

Condensation shows little sign of abating as a building problem. The subject is increasingly complex. BS 5250 *Control of condensation in buildings* is being updated but has it gone far enough, especially bearing in mind that it is likely to be held up as a model in court? Peter Burberry assesses the new draft.

Condensation is an acute problem in many buildings, particularly houses. Not only does the problem remain in a substantial proportion of housing, but it is also being found in new types of construction and building types. Condensation therefore justifies urgent concern and wider discussion than might be normal for a BS. The current version of BS 5250 *Control of condensation in buildings* was published in 1975. It is in urgent need of revision.

The new draft follows a very similar pattern to the current standard. However, there is considerably more detailed information which is expressed more precisely to aid the designer. Several important new concepts are included. They are that condensation can occur simultaneously on more than one surface, that when sunshine falls upon damp external walls it can produce a reversal of the usual temperature and vapour pressure gradients and cause what is coming to be called 'reverse condensation', and that the significance of condensation varies with its location within the building.

The section on design principles should be a key element in the standard. It contains the useful suggestion that, when practicable, the vapour resistance of layers of construction should diminish progressively from inside to outside. It does not, however, state concisely and clearly that the fundamental principle of all design to minimise condensation risk is to either reduce vapour pressure or increase structural temperature, and that the practical ways to achieve this are to extract moisture at source, increase ventilation, increase vapour resistance on the internal side of insulation, increase heating or increase insulation on the outer side of the main vapour resistance.

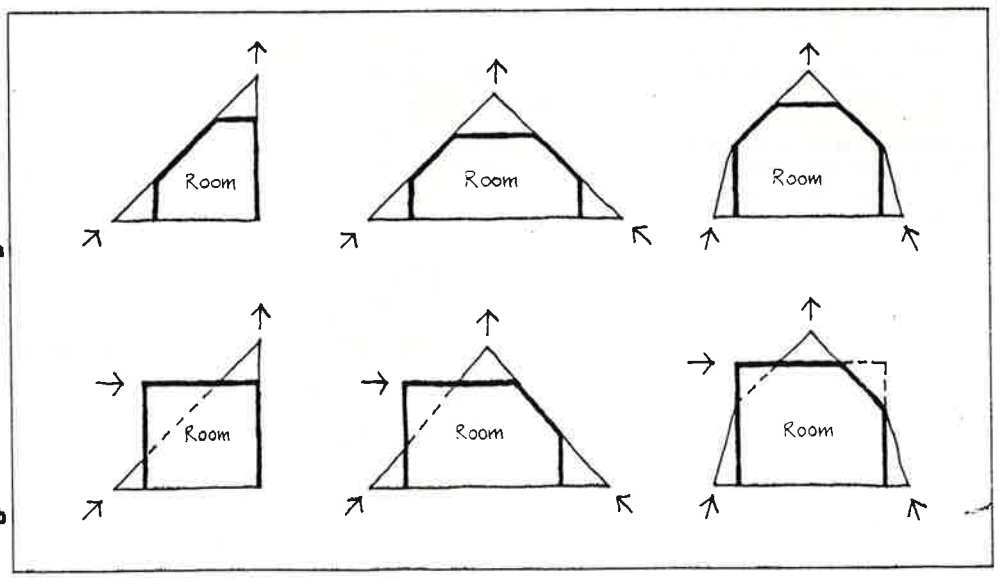
Attention is called to the question of thermal mass, which can be good or bad, however, no method of assessing the effects is provided. Cold bridges are mentioned, but their importance is not emphasised. In practice, a single patch of mould arising as a result of a cold bridge can dictate the whole thermal or ventilation regime of a dwelling and lose all the advantages of other energy conserving or condensation prevention measures.

Design details

The section dealing with design details is greatly and usefully expanded, although not without problems. It is a pity that the 'cold deck' and 'warm deck' terminology is retained. Many roofs fall into intermediate categories and the approach encourages an oversimplified, rather than a fundamental approach to the problem.

The recommendation for 1500 mm^2 of ventilation openings per metre run of walling for suspended ground floor ventilation is in conflict with the Building Regulations Approved Document value of 3000 mm^2.

Overlapping insulation to overcome concrete boot lintel cold bridges will require more detailed explanation if structural



1ab The new draft code includes diagrams, making it look more like a potential Approved Document than its predecessor. a, shows ventilation points for cold deck construction with partially inclined ceilings. The code allows normal roofspace ventilation methods if the inclined ceiling is no longer than 1·5 m on the slope. b, shows ventilation points for rooms with dormers where the dormer is 1·5 × 1·5 m or more on plan.

stability and effective condensation control are to be maintained.

Attention is drawn to the problems which can arise from inadequate vapour barriers, but there is no practical advice on how to overcome them. This section on design details is undoubtedly useful. However, it has limited value in equipping readers to deal with situations not specifically illustrated and a greater emphasis on general principles would have been welcome.

The perfect occupant

The inclusion of a section dealing with occupants' behaviour is welcome but the responsibilities allocated seem unrealistic. Occupants are called upon to keep kitchen doors closed and windows open when cooking, keep bathroom doors shut and windows ajar when bathing, and keep heating going during unoccupied periods. While these may be unavoidable in existing badly designed accommodation, they cannot as a package be regarded as satisfactory in new buildings.

Calculation

A new calculation procedure is given for the estimation of surface condensation. This is welcome in principle, but is based on mean internal conditions and so can only be approximate for surfaces which, in most buildings, vary considerably in temperature. Steady state analysis is used for interstitial condensation and is likely to be satisfactory for this application. The method proposed overcomes one of the serious shortcomings of that given in the previous code—it enables a proper assessment of vapour pressure distribution to be made and this makes possible the estimation of vapour flows and rates of moisture deposition without which condensation calculations have very limited value. The designer needs to know whether it is a thimbleful or a bucketful. The standard gives limits of moisture accumulation over a 60 day period in winter. Unfortunately, it does not suggest reasonable values of internal and external conditions for 60 day periods. The lack of these will inevitably lead to confusion.

There are also circumstances when much shorter periods than 60 days can lead to problems, which are ignored by this approach.

It is regrettable that a manual procedure has been adopted. Programs can be written to carry out the procedure, and this will be essential if informed design development and optimisation of results are to be achieved. At the least a computer approach would provide more detailed analysis and more significant results.

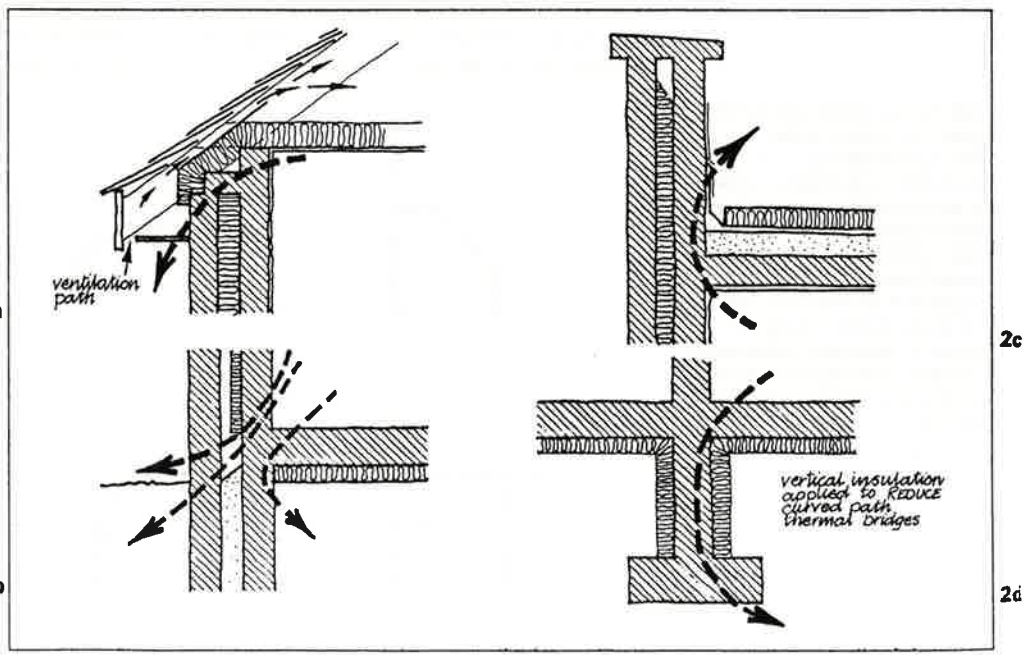
Conclusion

The major shortcomings in the new draft are the absence of comprehensive design data and standards, and the lack of any quantitative approach to moisture transported by air flows. It is conventional to regard condensation as too complex a problem to allow any set of design standards. Equally complex situations have been provided with satisfactory standards and the same approach should be taken to condensation. The matter cannot be left to individual judgment and responsibility.

The importance of ventilation in controlling condensation has been rightly emphasised in the document. It is not so clear that the movement of moist air is one of the major factors in the incidence of condensation, much more so than diffusion through materials. Existing information on air movements within buildings, and particularly from rooms to cavities is admittedly far from complete, but designers might expect more guidance than is provided by this draft.

It is not clear why it makes no mention of BS 6229 *Flat roofs with continuously supported coverings*. This will lead to confusion, as both documents cover flat roofs.

The draft is a considerable improvement upon the previous version but could have been more useful even in the current state of knowledge. It demonstrates the need for urgent development of the subject and updating on standards. Yet traditionally standards remain unchanged for years. The current BS 5250 dates from 1975. Codes such as this need regular updating rather than long term use like the current standard.



2a-d Diagrams on cold bridging risks. a, cavity closer should be of low thermal conductivity. b, multi-directional thermal bridge paths. c, thermal bridging between insulants can be minimised by low conductivity inner leaf to parapet plus insulating screed, or lightweight concrete roof deck, or adding insulation to the roof soffit and inner surface of the wall. d, measures to reduce horizontal and vertical bridging.

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