

# LOOKING AT WINDOWS

*Pilkington Glass have been involved in investigations into just how energy efficient or otherwise high performance glazing is.*

**T**ests recently carried out by the Building Research Establishment (BRE) have shown that rooms with large window areas can, if properly insulated, consume less energy for heating and lighting combined than rooms with smaller windows. The tests, using electric panel wall heaters, were carried out at the establishment's Low Energy Office at Garston, Watford, one of the first buildings in Britain to be designed with the specific aim of minimising energy use.

Refurbishment of the building to achieve minimum heat loss - a process which almost halved the fabric heat loss of the original design - was supported by Pilkington Glass. The building was duly fitted with double-glazing units made up of low-E glass and clear float, with an argon fill in a thermally broken frame.

Although the glazed areas on the north and south faces of the building were significantly different (30 per cent and 45 per cent, respectively), an analysis of the first year's running costs showed that energy consumption for heating was similar on both faces.

The official report on the tests noted, however, that electrical consumption for lighting - an important source of internal heat gains, and therefore of heating - on the south face was almost half that on the north. "The figures for the building indicate that, so long as good quality, high-performance glazing units are used, window areas do not significantly affect heating energy use," said BRE.

"When combined with the fact that electrical consumption for lighting (a source of adventitious heat gains) is greater on the north than the south face of the building, it could perhaps even be argued that larger windows helped to slightly reduce energy use."

Low-E glasses, commonly used in the inner pane of double glazing units, are designed to improve U values without significant loss of light transmittance. Genuine Low-E glasses provide U values better than standard triple glazing.

What is important to most people is "effective U value," which can be defined as "heat out, minus useful heat in." This depends on the direction a window faces. But a south-facing window double-glazed with Pilkington K Glass will have an Effective U value of about 0.1 W/m<sup>2</sup>K, because it lets in a lot of the sun's energy compared with opaque areas of a building such as walls and roofs.

The reflection of longwavelength energy is achieved by applying a low-E coating to one surface of high-quality clear float glass. The coating can be hard, as in the case of Pilkington K Glass, or soft, as applied to Kappafloat or certain solar control glasses. Soft-coated products, however, obviously have to be handled with greater care.

In addition to being used in sealed double-glazing units, hard low-E glasses can also be used in secondary sash glazing. With the coated surface positioned so as to face into the glazed cavity, this can provide valuable thermal insulation. But because it is not possible to totally exclude the ingress of warm, moist air into the cavity, condensation may form on the glass surfaces. If a soft-coated product is used in secondary sash, it could be damaged by cleaning.

Contrary to popular expectations, low-E glazing does not cause overheating in summer. The effect of extra insulation is only really apparent when there is a significant temperature difference between inside and outside. In summertime, these temperatures are close to being the same. And, in summertime, people are likely to open their windows for ventilation anyway.

In hot, humid climates, condensation can form on the outside of windows in air-conditioned buildings. The higher insulation of double glazing units which incorporate low-E glass makes the outer glass warmer and reduces condensation.

Pilkington calculate that, if Pilkington K Glass were used to double-glaze all the nation's 15 million single-glazed homes, energy worth £1 billion would be saved each year. This is equal to the output of three large, modern power stations, and the carbon dioxide emissions associated with producing that energy would weigh 10 million tonnes.

Circle 143

*Greenpeace International's London offices are glazed with Pilkington K Low-Emissivity glass.*

