

## BUILDING REGS

# 5131

# How to meet the new thermal regs 1

The new Building Regulations that come into force in April demand better insulation and ventilation. In a new series Paul Davidson of the BRE summarises the main changes

The Department of the Environment has a programme of revising the Approved Documents to the 1985 Building Regulations. The first five new Approved Documents come into force on April 1, 1990. They are: Approved Document F, Ventilation; Approved Document G, Hygiene; Approved Document H, Drainage and Waste Disposal; Approved Document J, Heat-producing Appliances; and Approved Document L, Conservation of Fuel and Power.

To supplement Approved Document L, there is a new Building Research Establishment report, Thermal Insulation: Avoiding Risks. It is included in the HMSO sales pack with the Approved Documents. Although the BRE report does not have the status of an Approved Document, it contains an essential checklist to take into account when deciding how to insulate a building.

This article is the first of a series dealing specifically with the implications of changes to Approved Documents F, Ventilation, and L, Conservation of Fuel and Power.

## Approved Document F, Ventilation

Requirement F1 of Approved Document F applies to the ventilation of dwellings and contains some fundamental changes:

□ Kitchens, bathrooms and showers must have mechanical extract ventilation to provide rapid ventilation of moisture as close as possible to its source. Kitchens should also have background ventilation (at least 4000 mm<sup>2</sup>); for example by trickle ventilators, or alternatively by continuous operation of the mechanical ventilation to give one air change an hour.

□ Sanitary accommodation must have an openable window (one-twentieth of floor area) or mechanical ventilation.

□ Habitable rooms must have window and door openings (one-twentieth of floor area) for rapid ventilation, as well as background ventilation (at least 4000 mm<sup>2</sup>); for example by trickle ventilators.

In practice, unless the builder installs a comprehensive ventilation system, he will need to put extractor fans in all kitchens and bathrooms to comply with the need for mechanical extract ventilation. In addition, all rooms will need to have either trickle

ventilators fitted to windows or through-the-wall ventilation.

Requirement F2 deals with the ventilation of roof spaces. There are few changes here, except that the fundamental requirement for the ventilation of lofts has been extended to all building types. Where ridge ventilation is needed (for example in room-in-the-roof designs) the width of the continuous slot has been increased to 5 mm.

## Approved Document L, Conservation of Fuel and Power

Part L has been completely reorganised and a number of changes and new provisions introduced.

The main changes are:

□ A reduction in the maximum U-values for

roofs, walls and exposed floors (see Table 1).

□ A new requirement to insulate ground floors (see Table 1).

□ A new requirement to insulate semi-exposed walls and floors which separate heated and unheated spaces (for example the wall between a house and a garage).

□ A new limit on single glazed areas in dwellings of 15 per cent of the floor area, rather than 12 per cent of the perimeter wall area. Glazed areas for other building types are unchanged.

□ A new requirement to limit U-values at jambs, sills and lintels to 1.2 W/m<sup>2</sup>K, to avoid cold bridges.

□ New trade-off options to allow some U-values to be kept at their present level.

Loft conversions in existing dwellings can keep to a roof U-value of 0.35. Dwelling extensions of less than 10 m<sup>2</sup> do not need to comply with Part L if they are built to match the existing construction.

As well as stipulating the new U-values and glazed areas in Table 1, to be used when following the elemental approach, the new Part L also describes a number of trade-offs.

One of these is double glazing the permitted glazing area in exchange for keeping the U-values of the walls, roofs and floors at their 1985 levels. This option is illustrated in Fig. 1.

This means that you can meet the new regulations by keeping existing insulation values and simply double-glazing all windows. But you must not exceed the glazing areas shown in Table 1 and you must meet the new 1.2 U-value requirement at jambs, lintels and sills.

This trade-off leaves the ground floor the only uninsulated element of the construction. As a consequence, there is a risk of condensation at the perimeter, so some floor insulation is advisable.

For the mathematically adventurous, the new Part L includes two calculation procedures to allow more complex trade-offs to be made.

Two worked examples are given in the appendix to Part L to show how to use the simpler Calculation Procedure 1. The more complex Calculation Procedure 2, for dwellings, is described in BRE Report 150.



Contents	Page
1 How to meet the new thermal regs	20
2 Ground floors general	24
3 Supported concrete floors	26
4 Suspended concrete ground floors	28
5 Suspended timber ground floors	32
6 Walls general	34
7 Walls with full or partial cavity fill	36
8 Unfilled cavity walls and solid walls	40
9 Walls: detailing to avoid cold bridges	42
10 Windows	44
11 Pitched roofs	49
12 Flat roofs	51

## BUILDING REGS

## Thermal Insulation: Avoiding Risks

Building to higher insulation levels is not particularly difficult, but it must be carried out correctly if problems are to be avoided. The BRE report Thermal Insulation: Avoiding Risks lists a range of points to watch out for covering every part of the building. Each point is explained and then followed by illustrated examples of good practice detailing. Although correct design should be the first line of defence, a good standard of workmanship and careful supervision are considered just as important.

The problem areas covered in the report include: condensation within the construction and at cold bridges; fire spread due to combustible insulation; freezing water pipes and tanks; rain penetration through external walls; and damage to materials from construction moisture.

## Avoiding cold bridges

Cold bridges are a recurring area of concern and are covered comprehensively in the BRE report. Cold bridges are small, uninsulated parts of the construction where there is a high heat loss, resulting in cold surface temperatures and the risk of condensation and mould growth. As the rest of the building becomes better insulated, the remaining cold spots are more likely to suffer from condensation. So, as insulation levels are improved, it becomes more important to eliminate cold bridges.

The revised Approved Document to Part L requires a maximum U-value of 1.2 at jambs, lintels and sills. BRE recommends the use of this limit at other potential cold bridges, such as wall/floor and wall/roof junctions. This has important repercussions on the detailing of window and door openings. Unless a super lightweight block is used, such as Thermalite Turbo, the only way of meeting the 1.2 U-value is to add extra insulation (see Fig. 2). The appendix to the Avoiding Risks report gives a simple method for calculating the thickness of insulation required to achieve a 1.2 U-value at a window jamb.

## Integrated energy design

To take full advantage of the new changes, it is important to consider insulation, ventilation and heating as a package. As insulation standards are improved, adequate ventilation must be maintained, but the size of the heating system can often be reduced without affecting comfort. It is often worthwhile to improve insulation standards beyond the new Building Regulations standard, especially if it allows a simpler and cheaper heating system to be installed.

Many examples of such designs have been monitored and reported on for the Energy Efficiency Office by the Building Research Energy Conservation Support Unit. ○

Building type	U-values (W/m <sup>2</sup> K)			Maximum single glazed areas	
	Roofs	Exposed walls Exposed floors Ground floors	Semi-exposed walls and floors	Windows	Rooflights
Dwelling	0.25	0.45	0.6	15% of floor area (windows and rooflights)	
Other residential	0.45	0.45	0.6	25% of exposed wall area	20% of roof area
Offices, shops and places of assembly	0.45	0.45	0.6	35% of exposed wall area	20% of roof area
Industrial and storage	0.45	0.45	0.6	15% of exposed wall area	20% of roof area

Table 1: Maximum elemental U-values and glazing areas

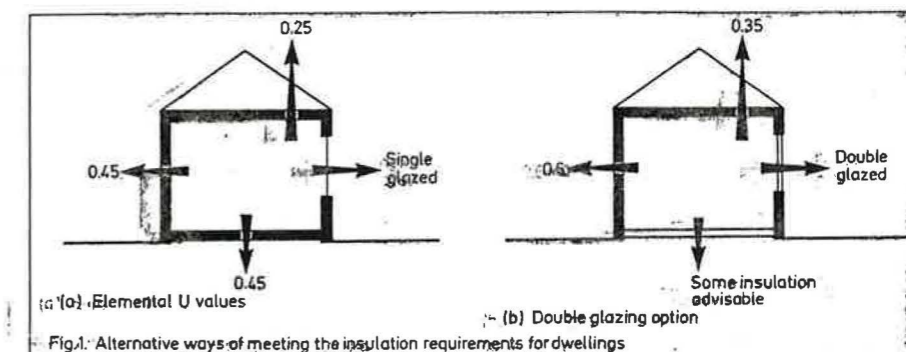


Fig. 1: Alternative ways of meeting the insulation requirements for dwellings

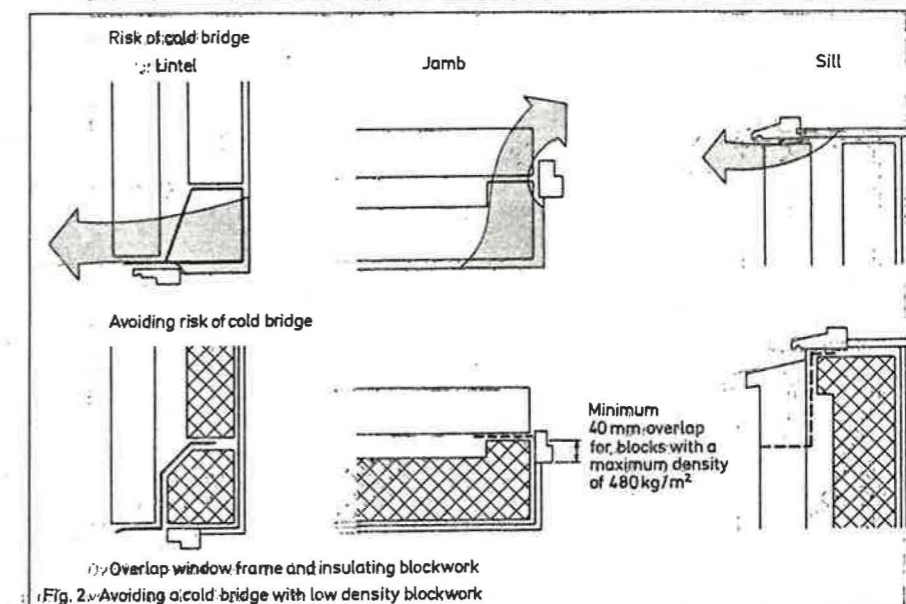
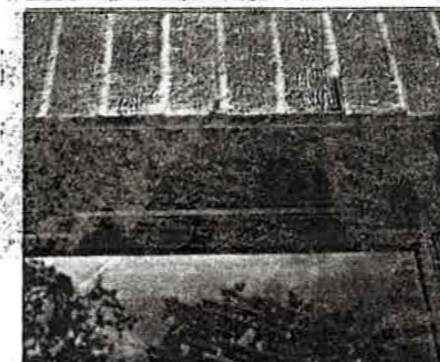


Fig. 2: Avoiding a cold bridge with low density blockwork



Trickle ventilators will be used much more to meet the revision to Part F

This article is published by permission of the director of the Building Research Establishment. In preparing this article, the author was assisted by NBA Tectonics, under contract to BRECSU for the Energy Efficiency Office.  
© Crown Copyright 1990

## Bibliography

BRE Report BR143: Thermal Insulation: Avoiding Risks.  
BRE Report BR150: Building Regulations: Conservation of Fuel and Power — the energy target method of compliance for dwellings.

**bre**