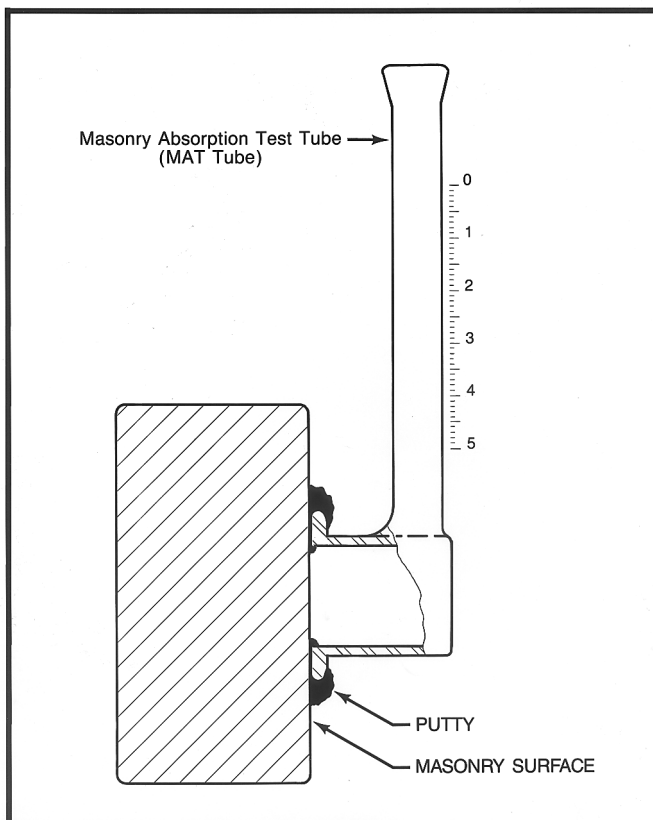


## M.A.T. TUBE (MASONRY ABSORPTION TEST)

Most deterioration problems in masonry are moisture or water related. Therefore, the durability of masonry depends on its resistance to water penetration. **SaverSystems** manufactures high performance water repellents to protect concrete and masonry from this destructive water damage. And to take the guess work out of analyzing a variety of water problems, masonry absorption test tubes, or M.A.T. tubes, are available. Simply attach a tube to masonry to:

- **Detect leaks**
- **Predict vulnerability to water damage**
- **Diagnose and solve water penetration problems**
- **Determine effectiveness of a water repellent treatment**

M.A.T. tubes, similar to European RILEM tubes, were developed by **SaverSystems** as a non-destructive field test to evaluate water permeance in masonry structures. The tubes are easily attached with putty to areas where leaks occur, such as head joints, bed joints, or to masonry itself. After water absorption rates are recorded, they may be graphed to identify problem areas.



To help interpret the findings from M.A.T. tube testing, **SaverSystems** commissioned a two year water permeance study from the University of Wyoming. For more information on the findings from this study, or literature on our complete product line, please contact **SaverSystems** at 800-860-6327.

### **M.A.T. TUBE KIT CONTENTS:**

- Directions for use
- 1 - 90° M.A.T. tube
- 1 - pound reusable putty
- 1 - water dispensing bottle

## **M.A.T. Tube Test Procedure**

Decide on placement of M.A.T. tube at a head joint, bed joint, or to the brick itself (**see Figure 1 for location types**). Most leak points occur at the head joint, but can occur wherever there is a poor bond between the brick and mortar. In most cases, it is best to test several joint locations, as well as the surface of a brick, stone, or masonry unit. For accelerated testing, multiple tubes may be used at various locations.

Tear off enough putty to create a seal between the tube and the masonry. Roll putty in hands to form a snake-like piece, long enough to place around the large opening on the tube. Place tube with putty on it at the point you wish to test. Press firmly against wall and form putty around the lip on the tube to make a water tight seal between the tube and the wall (**see Figure 2**).

Record the type of surface texture, and the location of the point on the wall you are testing in the spaces provided on the absorption graphs (**see sample graph in Figure 3**).

For example, location is indicated in the sample as: West/4th D./2nd F.R./M.H. Joint.

**This simply means: West side, 4th course down, 2nd from right, middle head joint.**

**Note:** Accurately compare the readings obtained from a masonry surface before and after repairs and/or treatment with a water repellent. It is important to record the exact location of the tube and use the same location for further testing.

Fill M.A.T. tube to the zero mark with water. Use the absorption graph to record the amount of water absorbed after each 5 minute interval. Most joint locations in masonry will absorb 5 ml. of water in 5 to 20 minutes. Bricks, concrete, and other masonry units will vary considerably depending on how porous they are. A surface that has been properly repaired and/or treated with a water repellent will absorb significantly less water over much longer periods of time.

### **Field Evaluations:**

M.A.T. tubes can be used on site to demonstrate the effects of weathering and susceptibility to deterioration and leaks. Readings obtained from areas exposed to more severe weathering (chimneys or walls with western or souther exposure) can be compared to readings taken from protected areas of the structure, such as under eaves, east walls, etc. This type of comparison helps determine if a weathering problem exists.

The comparison chart (**Figure 4**) is a graph of the average time in which 5 ml. of water were absorbed in 4 x 6 laboratory test panels at each location type (leaking joints, bed joints, and head joints including top, bottom, and middle). Test panels were built by journeyman masons to the “Construction of Brick Masonry” building code requirements for engineers as established by the Brick Institute of America (BIA).

On each wall panel there were several leak points where water actually flowed through to the back side during M.A.T. tube and ASTM E 514 testing: (See attached article “*Measuring Water Penetration*”).

**Note:** The comparison chart in figure 4 represents readings from laboratory test panels built under ideal conditions. The chart is intended to be used as an example of how to graph readings obtained from M.A.T. tube testing in the field. However, potential problems with a wall system are indicated if all 5 ml. of water are absorbed in less than 5 minutes.

## **Analyzing Water Penetration in Masonry**

The following tests are also useful in determining the cause of leaks or penetration in masonry:

### **The Plastic Test:**

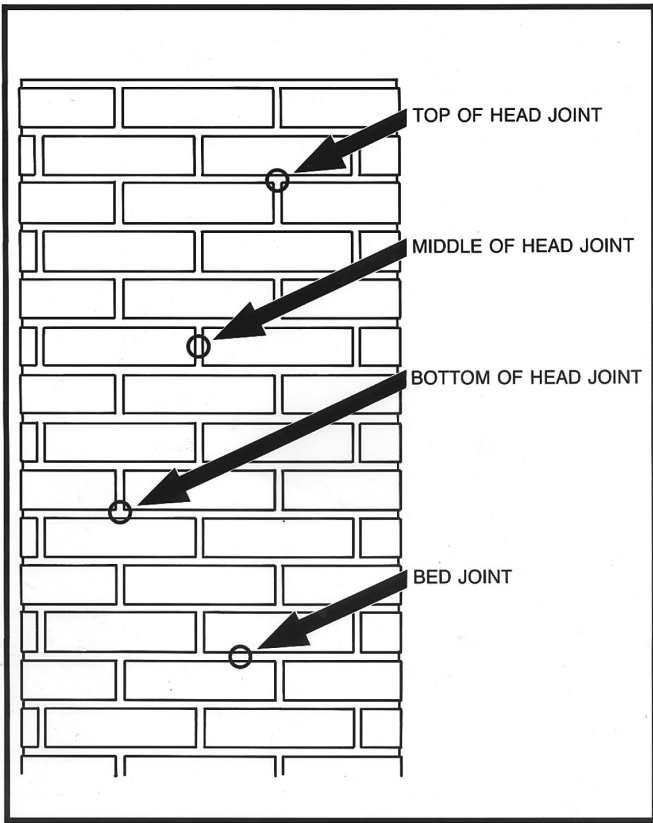
This simple test is used to determine if a moisture problem is being caused or contributed to by interior moisture or condensation. Begin by duct taping a clear plastic sheet, usually about 3' by 3', to an exterior wall section. Check the sheet in a day or two, any moisture that collects on the inside of the sheet is most likely condensation.

### **Mask and Spray or Spray Test:**

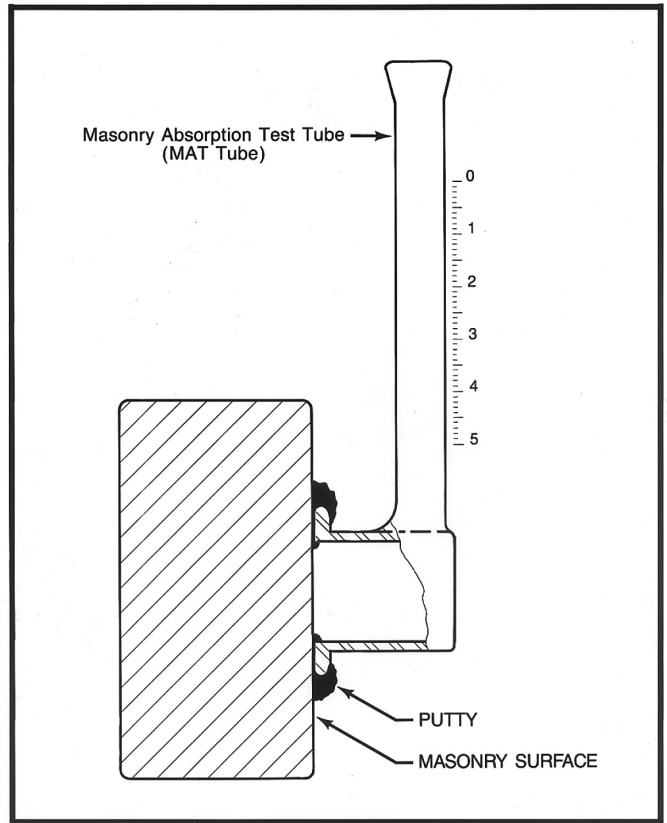
Plastic sheeting can be used to isolate certain wall or chimney sections. Water from a garden hose is then sprayed about a foot from the exposed surface to simulate driving rain. Leaks are usually detected within 20-30 minutes. This test method can be especially useful for checking water penetration and leaks in flashing, chimney crowns, caulking, expansion joints and exterior corbeling.

### **ASTM E 514 Test:**

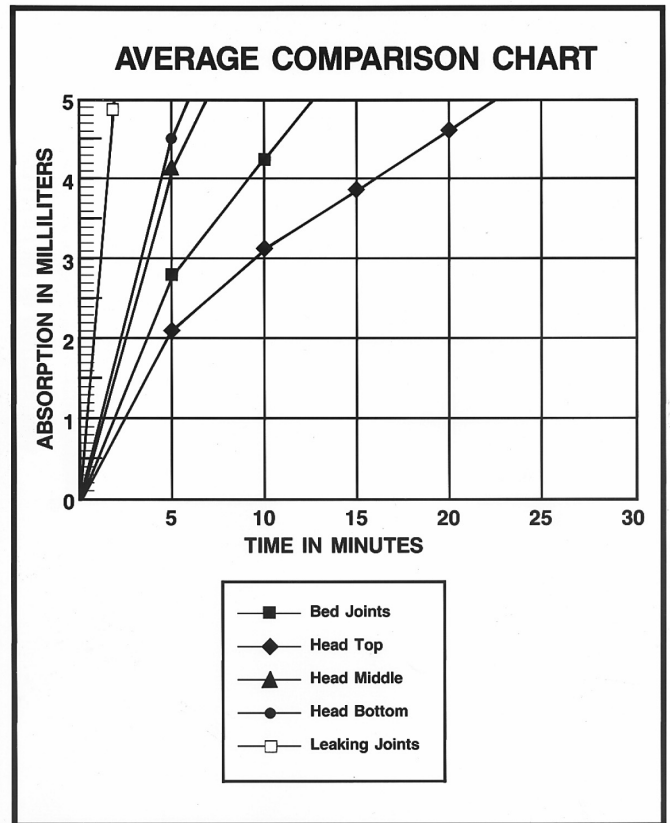
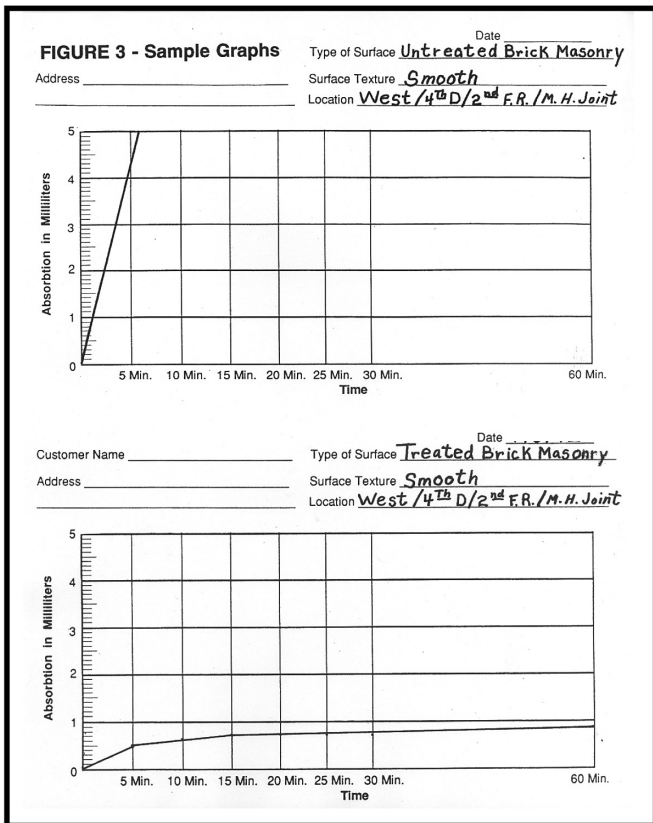
The ASTM E 514 was developed as a laboratory test method designed to determine resistance to water penetration and leakage through masonry units subjected to wind driven rain. In addition, a modified ASTM E 514 was developed for field use. It involves constructing a 4 x 3 foot test chamber that is mounted and sealed to an existing masonry wall to measure the amount of water that leaks into the wall. A spray bar is mounted in the chamber and water is sprayed at a controlled rate and pressurized to simulate driving rain. Leakage rates up to a 1/2 gallon per 12 square feet per hour are generally considered acceptable.



**FIGURE 1 - Mortar Joint Location Types**  
**HEAD JOINTS - (Vertical Joints)**  
**BED JOINTS - (Horizontal Joints)**



**FIGURE 2 - Detail of MAT Tube attached to a Masonry Surface**



**FIGURE 4 - Average time required for absorption of 5 ml of water for each location type in laboratory test panels.**

Date \_\_\_\_\_

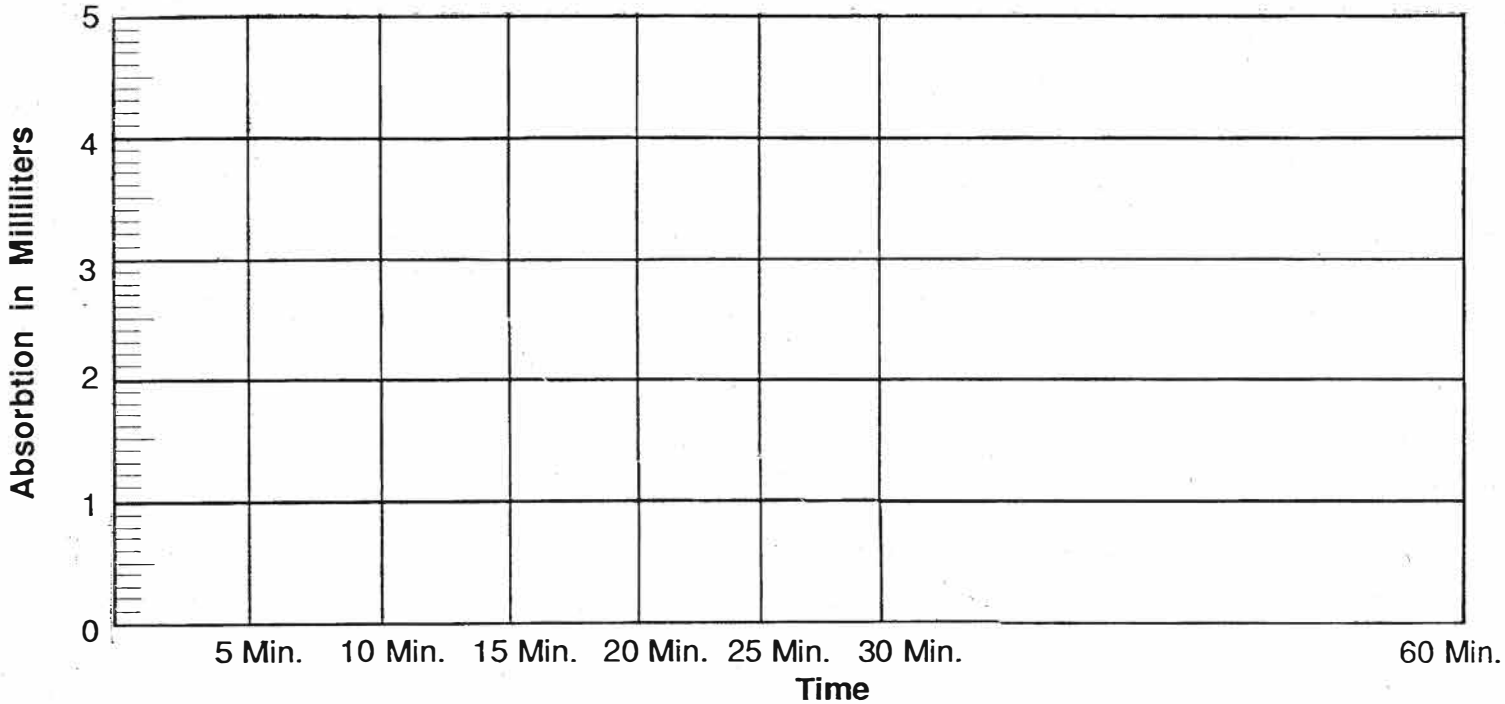
Customer Name \_\_\_\_\_

Type of Surface \_\_\_\_\_

Address \_\_\_\_\_

Surface Texture \_\_\_\_\_

Location \_\_\_\_\_



Date \_\_\_\_\_

Customer Name \_\_\_\_\_

Type of Surface \_\_\_\_\_

Address \_\_\_\_\_

Surface Texture \_\_\_\_\_

Location \_\_\_\_\_

