

## Introduction

Windows and glazed cladding systems such as curtain walls are always required to meet specified performance criteria for air leakage. However, there are two different forms in which air leakage is reported, and this can cause confusion. This Technical Note explains the reasons behind, and the relationship between, different representations of air leakage.

Air leakage can be expressed as:

- A leakage flowrate per unit area of facade (or product)
- A leakage flowrate per unit length of joint

These different forms of expression can often be applied equally to the same component, but there are circumstances where one or the other is the more sensible:

- a) Air leakage can occur through visible openings between parts of a component (even the smallest gaps may give an appreciable air leakage) or through invisible pores in the bulk of a material. In the first instance the length of the opening can often be measured, and used to derive a length-dependent air leakage rate, but in the second case the area of the pores is indeterminate and only an area-based rating is possible;
- b) A component or facade designer needs to know the leakage per unit length in order to calculate the total air leakage through an assembly. The building services engineer

or architect is concerned only with the overall leakage represented as leakage per unit area. If the unit area air leakage rate is specified by the architect/building services engineer then the component/facade designer can select and arrange suitable details to achieve that level of leakage.

The need to assess air leakage is based on two issues: energy use and thermal comfort. The energy use issue is obvious and usually dominates - air leakage through the facade implies an energy loss, which the services engineer must allow for when designing the heating and cooling systems. From a comfort standpoint the problem is draughts - openings which permit gross air movement can generate strong air currents causing discomfort, and possibly generate noise as well. It should be noted however that it is not always a requirement to eliminate air leakage; air leakage can provide a valuable background service in dispersing pollutants and odours, and in reducing humidity levels.

## Leakage flowrate per unit area

For a facade as a whole (or a large-scale test sample which incorporates all of the features of the facade) the air leakage is expressed as a leakage per unit projected area, in  $\text{m}^3/\text{hour}/\text{m}^2$ . Figure 1 shows the allowable air leakage through a curtain wall, from *Standard for curtain walling* (CWCT, 1996).

Using an area-based leakage flowrate is the only option for large-scale facades and facade samples. The diverse components in a facade often mean that there are several different