Technical Note No. 17

WEATHERTIGHTNESS AND DRAINAGE

Introduction

This Technical Note describes requirements for weathertight construction and how this can be achieved in the design of windows and cladding systems. In this context weathertightness is concerned with the penetration of the building envelope by air and water. Thermal transmission, either in the form of heat gain resulting from solar radiation or heat loss in cold weather, is not included.

Effects of weather penetration

Water ingress through a cladding system and into a building can lead to:

- Damage to internal finishes;
- Degradation of seals (e.g. at the perimeter of glass units or between mullions and transoms);
- Corrosion of elements (e.g. fixings or steelwork),
- Reduced levels of thermal insulation.

High rates of air leakage will increase heat loss and lead to discomfort of the occupants of the building.

Rainwater wetting

Designing against water penetration requires an understanding of the theory of rainwater wetting and subsequent leakage mechanisms.

Rain and wind usually occur concurrently so that raindrops fall at an angle, which depends on the size of drops and speed of the wind.

Due to water's greater inertia, abrupt changes in wind direction caused, for example, by the flow over the top and around the sides of a building, leads to the rainwater separating from the air stream and being deposited near that part of the facade. If rainfall continues for long enough, rainwater will begin to flow across the whole facade, causing heavy wetting of the mid regions of the windward face, particularly on walls of impervious materials. Impervious cladding materials, such as metals and glass, encourage water to run off, rather than be absorbed, so that much more water accumulates and covers the façade. Any projections (e.g. framing members of curtain walling) may serve to direct water towards joints which are points of vulnerability, requiring good joint design, construction and sealing to prevent water penetration.

Shelter from any adjacent buildings or an overhang will affect the pattern and degree of wetting.

Leakage mechanisms

For water ingress to occur there must be, simultaneously:

- presence of water ;
- a path (e.g. a joint between components or connecting cells in a porous material), and
- a force (e.g. gravity, wind pressure or capillarity).

There are six mechanisms of water leakage as shown in Figure 1: