

# Lecture-6

## Brick Masonry

By

Dr. Himanshu Chawla



# OVERVIEW

INTRODUCTION

BRICKS

MORTAR

MASSONRY JOINTS



# BRICK MASONRY



# INTRODUCTION

**Masonry** is the building of structures from individual units, which are often laid in and bound together by mortar.

**BRICK MASONRY**:- The art of laying bricks in mortar in a proper systematic manner gives homogeneous mass which can withstand forces without disintegration, called Brick masonry.

- Several bricks are laid together in stacks.
- Mortar paste is placed on top of each to form a firm bond.
- Mortar paste and bricks are laid to form the structure.
- There are different ways in which bricks are termed as bonds.



# BRICK

Brick is a building unit, which is in the form of rectangular block in which length to breadth ratio is 2 but height can be different.



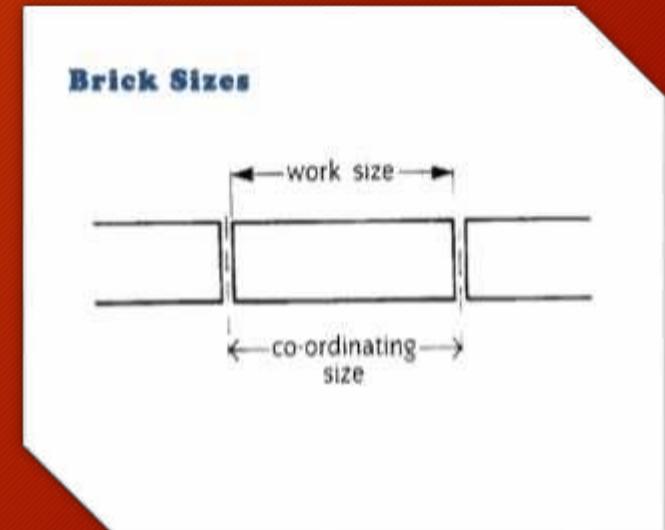
Normal Brick



Perforated brick

## SIZES OF BRICK

- In India, standard brick size is **190 mm x 90 mm x 90 mm** as per the recommendation of Bureau of Indian Standards(BIS).
- With mortar thickness, the dimension of the brick becomes **200 mm x 100 mm x 100 mm** which is also known as the **nominal size** of the modular brick.



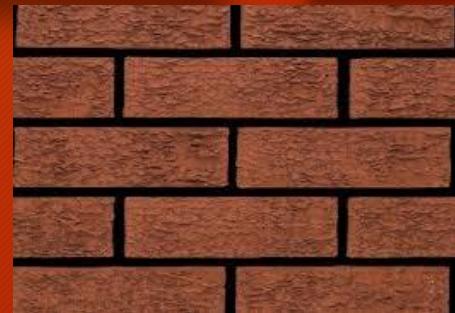
# QUALITIES OF GOOD BRICKS

1. Bricks should be uniform in shape & standard in size.
2. Bricks should give a clear metallic ringing sound when struck with each other.
3. Bricks should show a bright homogeneous & free from voids.
4. Bricks should be well burnt and possess sharp edges.
5. Colour of the bricks should be uniform and bright.
6. Bricks should be sufficiently hard & no impression should be left on bricks surface when scratched with finger nail.
7. Bricks should have crushing strength above  $5.50 \text{ N/mm}^2$ .
8. The bricks should not break when it dropped from a height of about 1 m.
9. The bricks should not absorb water more than 20% by weight when soaked in cold water for 24 hrs.
10. The bricks should not show any deposits of white salts when allowed to dry in shade.

# CLASSES OF BRICKS

## □ 1<sup>st</sup> Class

- Uniform color, the surface and edges of bricks are sharp.
- They are more durable and having more strength.
- The thickness of mortar joints doesn't exceed 10 mm



## □ 2<sup>nd</sup> Class

- Ground moulded bricks are used.
- Bricks are rough and shape is slightly irregular.
- The thickness of mortar joint is 12 mm.



## □ 3<sup>rd</sup> Class

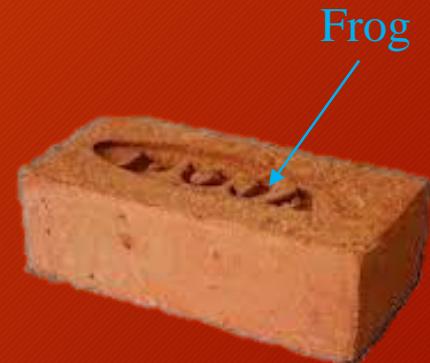
- Bricks are not hard, rough surface with distorted shape.
- Used for temporary structures.
- Used in places where rainfall is not heavy.



# FROG

- A frog is an indentation in the face of a brick to form a key for holding the mortar
- Depth of frog in a brick 10 to 20mm
- Length and width approx.  $100 \times 40$  mm
- Frog should be upward. Why?

Mortar will be covered in frog fully and it will make the proper bond with above layer.



# Mortar

Mortar is a pasty material formed by the addition of water to a mixture composed of an aggregate (sand) and a binding material (cement or lime) which may be handled with a trowel. The mortar units the individual bricks together. Generally, following types of mortar are in use,

- o Mud mortar
- o Cement mortar
- o Lime mortar
- o Cement lime mortar

# BRICK WORK IN MUD MORTAR

**Mud mortar** is used for the temporary construction and for low-rise building which carry light loads.

- The mud is used to fill up the joints.
- Thickness of the mortar joint is 12 mm.
- Cheapest
- Maximum height of wall is 4 m.



# Mortar (Cont.)

Cement mortar are used for high-rise buildings, where strength is of prime importance. **Generally it is provided 10 mm.**

Lime mortar and lime-surkhi mortars are used for all types of construction

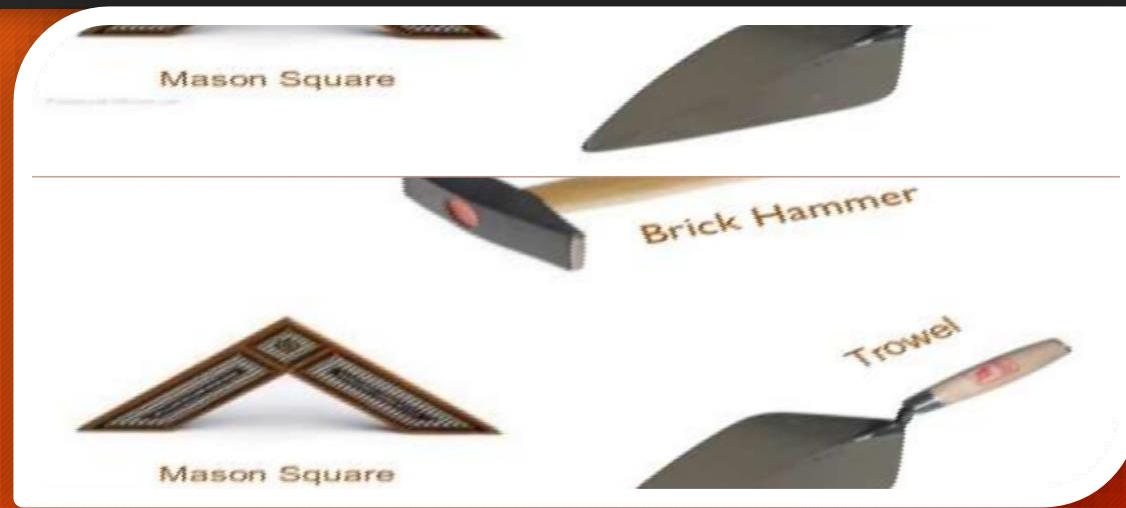
Cement lime mortar known as guarded mortar or gauged mortar is made by mixing cement and lime. The advantages are increased water retentivity, workability, bonding properties and frost resistance. The mortar gives good and smooth plaster finish.

The chief properties of hardened mortar are strength, development of good bond with building units, resistance to weathering and those of green mortar mixes are mobility, playability and water retention. In addition, the mortar should be cheap and durable and should not affect the durability of building units in contact. The joint made with mortar should not develop cracks.

In order to select a suitable type of mortar for a given construction, we must know the type of desired finish, the magnitude and nature of super-imposed load, the effect of weathering agencies and the importance of structure.

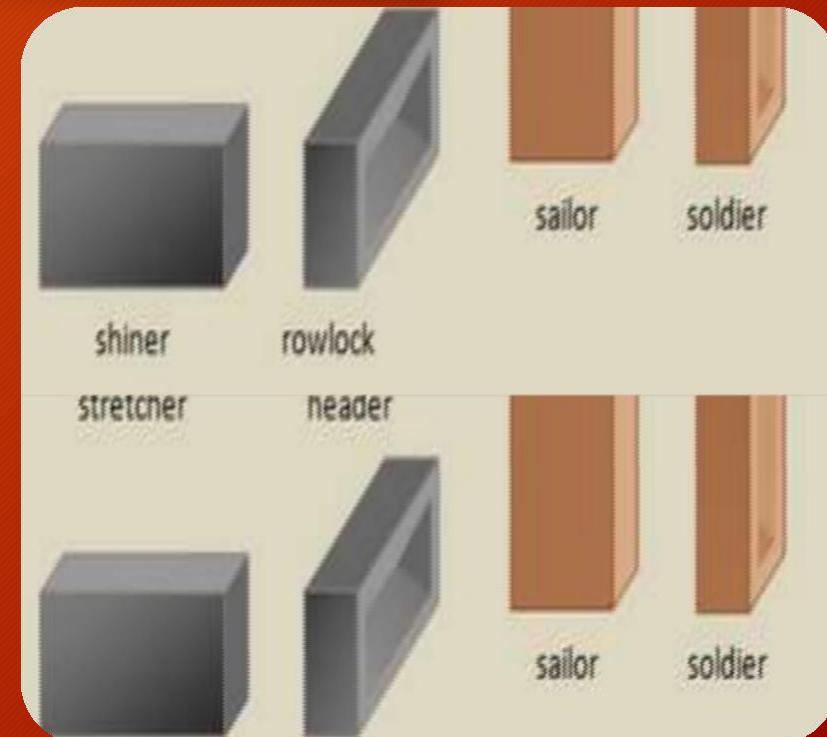
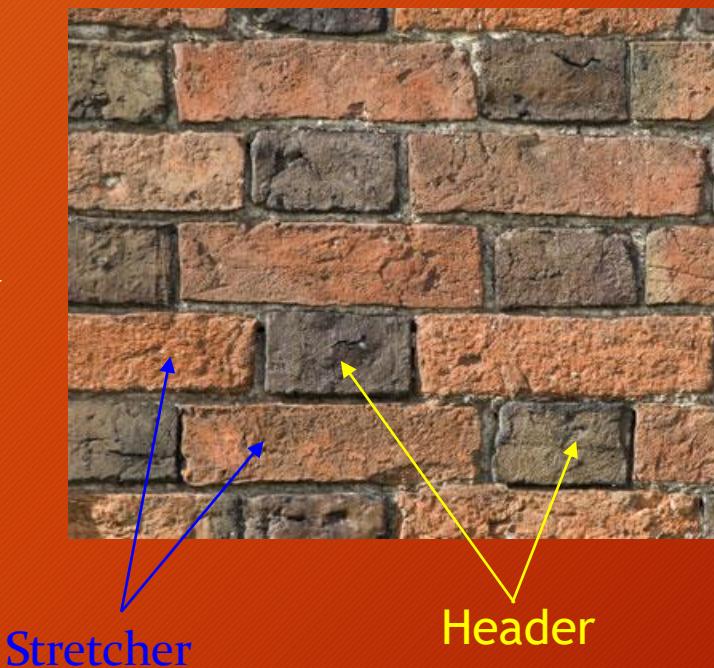
# TOOLS USED IN BRICK MASONRY

- Trowel
- Plumb bob
- Hammer
- Spirit level
- Mason square
- Steel tape



# ORIENTATION OF BRICKS

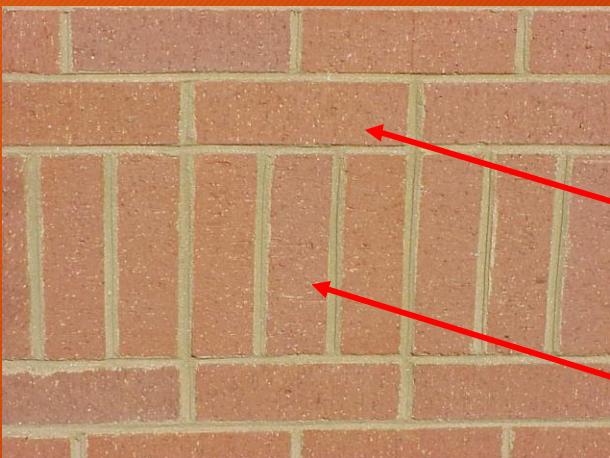
- ✓ **STRETCHER**: A brick laid with its long narrow side exposed.
- ✓ **HEADER**: A brick laid flat with its width at the face of the wall.
- ✓ **SOLDIER**: A brick laid vertically with the long narrow side of the brick exposed.
- ✓ **SAILOR**: A brick laid vertically with the broad face of the brick exposed.



# BASIC BRICKWORK TERMINOLOGY



**Header - Bonds two wythes together**  
Wythe: vertical layer 1 unit thick



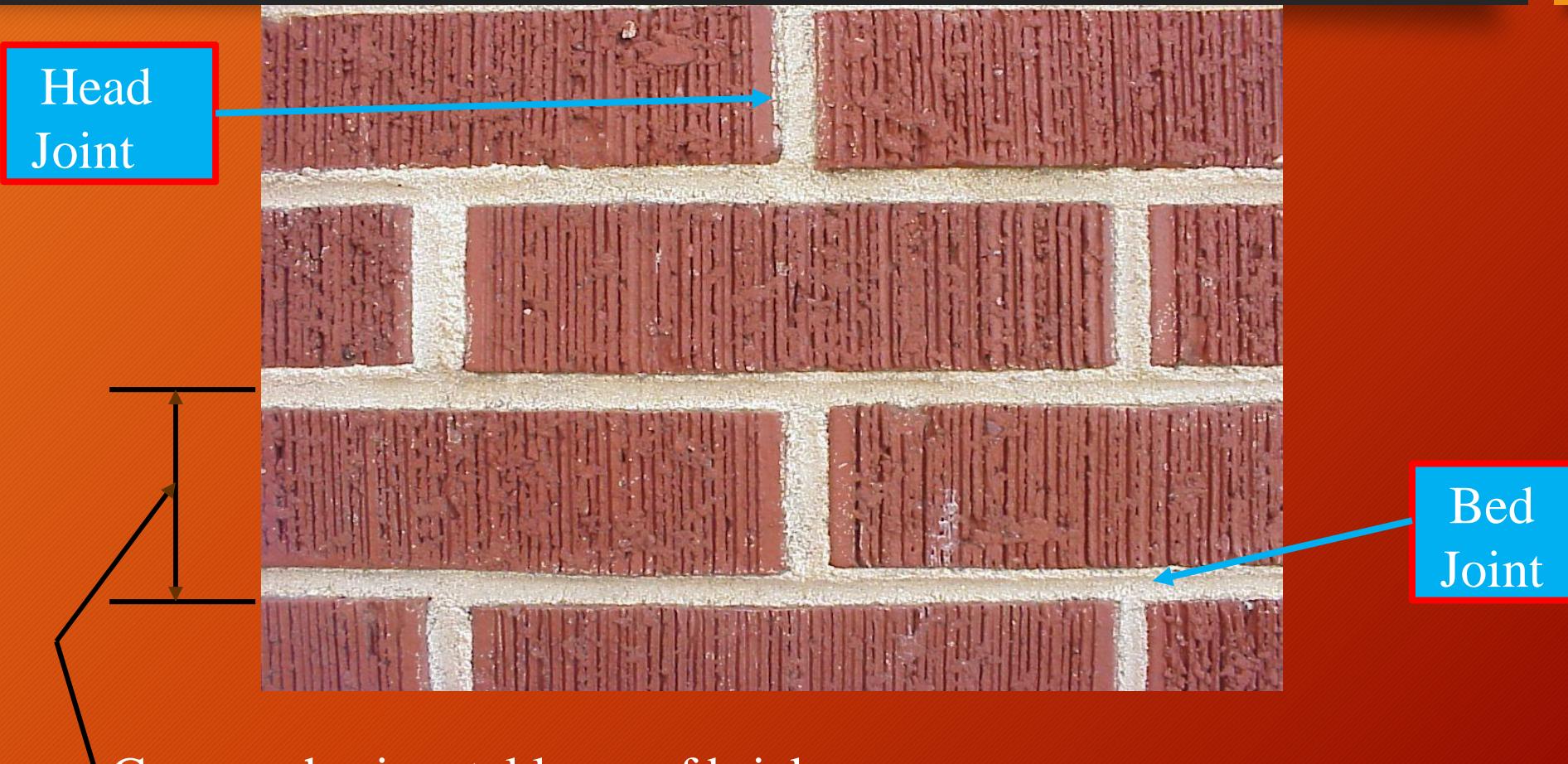
**Rowlock -  
laid on face,  
end visible**

**Stretcher - long dimension horizontal  
& face parallel to the wall**



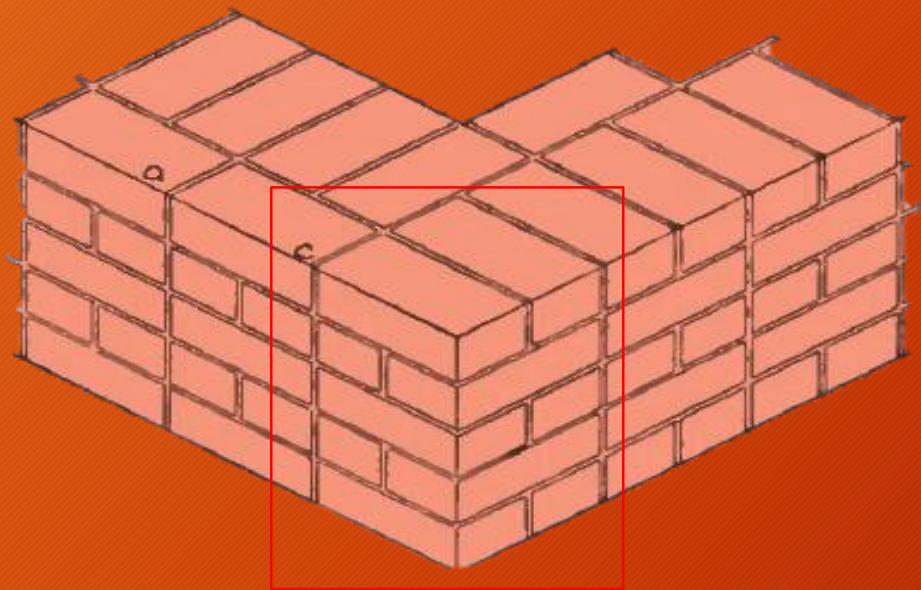
**Soldier - Laid on its end, face parallel**

# BASIC BRICKWORK TERMINOLOGY

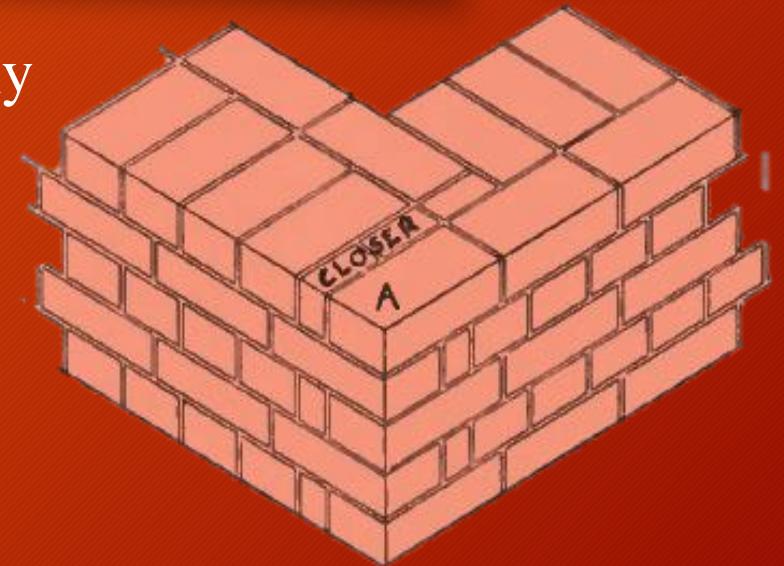


# GOOD BRICK BONDING

The manner in which bricks are arranged in a wall is obviously of great importance to the **appearance and strength**.



**Incorrect way of arranging bricks, because vertical joints are at same position.**



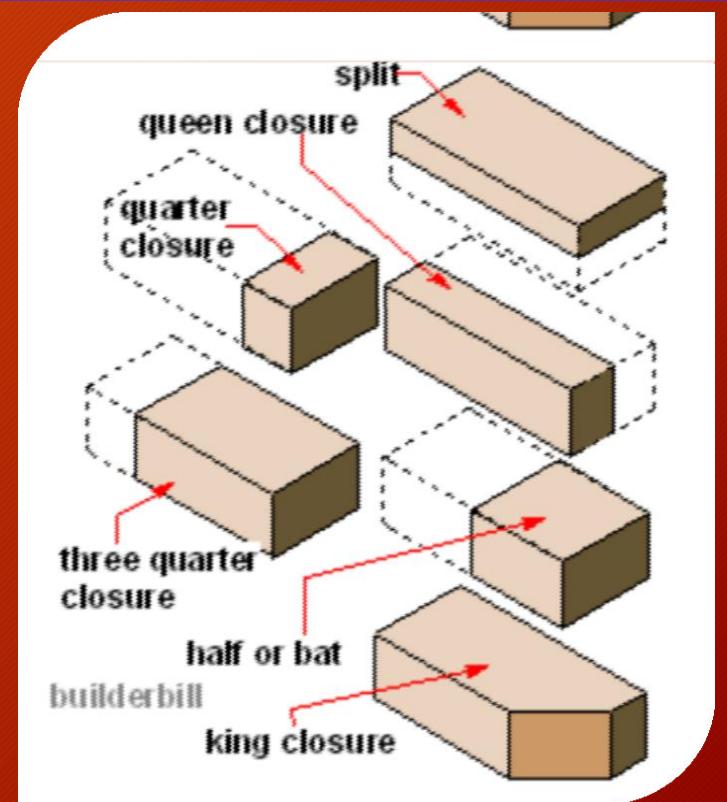
**Correct arrangement of bricks :** This picture shows the correct arrangement of bricks showing the overlapping of bricks due to insertion of closer next to the corner brick.

This makes the wall to act as a **homogeneous body**. This process of overlapping is called "**BONDING**".

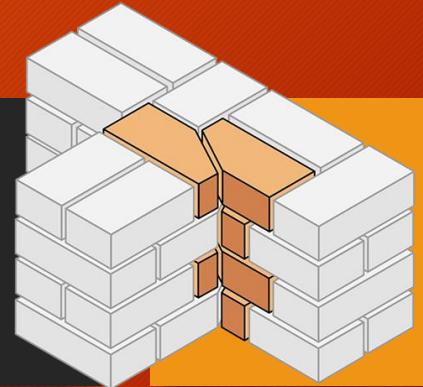
# BRICK CLOSURES

**Closer** : It is a portion of a brick with the cut made longitudinally, and is used to close up bond at the end of the course. A closer helps in preventing the joints of successive sources (higher or lower) to come in vertical line. Closer may be of various types, defined below.

- **QUEEN CLOSURE**: A brick cut in half down its length.
- **KING CLOSURE** : A brick cut a corner & joining middle points of width and length of the brick.
- **THREE QUARTER BAT** : A brick cut to three-quarters of its length, and laid with its long, narrow side exposed.
- **HALF BAT**: A brick cut in half across its width and laid in the wall structure.
- **QUARTER BAT**: A brick cut to a quarter of its length.

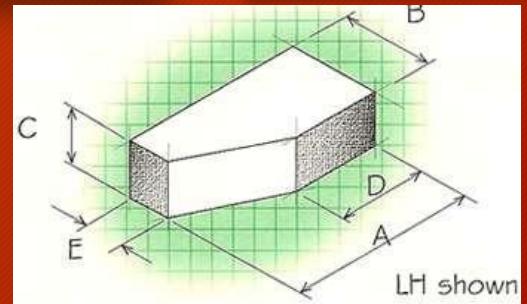


# BRICK CLOSURES



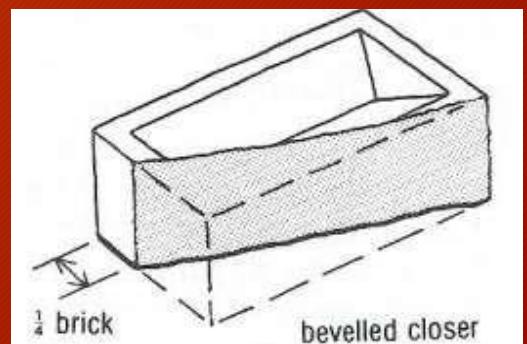
## King Closer

It is the portion of a brick which is so cut that the width of one its end is half that of a full brick, while the width at the other end is equal to the full width. It is thus obtained by cutting the triangular piece between the center of one end and the centre of the other side. It is half header and half stretcher face.



## Beveled Closer

It is a special form of a king closer in which the whole length of brick (i.e., stretcher face) is beveled in such a way that half width is maintained at one end and full width is maintained at the other end.

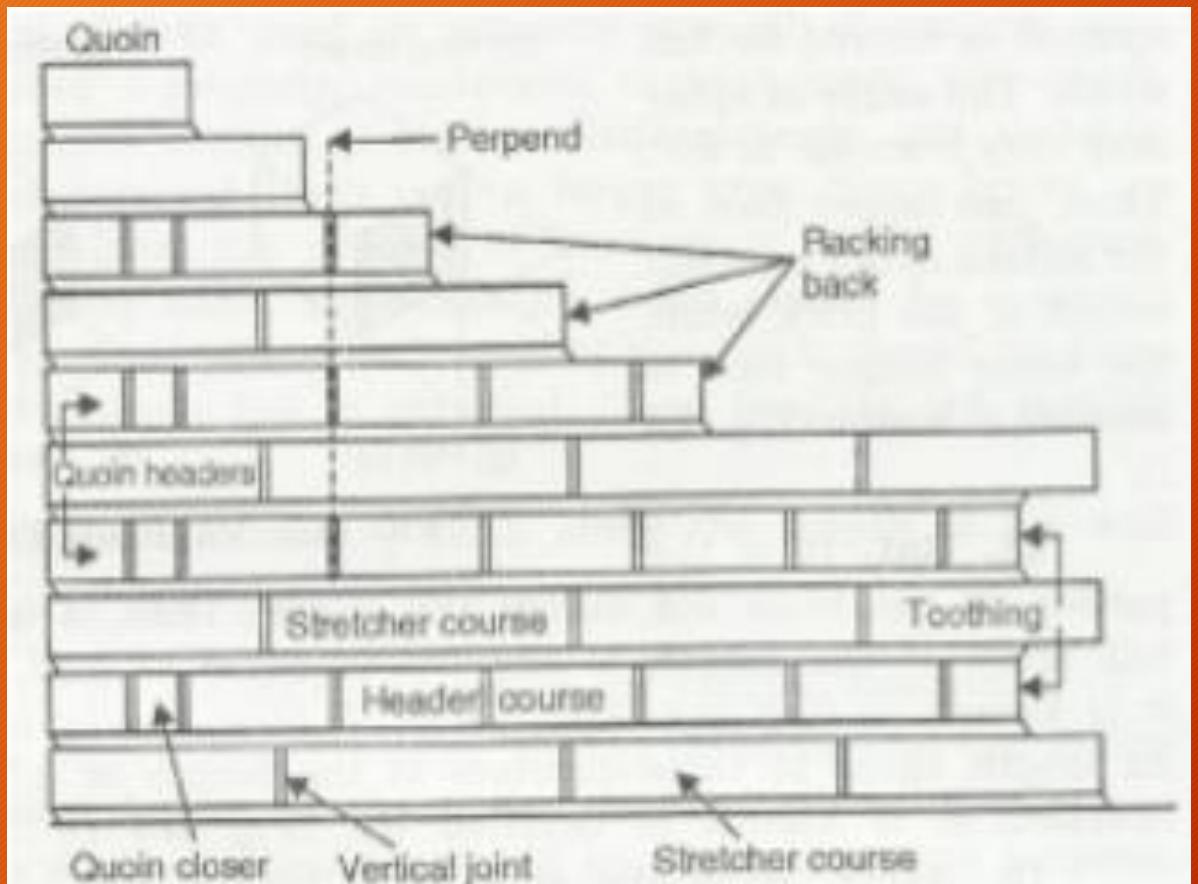


## Mitred Closer

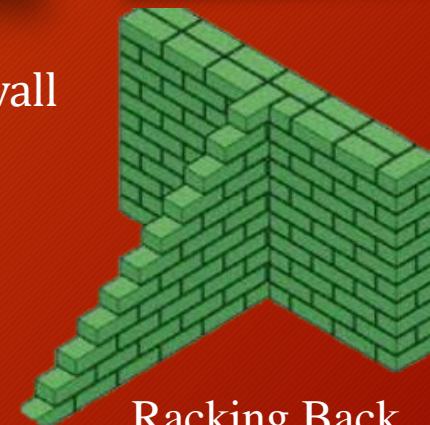
- It is a portion of a brick whose one end is cut splayed or mitred for full width. The angle of splay may vary from  $45^\circ$  to  $60^\circ$ .
- Thus one longer face of the mitred closer is of full length of the brick while the other longer face is smaller in length.



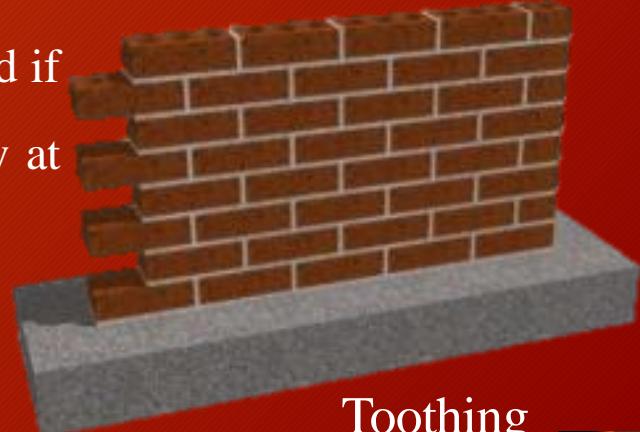
# BASIC BRICKWORK TERMINOLOGY



**Racking Back:** It is the termination of a wall in a stepped fashion

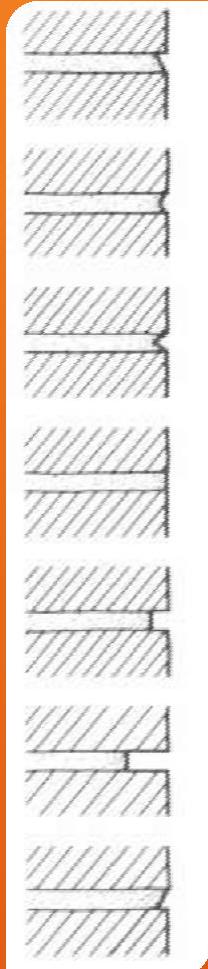


**Toothing:** It is the termination of the wall in such a fashion that each alternate course at the end projects in order to provide adequate bond if the wall is continued horizontally at a later stage.



Tooothing

# MASONRY JOINTS



- **Weathered joint** :- Mortar joint has sloped (downwards) edge.
- **Concave joint** :- Joint concave inwards.
- **Vee joint** :- Mortar joint is the form of V.
- **Flush joint** :- Mortar joint is flush with the brick surface.
- **Raked joint** :- A medium portion of the mortar joint is raked out not a safe, impermeable joint.
- **Stripped joint** : A large portion of the mortar joint is a safe permeable joint.
- **Struck joint** :-Mortar joint has aslope (upwards) edge.

# MASONRY JOINTS



Concave Joints



Racked Joints

# MASONRY JOINTS



V-Joints



Flush Joints



Tooling Joints

A dark, atmospheric interior of a church. The scene is dominated by a tall, narrow stained-glass window in the background, which casts a warm, golden glow onto the brick wall behind it. The floor is made of polished wood planks, and rows of wooden pews are visible on either side, mostly in shadow. The overall mood is somber and contemplative.

Thank you