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## Brick Walls and Water Penetration

*Brick & Tile Corporation sincerely wishes for all of its customers to enjoy the finest possible brickwork that will maintain its beauty and structural integrity for generations to come. The following information is intended for those who have experienced problems with regard to water penetration. The purpose being to explain the possible reasons for these problems and to suggest some potential remedies.*

It is not unusual for a brick manufacturer to be called in when interior damage from water penetration is evident and to be accused of furnishing "leaky brick." On this matter the record is clear. Years and years of testing have proven that **brick do not leak**, due to their density, achieved by firing at temperatures approaching 2000 degrees. However, a brick wall will allow for small amounts of water to pass through and return to the outside of the wall when designed and constructed properly.

A brick and mortar masonry wall is comprised of basically four(4) elements; brick, mortar, workmanship, and design. The idea that such a wall will be completely impenetrable to water when exposed to wind, rain, and other forces of nature is a myth. Years of successful masonry construction practices and the availability of much detailed information about wall design recognize the fact that masonry walls must be assumed to be vulnerable to the passage of small amounts of water. As such, no prudent brick manufacturer would claim that a masonry wall containing his product would create a total blockage of the passage of water from the front through to the back of the exterior wall. In recognition of this fact, all properly designed and constructed exterior masonry walls must be **drainage walls**, to allow any water passing through the wall to migrate back to the outside and away from the structure. Having already established that a brick wall will allow for the passage of some water, **any interior water damage that may occur, regardless of the reason for the entry of that water, is most likely a result of a lack of proper provisions for directing and channeling that water back to the outside and not a result of bad or "leaky brick."**

### Drainage Walls

A 4in. thick brick wall cannot be counted on to resist water penetration entirely.

Drainage walls allow for small amounts of water to penetrate the veneer.

When the wall is properly constructed with a 1-2" air space, this water drips down the back of the brick to the flashing.

The flashing stops the water and directs the water to weep holes where it is channeled to the outside.

If water is entering the house it is safe to assume that flashing and weep holes are not present or they are not properly installed.

Without flashing *and* weep holes the drainage wall system will fail.

### **Where water penetrates the brickwork**

At junctions between roofs, walls, and chimneys that do not have proper flashing and weep holes.

Partially filled head and mortar joints

Improperly tooled mortar joints such as rake joints or cut joints

Weak bond between brick and mortar caused by improper brick/mortar combinations, frozen mortar joints or additives to mortar that may reduce its bond strength

Defective caulking or lack thereof around windows, doors, and other masonry openings

Cracks in walls

### **How to determine the cause of the leak**

1. Check to see if weep holes are present
  - Normally located close to ground level and spaced about every 3-4 brick
  - If none are present this is likely the reason water is entering the wall.
2. If weep holes *are* present the next step is to check for flashing.
  - This may require digging out a bed joint around the bottom of the weep hole unless open head joints are used in place of weep holes.
  - If you can see the top of the brick in the course below the weep hole all the way to the back then you do not have flashing.

### **Flashing**

Flashing directs the water to the weep holes and out of the wall.

Flashing should be located below the first course of masonry above ground level.

Flashing should be located at shelf angles, lintels, tops and sides of windows and doors

Flashing should also include end dams and sealed joints.

Without flashing, water will migrate wherever it wants to, which is generally not to a weep hole.

### **Weep Holes**

Allow water to be channeled to the outside of the wall.

Lack of weep holes, though not the source of the leak, is a likely reason water is entering the wall.

Weep holes should be located immediately above the flashing at 24" on center.

The best weep holes are open head joints that are formed by simply leaving mortar out of a head joint.

Pieces of rope or plastic tubes can also be used for weep holes.

Weep holes without flashing are essentially ineffective.

### **Brick Composition and Water Penetration**

Brick are fired in a kiln at temperatures ranging from 1600-2400 degrees.

The clay is fused into a solid relatively low absorption unit.

Pores in fired brick have a diameter of only about 0.01mm. Repeated testing has indicated that water penetration will occur only through cracks wider than 0.1mm.

### **Proving Brick Do Not Leak**

Individual brick do not leak.

24 Hour Soak Tests show the percentage of its body weight a brick will absorb if exposed to a never ending wind driven rain.

Once the brick reaches its absorption point it will not take on any more water.

Any change in water content in the brick is lost through evaporation.

It does not pass water from the front of the brick through the back of the brick in order to take on more water.

Neither will a crack in the face of the brick allow water to pass through the brick. It only serves to speed the process by which the brick will reach its saturation point.

*Rilem Tube Test* shows that virtually no free water will be absorbed into the body of the brick. Any change in water level in the tube during this test occurs only through evaporation.

### **How to Fix a Leaky Wall**

First seal any cracks around windows, door frames and other areas where water is likely to be entering the wall.

Apply a penetrating, water vapor transmitting sealant such as *Siloxane*, that will keep water out while allowing water already in the wall to escape.

This should help slow but not stop the problem. The life span of most water repellants is 3-10 years.

Do not use silicone which will keep the water out but also prevent the water already in the wall from escaping.

Repoint any mortar joints where water may be entering the wall.

Retrofitting the wall with flashing and weep holes is the best long term solution to the problem.

However, it is an expensive one that will require sections of the wall to be removed.

**Brick & Tile Corporation**

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