

## Overall building envelope U-values

*This Technical Note is one of four on the effect of building envelope performance on energy use in buildings. The series comprises:*

- TN 46 Introduction to building envelope energy transfer*
- TN 47 Overall building envelope U-values*
- TN 48 Energy loss through windows*
- TN 49 U-values of curtain walls*

### Introduction

This Technical Note introduces the reader to the assessment of overall U-values for complete building envelopes or assemblies of components forming part of the building envelope.

Building envelope is here considered in the application of commercial and public buildings and large buildings divided into many separate dwellings. Buildings of this type are covered by Approved Document L2 of the Building Regulations (England and Wales). An appendix gives equivalent values for Scotland and Northern Ireland. Similar considerations apply to other types of building and to buildings that have to comply with a different regulatory regime.

Energy use within a building will also depend on any solar gain and radiant losses through transparent areas of the envelope. These are covered in TN48 and TN49.

### Effect of building envelope conduction

Energy use in buildings is heavily governed by energy transfer through the building envelope. Reducing the energy lost by conduction through the building envelope is an important aspect in the design of energy efficient buildings.

Calculation of the amount of energy lost by conduction through the building envelope is an important part of any method of assessment or compliance checking procedure.

Heat transfer by conduction is calculated using U-values (TN46).

### Effect of air leakage

Air leakage through the building envelope is a major contributory factor to the rate of energy loss through the building envelope (TN46).

Currently non-domestic buildings in the UK are required to achieve an air leakage rate of 10 m<sup>3</sup>/m<sup>2</sup>hr. For buildings that achieve lower air leakage rates it is possible to balance energy savings from improved sealing against greater conduction losses/gains associated with higher U-values.

### Assessing energy efficiency of buildings

The Building Regulations (England and Wales) give three methods for showing compliance. All of these methods require knowledge of the overall U-value of the building envelope or of separate zones of the building envelope.