

## Thermal and moisture performance of cavities in building envelopes

*The use of air cavities in wall construction is commonplace and may provide an improvement in performance, as well as providing a more robust design. The air cavity may increase the overall thermal resistance of the wall. It may also provide a means of removing moisture from the wall, through drainage and/or ventilation. Typical examples are the cavities in a rainscreen system or a brick/block wall.*

*This Technical Note describes the thermal and moisture performance of different air cavities within wall constructions. This Technical Note should be read in conjunction with:*

*TN 33 Breather membranes and vapour control layers in walls*

*TN 46 Introduction to building envelope energy transfer*

### Introduction

There are two main sources of moisture that have to be considered when designing a wall. These are water from the external environment, usually in the form of rainwater, but may also include the diffusion of moisture from a wet surface, and moisture vapour diffusion.

In temperate climates such as that found in the UK, the air in the internal environment usually contains more moisture than the outside air. Therefore moisture vapour will tend to migrate outwards through the construction.

### Water penetration resistance

There are two main approaches to water penetration resistance. They are:

- Face sealing
- Secondary defence

Face sealed systems rely on the outer skin of the construction alone to prevent water penetration. If there is any moisture ingress past the external skin, there is no provision to allow the water to drain back to the outside.

An alternative approach to water penetration resistance is to provide a secondary defence. This usually takes the form of a cavity behind the external face of the wall. The cavity allows moisture that passes the external face to drain back to the outside through openings in the outer surface. The cavity may also have sufficient openings to allow ventilation, for increased moisture removal.

### Moisture transfer

A drained and/or externally ventilated cavity may also be beneficial in the removal of any moisture that migrates through the wall from the warm moist internal environment.

The amount of moisture diffusion through the wall can be reduced by incorporating a correctly detailed vapour control layer (VCL) as close to the internal surface as possible (see TN33 – Breather membranes and vapour control layers in walls). This however is not a guarantee that moisture will not accumulate within the wall construction as this method relies on the VCL being installed without gaps and holes, which is difficult to achieve at junctions and around penetrations. Water vapour may also be trapped by other materials with a higher vapour resistance within the wall.

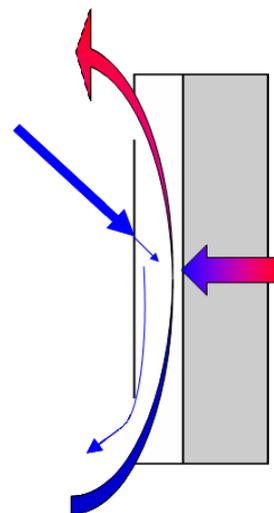


Figure 1 Principles of cavity construction