# ABC of insulation

Eskom, various technical or trade associations and local governments have been advising property owners to insulate their buildings.

A combination of rising energy costs that directly affect operating costs for building HVAC systems or domestic air conditioning, climatic changes that are underpinning much of the green building imperative, and government legislation that prescribes a minimum energy performance for buildings are forcing the building designer to look for cost effective solutions. Insulation has been positioned as one of the most cost effective methods on the market.

## Insulation is passive

Most insulation types will last the lifetime of the building if properly installed. Installed insulation can provide a payback period of plus/minus three years, depending on the type fitted. There are no ongoing or maintenance costs, assuming the roofs pace or cavity area is sealed from dust, debris and water.

## The science of insulation

Thermal insulation acts as a barrier to the movement of heat, therefore slowing down the escape of heat from a building in winter – outside temperature lower – and the entry of heat into a building during summer – outside temperature higher. Energy is required either to lower or raise the temperatures inside, hence the use of air conditioners or heaters. This is called active temperature control. Once active measures are turned off, a reverse flow of heat happens and the temperature returns to ambient. To maintain a given temperature considerable continuous energy is required. Insulation reduces this energy loss.

Heat moves through a wall or inside the roof space by any of the following means:

- Radiation – caused by direct incoming sunlight;
- Convection – caused by the current in air;
- Conduction – caused by heat moving across touching materials.

The movement of heat is controlled by all these means – especially convection and conduction. Insulating materials can act as radiant, convective and conductive barriers. Certain commonly used materials such as foil insulation operate almost exclusively to the control of reflective heat. The purpose of bulk insulation is to trap a dormant layer of air inside a stable fibrous insulation layer. This works by trapping a large volume of air that slows convection and conduction. Air is a poor conductor of heat. Insulation board works similarly. Naturally, drafts must be sealed.

The R-value is an insulation parameter that is the inverse to the thermal conductivity of a material. So the lower the thermal conductivity of insulation, the higher will be its R-value. “R” = resistance to heat flow. Higher R-value = greater insulation. The R-value is disclosed for most products. R-values offer a comparative basis for comparing insulating materials for both similar and non-similar materials although the installed thickness must also be considered.

However, building regulations require that an R-value be calculated for the roofing or walling system. This incorporates the individual R-values of the insulation, building material used, air gaps and roofing material, where applicable. These complex R-values are readily calculated and much information is available on the industry websites.

Info sites:
**W** www.tiasa.org.za/Technical.htm