

Technical Note No. 6

THE PRINCIPLE OF PRESSURE-EQUALISATION



This Technical Note is one of five on wind loading for the window and cladding industry. The series comprises:

- TN 2 Introduction to wind loading on cladding*
- TN 3 Wind loading on wall cladding and windows of low-rise buildings*
- TN 4 Issues relating to wind loading on tall buildings*
- TN 5 Wind tunnel testing*
- TN 6 Pressure equalisation*

Introduction

Water is forced through openings and joints in walls and windows by several mechanisms.

Two significant mechanisms are:

- 1 Pressure difference acting across a sealed or closed joint may force water through;
- 2 Kinetic energy of air-borne droplets in a fast moving air flow may carry water through an open joint.

The principle of pressure-equalisation is to reduce the pressure difference across a wall and any consequent air flows by creating a pressure on the rear of the joint or opening that matches, as closely as possible, the pressure on the outer face. It offers advantages in terms of:

- Weathertightness (elimination of the most significant leakage mechanisms, achieved without relying on correctly installed sealants);
- Structural requirements (pressure difference across panels less than peak wind pressure);
- Ease of construction (minor imperfections in the size and fit of components are less critical). However, more complicated detailing of openings, and compartmentation is required.

This technical note describes the principle of pressure-equalisation and how it may be

achieved in practice. Reference should be also be made to *Standard for walls with ventilated rainscreens* and *Standard for testing ventilated rainscreens* (CWCT, 1998).

Cladding constructions

Cladding that is designed and constructed on the principle of pressure-equalisation comprises:

- 1 An outer rainscreen, which intercepts raindrops and drains them safely away, contains large, shielded openings and transfers the wind load to the framing members, and thence the backing wall or building frame;
- 2 An inner air-tight barrier, which carries wind loading;
- 3 A cavity between, which is pressurised and provides a means of collecting and draining to the outside any water which penetrates the rainscreen.

Traditional cladding

The rainscreen or two-stage approach to weathertightness is not new; for many years walls have been constructed by hanging a 'rainscreen' of vertical tiles in front of a structural wall (Figure 1). In this case the 'rainscreen' provides the major barrier to water and the brick wall is the structural component and the air barrier. In practice, the effective air barrier is probably the inner, plastered finish to the wall.