

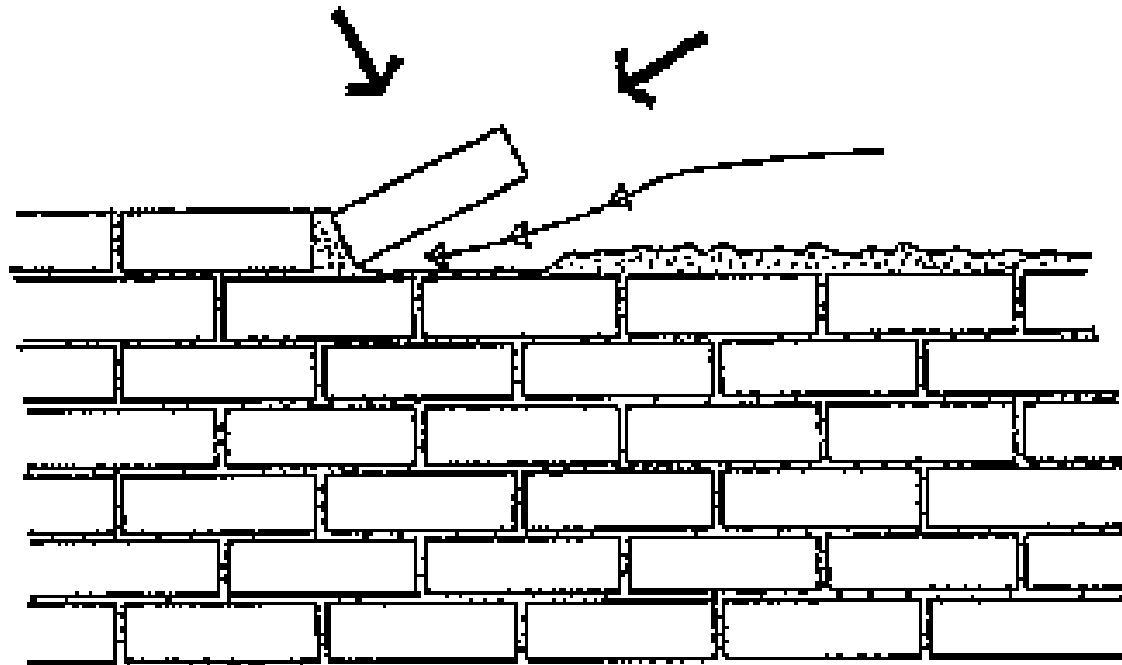


# 9<sup>TH</sup> LECTURE (MORTAR)

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## WHAT IS MORTAR

Mortar is a material used in masonry construction to fill the gaps between the bricks and blocks. Mortar is a mixture of sand, a binder such as cement or lime, and water and is applied as a paste which then sets hard.



## Mortar

**Mortar** is composed of **cement and sand**. Adding water to this mix activates the cement so that it hardens, or cures, just as with concrete. **Mortar is not as strong as concrete** and typically is not used as a sole building material. Rather, **is it the "glue" that holds together bricks, concrete block, stone, and other masonry materials**. A special type of mortar, called **thinset**, is used as an adhesive to install ceramic and stone tile.

Mortar is commonly sold in bags, in a dry pre-mixed form that you combine with water. It can also be mixed on-site, using a cement mixer or simply mixing with a shovel or hoe in a wheelbarrow or mixing tub. There are many different types of mortar designed for different applications. When working with brick and other masonry units, it is important to use the right type of mortar for the masonry, as some mortars are too hard for some types of masonry and can lead to cracks.

There are two types of mortars based on the nature of application. They are

- Wall laying mortar
- Finishing mortar



# Type of Mortar in Buildings Based on binding material used

In mortar, Binding material play key role. The quality, durability and strength of the mortar will mainly depend on the quantity and quality of binding material used. Classification based on the binding material used is as follows.

- Mud Mortar
- Cement mortar
- Lime mortar
- Gypsum mortar



# Type of Mortar in Buildings Based on binding material used

## 1- Mud mortar:

- The paste is prepared by mixing suitable clay, soil with water.
- The soil which is used for preparing mud mortar should be free from grass, pebbles etc.
- These are the cheapest mortars but weakest in strength.
- These mortars are used for brickwork of ordinary buildings and for plastering walls in rural areas.





Walls



Mud being Plastered to wooden Framework



Mud wall



Mud Plaster





## 2- Cement mortar

In this type, cement is used as binding material and sand is used as adulterant (fine aggregate).

- The proportion of cement and sand is decided based on the specified durability and working conditions.
- Cement mortar will give high strength and resistivity against water. The proportion of cement to sand may varies from 1:2 to 1:6.





# Proportion of Cement Mortar

The Proportion means the relative quantity of different components to be mixed to make good mortar, or simply the ratio between different materials.

Following are the proportions of cement mortar which is commonly recommended for different works:

## A. Masonry Construction:

For ordinary masonry work with brick/ stone as a structural unit. – **1:3** to **1:6**

For reinforced brick work – **1:2** to **1:3**.

For all work in moist situations – **1:3**

For Architectural work – **1:6**

For Load bearing structures – **1:3** or **1:4**

## **B. Plaster Work:**

For External Plaster and Ceiling Plaster – 1:4

Internal Plaster (If sand is not fine i.e. Fineness Modulus > 3) – 1:5

For Internal Plaster (if fine sand is available) – 1:6

## **C. Flooring Work:**

Mortar ratio of 1:4 to 1:8 (cement: sand, water to be judgmental), for 5 to 7 times thickness of verified tiles, should be given as bed between RCC floor and tiles.

### 3- Lime Mortar

In case of lime mortar, lime is used as **binding material**. There are two types of limes namely **fat lime and hydraulic lime**.

- Fat lime in lime mortar requires 2 to 3 times of sand and it is used for dry work.
- Hydraulic lime and sand in 1:2 ratios will give good results in damp conditions and also suitable for water logged areas.
- Lime mortars have plasticity ,good cohesion with other surfacing and little shrinkage.



## 4- Gypsum mortar

Gypsum mortar consists of plaster and soft sand as binding material and fine aggregate.

Gypsum mortar is a common building material that can be used especially for plastering the walls.

This mortar has three important weaknesses which can limit the gypsum mortar for building and statue construction.

**First; it has low compressive strength.**

**Second; it has high water absorption.**

**third; it has low setting time.**





## 5- Lime- Cement mortar

Also known as gauged mortar or gauged mortar is made by mixing cement and lime. The advantages of lime-cement mortar are increased water retentivity, workability, bonding properties and

frost resistance. The mortar gives good and smooth plaster finish and is used in buildings So, this is also called as composite mortar or lime-cement mortar. Usually 1:6 to 1:8 ratio of cement to lime will be used to prepare gauged mortar

<i>S.No.</i>	<i>Location</i>	<i>Ratio (by volume)</i>		
		<i>Cement</i>	<i>Lime</i>	<i>Sand</i>
1.	Outside wall	1	1	6
		1	2	9
2.	Inside wall	1	2	9
		1	3	12

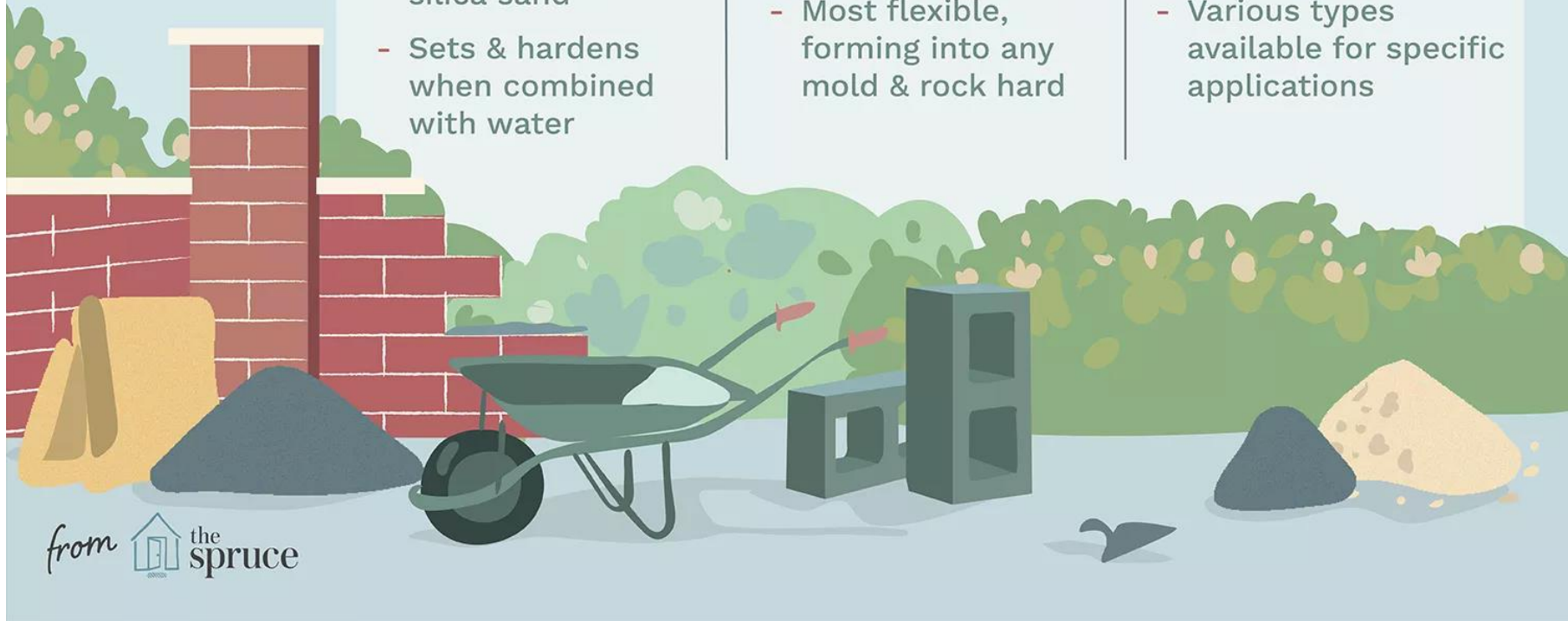
The terms Cement , concrete, and mortar can be confusing to beginning builders because they are often used interchangeably, which is inaccurate. Cement, concrete, and mortar are three different materials. The basic difference is that cement is a fine binding powder (which is never used alone), mortar is composed of cement and sand, and concrete is composed of cement, sand, and gravel.

# Cement vs. Concrete vs. Mortar

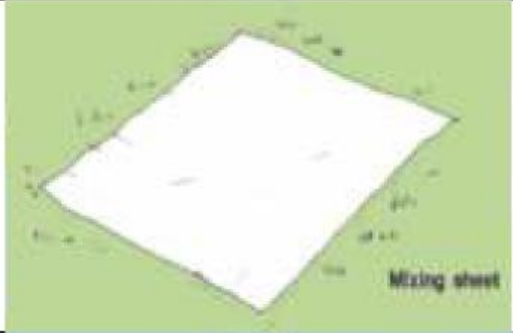

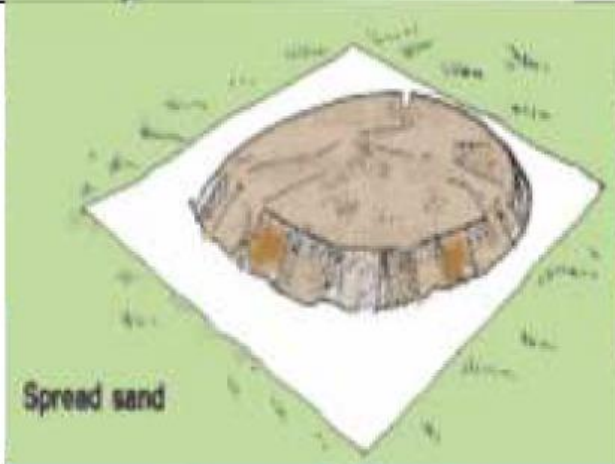
- Binding element in both concrete & mortar
- Made of limestone, clay, shells, & silica sand
- Sets & hardens when combined with water

- Made of cement, sand, & gravel
- Used for building: foundations, slabs, patios, & masonry
- Most flexible, forming into any mold & rock hard

- Made of cement & sand
- Used as the glue to hold bricks, blocks, etc. together
- Various types available for specific applications



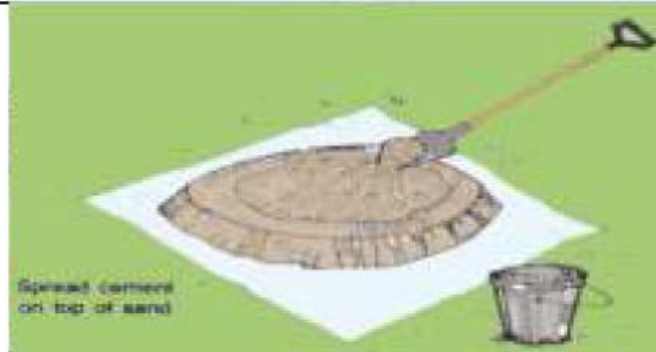
# The Process of preparing good cement mortar

 <p>Mixing sheet</p>	<ul style="list-style-type: none"><li>○ Prepare a clean mixing area, for example a metal sheet or a watertight wooden platform. As a rough guide, a 1-m<sup>2</sup> area is enough for 50 kg of mix.</li></ul>
 <p>Wet sand if dry</p> <p>Measure sand</p>	<ul style="list-style-type: none"><li>○ Measure the quantity of sand required. If it is very dry, wet it a little before measuring.</li></ul>
 <p>Spread sand</p>	<ul style="list-style-type: none"><li>○ Spread the sand over the mixing area.</li></ul>

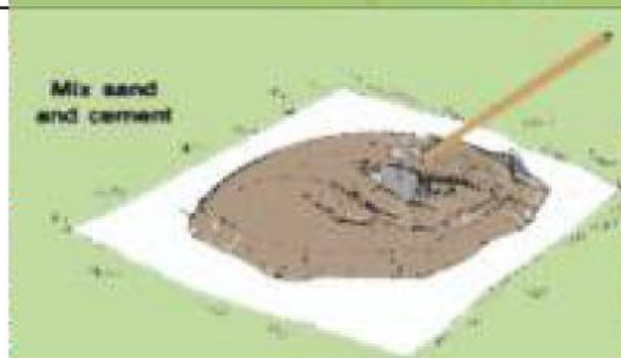




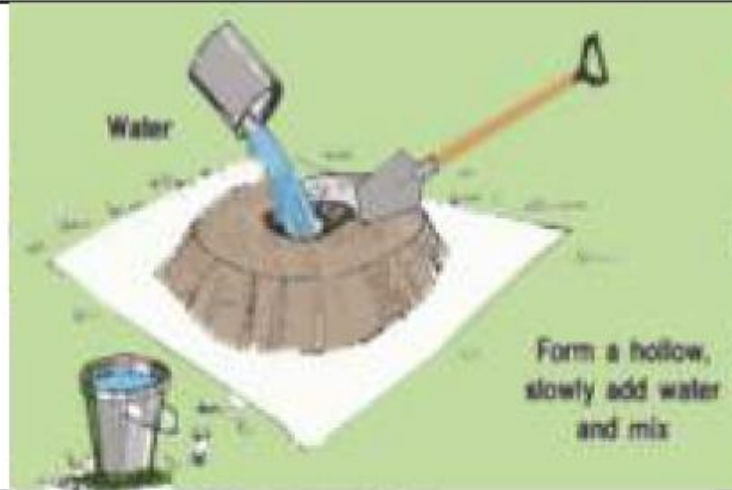
- Measure the quantity of cement required



- Spread the cement on top of the sand.



- Mix the sand and cement together thoroughly, until the mix has a homogeneous colour. Be sure to mix in the bottom and side materials.

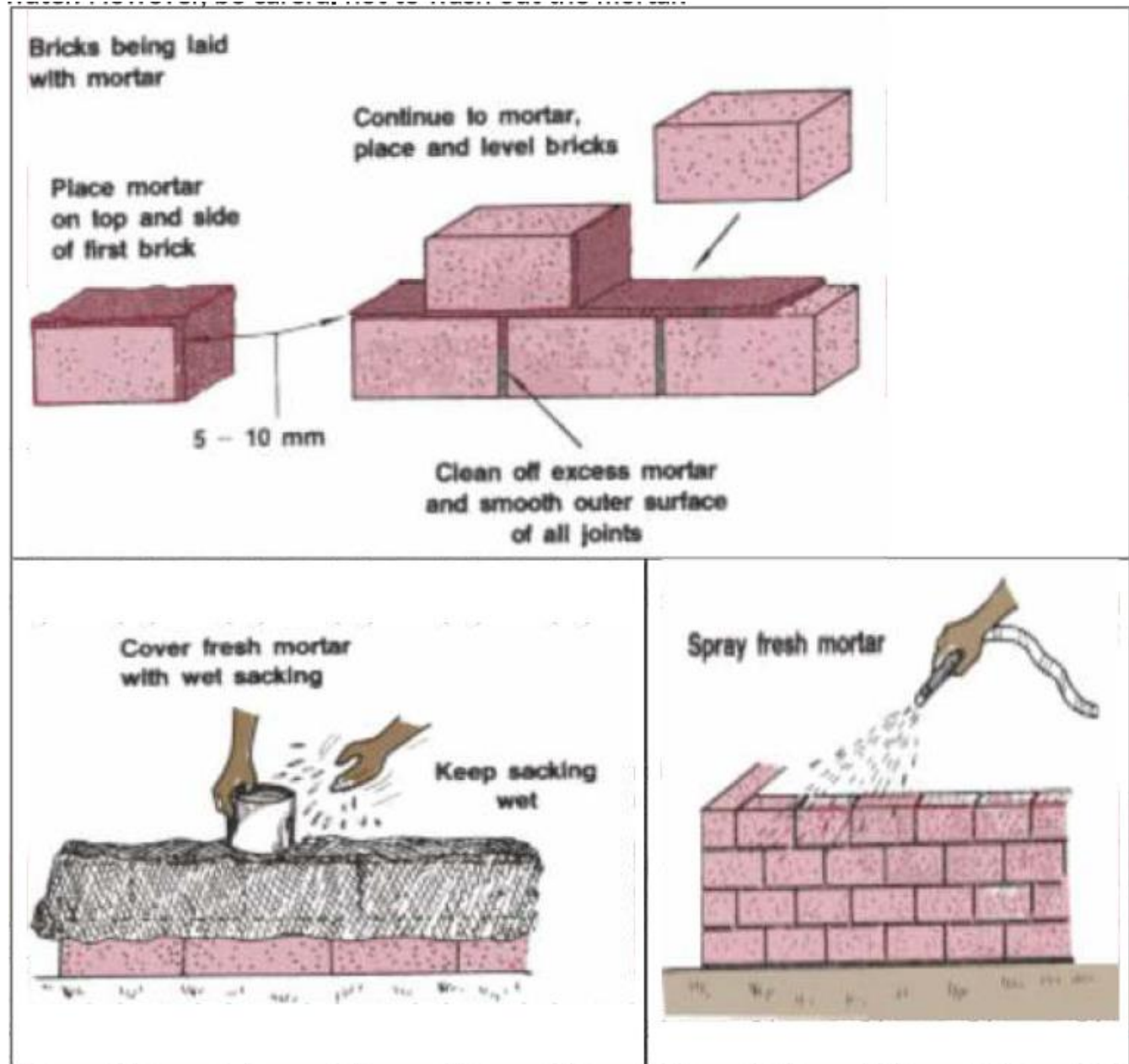


- Form a hollow in the middle, slowly add little water in the hole and moisten part of the mix. Work with water by carefully moving the dry mix in toward the hollow. Be careful not to let water run away.



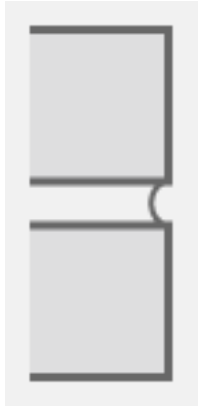
- Repeat adding water slowly until the whole mix is moistened. Continue mixing thoroughly, add just enough water to obtain a plastic consistency. The mortar should have a firm, smooth appearance. You should be able to make a clean slice into it with a trowel or shovel. It should sit on a trowel cleanly and firmly without loss of water and should spread smoothly.

Need to be used immediately after mixing



# TYPE OF JOINTS BY MORTAR

Mortar joints are typically  $\frac{3}{8}$ ", but can vary from  $\frac{1}{4}$ " to  $\frac{1}{2}$ ". Joints are finished using a tool or the trowel. Each type of joint has pros and cons, which are mostly related to their effectiveness at shedding water



## Concave Joint

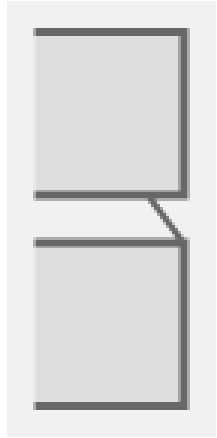
Good: The standard joint, which is universally accepted as the best joint for preventing water penetration.



## V Joint

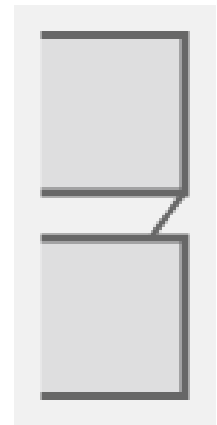
Fair: This joint is less successful at shedding water due to the point of the V, which can be an entry point for water if not tooled perfectly.





## Weathered Joint

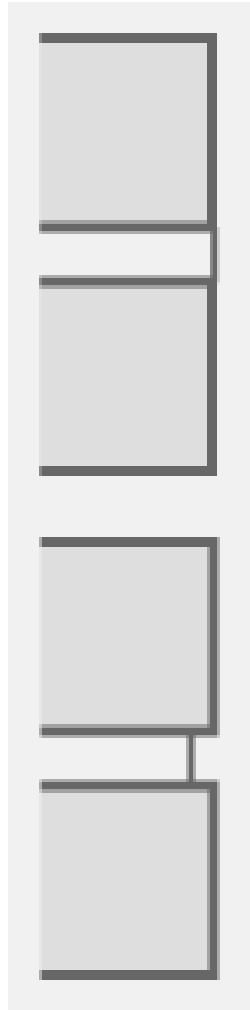
Fair: Due to the slope of the mortar, this joint also performs fairly well. However, water can run across the underside of the brick and enter if the mortar is not well adhered.



## Struck Joint

Very Poor: The slope of the joint pulls water into the joint and allows it to sit on the brick, which gives the water more time to penetrate.

Interior Use Only.



## Flush Joint

Poor: This joint is susceptible to water sitting on the top of the joint if it protrudes slightly from the brick.

## Raked Joint

Very Poor: The ledge allows water to sit on top of the brick and potentially get sucked into the wall.

Interior Use Only.

THANK  
YOU