

# Thermal insulation and the Building Regulations

The tried and tested route to energy conservation



by Mike Robinson CEng, FStructE

With the introduction of improved levels of thermal performances in buildings, specifiers and house builders will be looking to ways of upgrading their present constructions. It is at times like these, that the need arises to review existing construction procedures to establish how improvements can be made with minimum change, in a cost effective way and without incurring problems after construction has been carried out.

Published at the same time as the revised thermal insulation requirement is a Building Research Establishment publication, *Thermal insulation — avoiding risks* which draws attention to the possible risks involved when poorly designed constructions are used. Designers should ensure that they are fully aware of the contents.

In respect of external walls it should be borne in mind that the Ancient Greeks and Romans used masonry walls to protect themselves from the environment. The method they used was to take small units of natural stone and construct them into walls using mortar. In this respect masonry walling is much the same today, albeit that regular shaped units are used and are mainly precast concrete, clay, natural or reconstituted stone. The methods of holding them together remains the use of mortar.

Since masonry's early beginning considerable development has taken place. The masonry units today are manufactured under stringent quality control procedures. A masonry wall is therefore a well tried and tested form of construction and is ideally suited to protecting the inhabitants of buildings from the environment, while at the same time providing high levels of thermal insulation.

As well as protecting a building from the effects of weather and providing high levels of insulation, a masonry wall is required to produce resistance to imposed loading, from supported floors and roofs. In this respect masonry is also ideal. However, to ensure that this is achieved the masonry units and mortar must be compatible to enable the imposed loading to be transferred through the wall safely to the buildings foundations.

Many test programmes have been carried out which have shown that masonry walling will sustain varying amounts of loads depending on the unit strength and the type of

mortar used. For example, when high-strength units are used it is necessary to use high-strength mortar to enable the units strength to be maximised. At the other end of the scale, low-strength units require a lesser strength mortar. Indeed, the use of high-strength mortars with low-strength units can result in cracks becoming apparent in the completed wall.

In order to ensure that masonry walling performs in a satisfactory manner, the masonry units and mortar should have compatibility, i.e. be of similar strength. Compatibility between units and mortar is also important in respect of thermal insulation. If, for example, lightweight insulating blocks are used for the inner leaf of cavity walls in conjunction with strong mortars, the end result can be a cold bridging effect, which manifests itself as pattern staining. Several methods have been suggested to prevent this occurring, most of which adversely affect the performance of the masonry walls. Of all the methods put forward, by far the most satisfactory is to ensure compatibility between the masonry and mortar.

In practice the use of cement, lime, sand mortars of proportions 1:1:6, in conjunction with lightweight insulating blocks, has proved to be satisfactory.

One of the most satisfactory methods of ensuring that consistent strength mortar is used is to adopt the use of premixed factory-produced mortars. Their use on sites avoids the widely varying strengths of mortar which is commonly found to occur with site-mixed mortars.

Premixed mortars are now widely available from a number of manufacturers, the names of which can be obtained by contacting the Mortar Producers Association.

The benefit of using masonry to conserve energy and provide a high level of thermal insulation is best carried out by recognising its capacity to also provide a heat store. This is essential to ensure a satisfactory level of comfort for the building occupants while at the same time reducing the likelihood of condensation.

It is recognised that the construction industry is slow to change. This situation is not because the industry does not like to change, it is because the industry knows by far the best route towards meeting new requirements is via

a tried and tested route — one which can be guaranteed to produce buildings which will perform satisfactorily throughout the building's life.

## Thermal insulation

The Government's intention to reduce energy consumption in new buildings for space and water heating has the support of the Mortar Producers Association.

These changes are set out in The Building Regulations (Amendment) Regulations 1989 which were laid before Parliament on the 11 July, 1989 and will come into force on the 1 April 1990. For the first time since thermal insulation became a feature of building regulation, there is a definite attempt to simplify the thermal insulation requirements and introduce more flexibility to allow the specifier to choose for themselves how to comply with the Regulations. This can be seen in the mandatory requirement which requires that "Reasonable provisions shall be made for the conservation of fuel and power in buildings". All reference to performance levels has been removed from the statutory documents and placed in the 1990 edition of the Approved Document L, Conservation of Fuel and Power, which is not a statutory document.

I would argue that the changes to the thermal insulation requirements will not necessarily require housebuilders to make major changes to their current house designs. While they will require housebuilders to meet improved levels of thermal insulation, the flexibility allowed will enable the tried and tested construction to be retained. Indeed, many of the houses currently being built by the large housebuilders have external walls which already achieve thermal insulation levels in excess of current regulations. Consequently, minor adjustments to their designs will enable them to comply with the improved levels.

In view of the widespread concern about the technical risks involved, such as moisture penetration, the Building Research Establishment and the National House-Building Council have both published documents which recognise that such risks do exist with the move towards highly insulated buildings.

It would, therefore, seem sensible to avoid these risks by using products which are

