



4TH LECTURE **BRICK**

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WHAT IS BRICK

- Bricks are the **small rectangular blocks** typically made of **fired or sun-dried clay**, mainly used in buildings. The bricks are obtained by molding clay in rectangular blocks of uniform size and then by drying and burning these blocks.
- As bricks are of **uniform size**, they can be properly arranged and further, as they are light in weight, no lifting appliance is required to them.
- The common brick is one of the oldest building materials and it is extensively used at present as a leading material of construction because of its **durability, strength, low cost, easy availability, etc.**

TYPE OF BRICKS

■ **There Are Various Types of Bricks Used in Masonry:**

1. Common Burnt Clay Bricks
2. Sand Lime Bricks (Calcium Silicate Bricks)
3. Engineering Bricks
4. Concrete Bricks
5. Fly ash Clay Bricks

1. Common burnt clay bricks

are formed by pressing in molds. Then these bricks are dried and fired in a kiln. Common burnt clay bricks are used in general work with no special attractive appearances. When these bricks are used in walls, they require plastering or rendering.



Burnt bricks are classified into four types and they are

□ **1.1 First class bricks:-** these bricks contain standard shape, sharp edges and smooth surfaces. They are more **durable and having more strength**. They can be used for permanent structures. However, because of their good properties they are costly than other classes.



❑ 1.2 Second class bricks:-

A ground molding procedure is used to manufacture second-class bricks, which are of a lower quality. Kilns are also used to burnt these bricks. However, **due to ground molding, they lack smooth surfaces ,sharp edges and an irregular form as well.** The brick construction need smooth plastering.



❑ 1.3 Third class bricks:-

Unburned bricks are examples of third-class bricks, which are typically used in temporary buildings. Rainy locations should not use them. They are made of ground-molded bricks that are then burned in a kiln. **These bricks have a rough and irregular surface texture.**

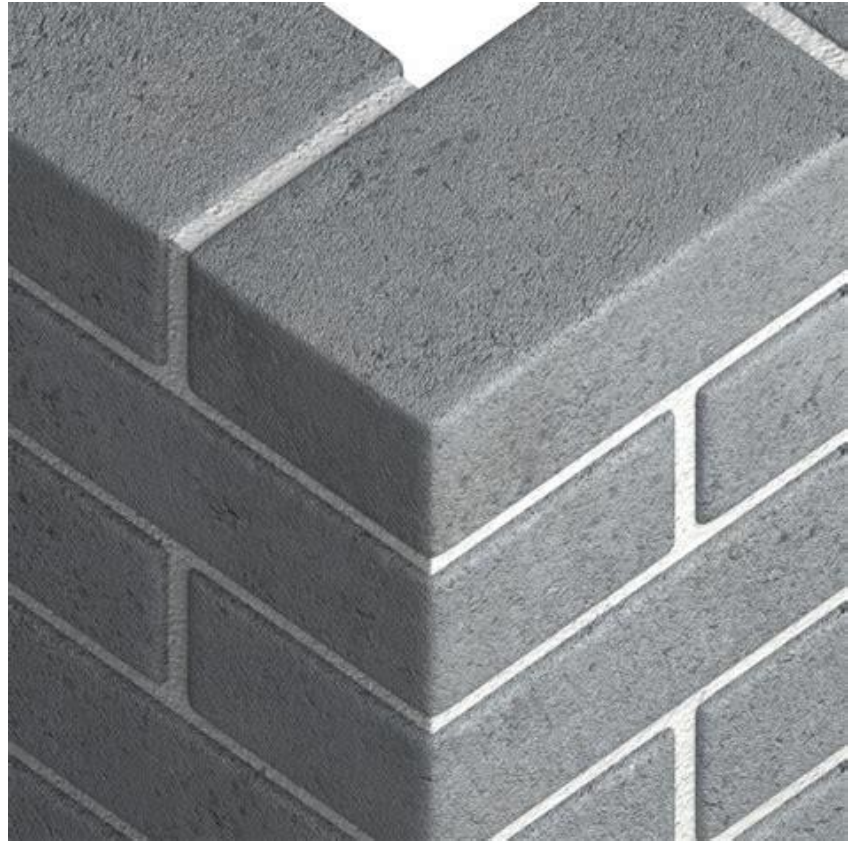


❑ 1.4 Fourth class bricks:-

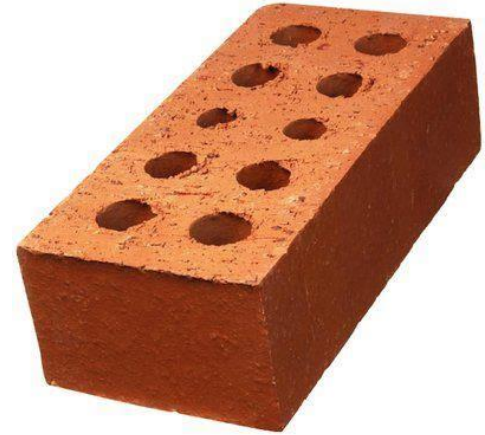
Fourth class bricks are very poor quality bricks and these are not used as bricks in the structure. They are crushed and used as aggregates in the manufacturing of concrete. They are obtained by over burning, because of this they get overheated and obtain a brittle nature. So, they can break easily and are not suitable for construction purpose.



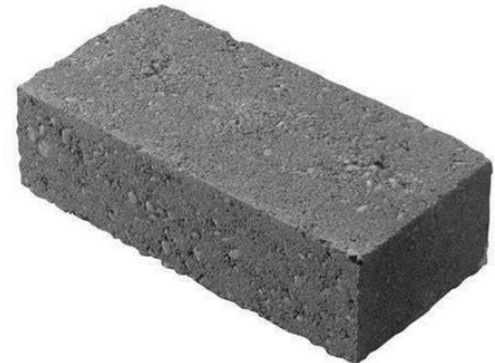
2. Sand lime bricks are
made by **mixing sand and
Lime**



3. Engineering bricks are bricks manufactured at extremely high temperatures, forming a **dense** and **strong brick**. These bricks are used in specific projects and they can cost more than regular or traditional bricks.



4. Concrete bricks are made from solid concrete and are very common among homebuilders. Concrete bricks are usually placed in facades, fences, and provide an excellent aesthetic presence. These bricks can be manufactured to provide different colors as pigmented during its production



5. fly ash and lime followed by **a chemical process during wet mixing**. The mix is then molded under pressure forming the brick. These bricks can offer advantages over clay bricks such as:

- Their color appearance is gray instead of the regular reddish color.
- Their shape is uniform and presents a smoother finish that doesn't require plastering.
- These bricks offer excellent strength as a load-bearing member.



WHY IS BRICK CONSTRUCTION SO POPULAR?

There are many advantages when bricks are used as part of the construction. The following list presents some of the most common advantages when using bricks instead of other construction materials.

Aesthetic: Bricks offer natural and a variety of colors, including various textures.

Strength: Bricks offer excellent strength

Porosity: The ability to release and absorb moisture

Fire Protection: When prepared properly a brick structure can give a fire protection maximum rating of 6 hours.

Insulation: .Thermal and sound insulation

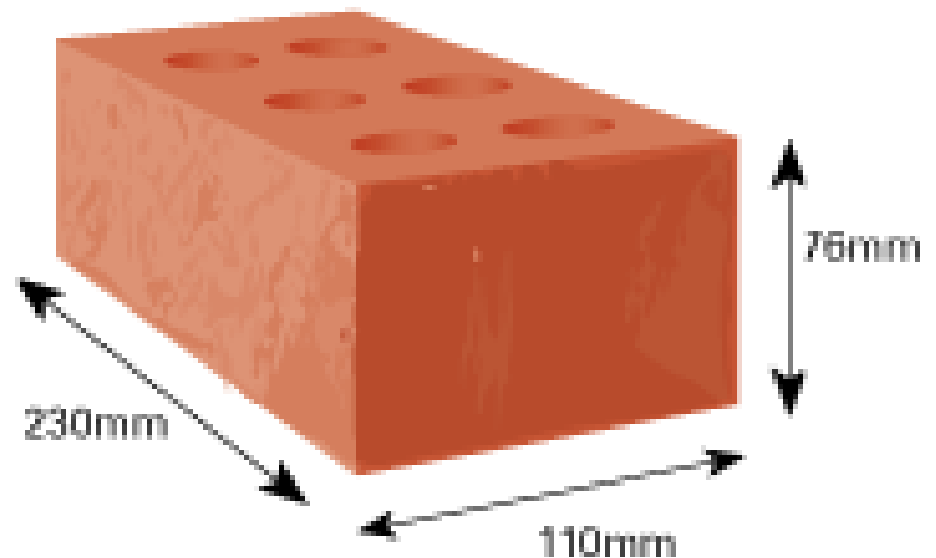
Wear Resistant: A brick is so strong, that its composition provides excellent wear resistance.

Durability: Brick is extremely durable and perhaps is **the most durable man-made structural building material** .

BRICK SIZES

Brick is a building material with a **human scale**. Brick sizes have varied over the centuries but have always been similar to present-day sizes. Some sizes were developed to meet specific design, production or construction needs. For example, larger brick were developed to increase bricklaying economy, and thinner brick help conserve resources.

Standard Brick Dimensions



Brick Orientation

A brick is given a **classification** based on how it is laid, and how the exposed face is oriented relative to the face of the finished wall.

Stretcher

A brick laid with its long narrow side exposed.

Header

A brick laid flat with its width at the face of the wall, or parallel to the face of the wall.

Soldier

A brick laid vertically with the long narrow side of the brick exposed.

Sailor

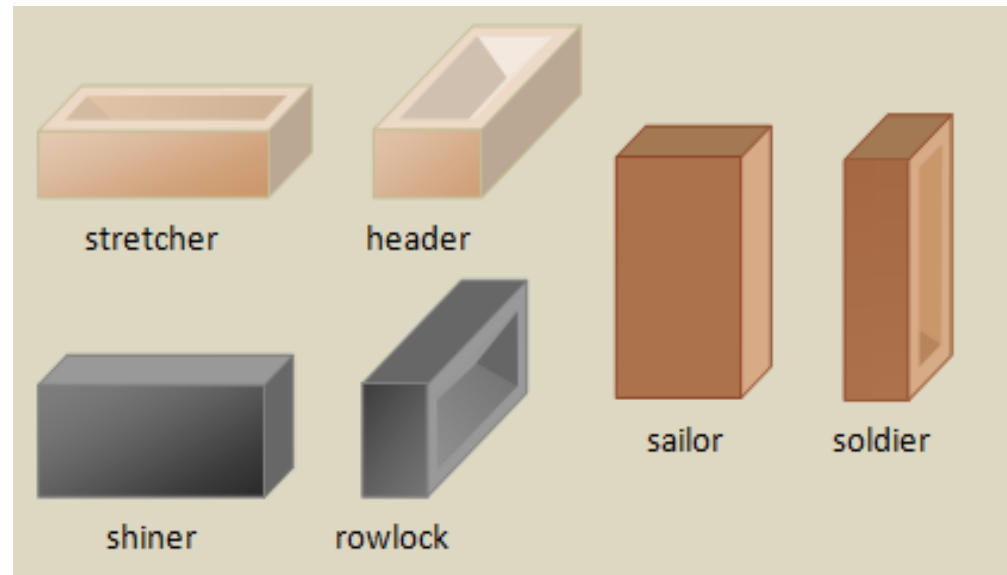
A brick laid vertically with the broad face of the brick exposed.

Rowlock

A brick laid on the long narrow side with the short end of the brick exposed.

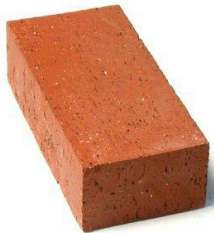
Shiner

A brick laid on the long narrow side with the broad face of the brick exposed. Also known as a Rowlock Stretcher.



Shape of Brick

shape of brick(Clay brick)
(solid, Hollow, perforated , cellular and recessed)



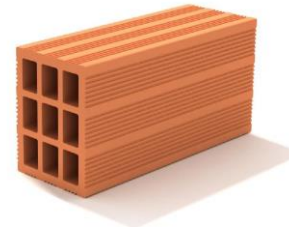
solid



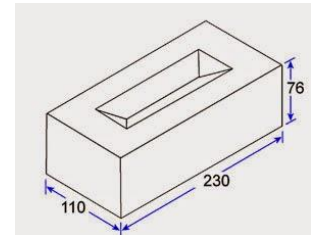
hollow



perforated

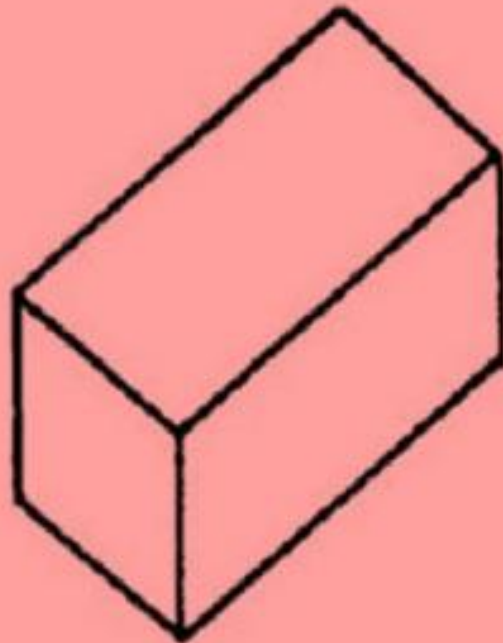


cellular

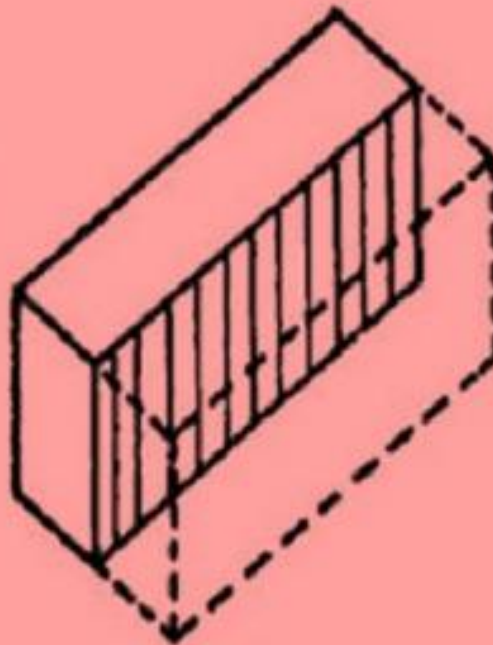


recessed

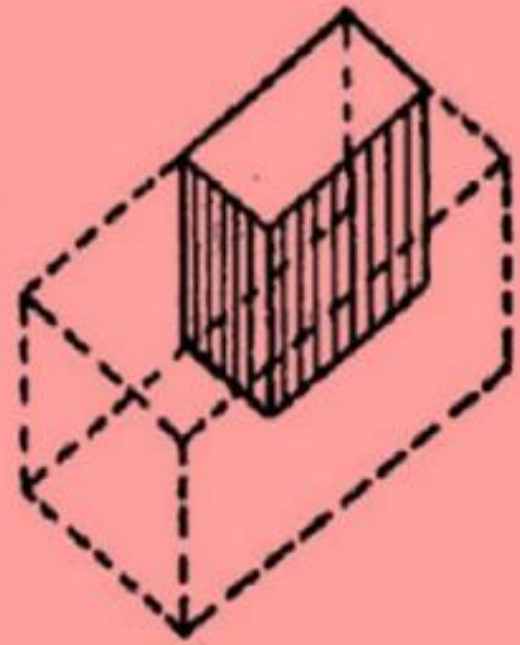
Types of Brick cut



Full
Brick

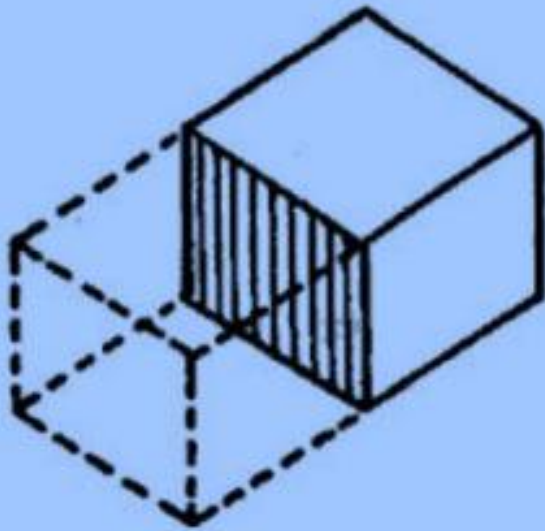


Queen - Closer
(Half)

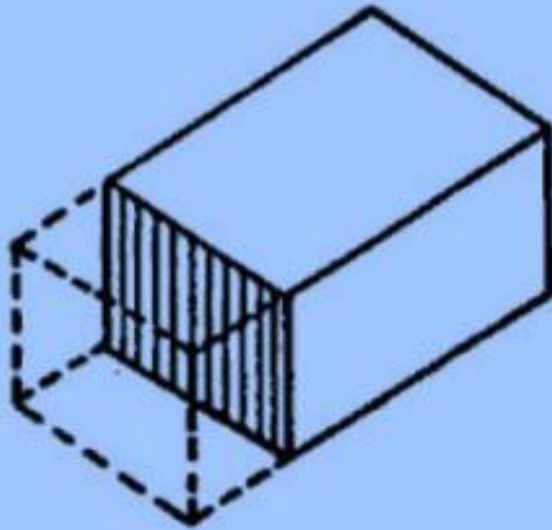


Queen - Closer
(Quarter)

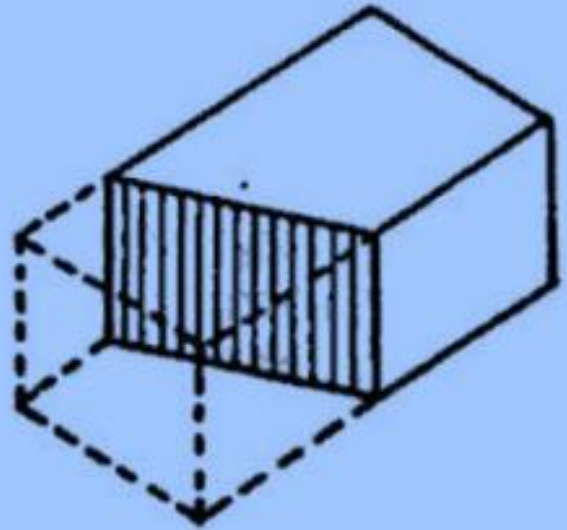
Types of Brick cut



Half Bat



Three Quarter Bat



Bevelled Bat

TYPES OF BONDS IN BRICK CONSTRUCTION

Brick masonry is built with bricks bonded together with mortar. For temporary sheds mud mortar may be used but for all permanent buildings lime or cement mortars are used.

The various types of bonds generally used in brick masonry are

Stretcher bond

Header bond

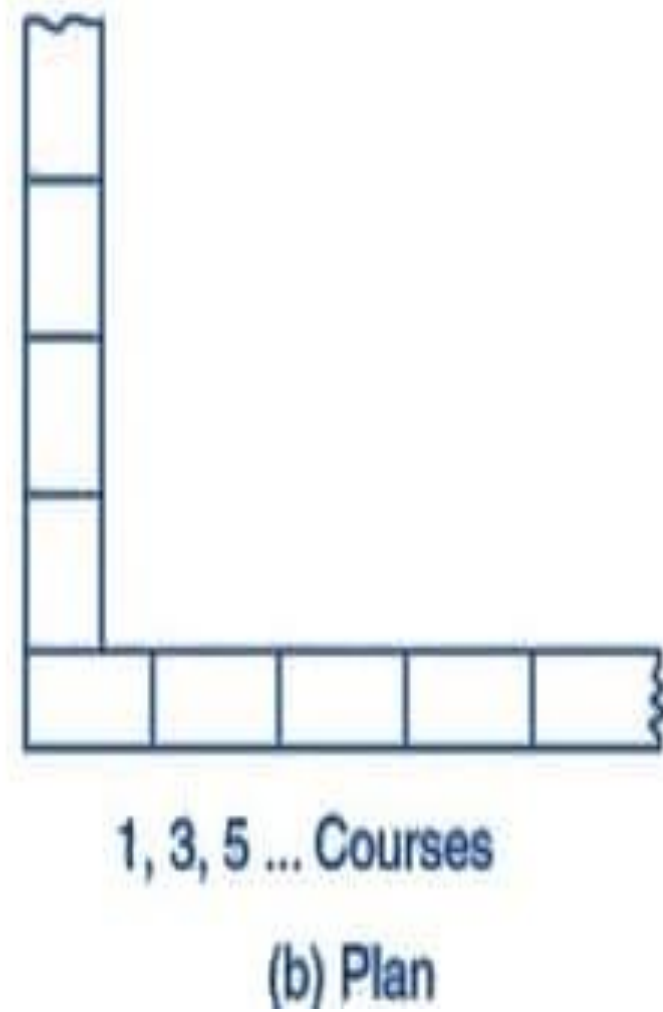
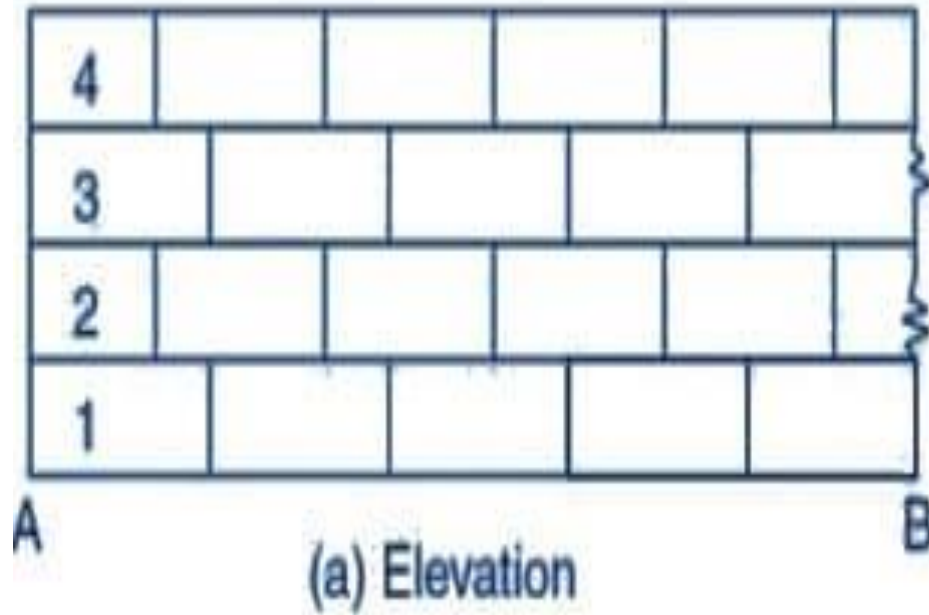
English bond and

Flemish bond

1. STRETCHER BOND

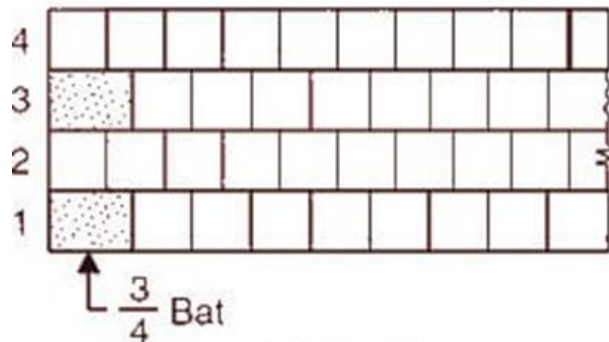
Longer narrow face of the brick is called as stretcher as shown in the elevation of figure below. Stretcher bond, also called as **running bond**, is created when bricks are laid with only their stretchers showing, overlapping midway with the courses of bricks below and above.

Stretcher bond in the brick is the simplest repeating pattern. But the limitation of stretcher bond is that it cannot make **effective bonding with adjacent bricks in full width thick brick walls**. They are suitably used only for one-half brick thick walls such as for the construction half brick thick **partition wall**.

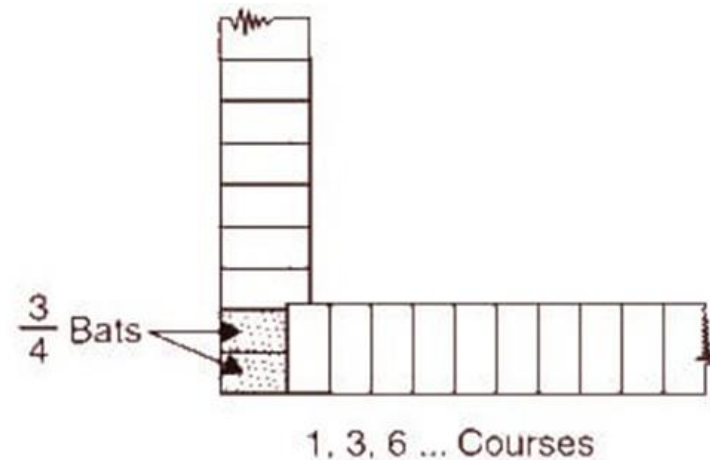


2. HEADER BOND

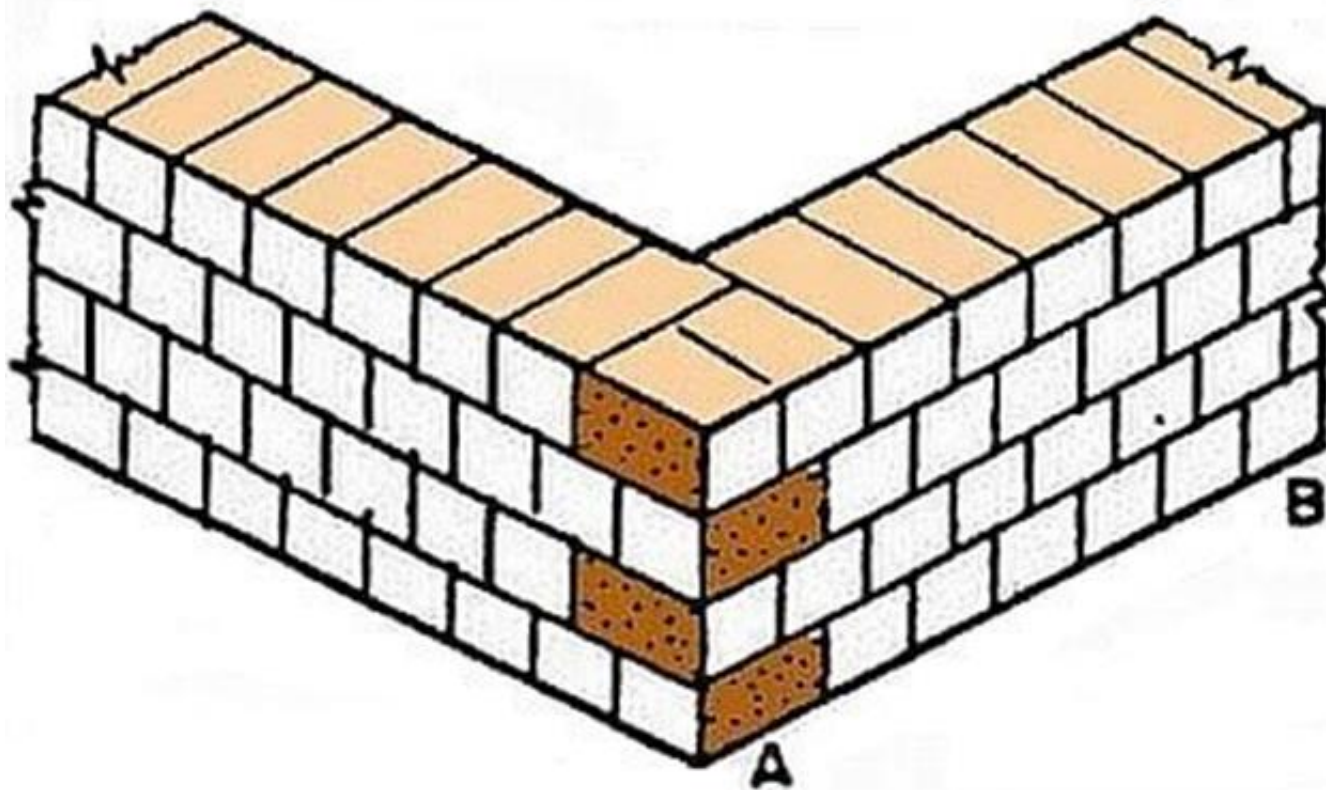
Header is the **shorter square face** of the brick. Header bond is also known as heading bond. all bricks in each course are placed as headers on the faces of the walls. It is used for the construction of walls with full brick thickness.



(a) Elevation



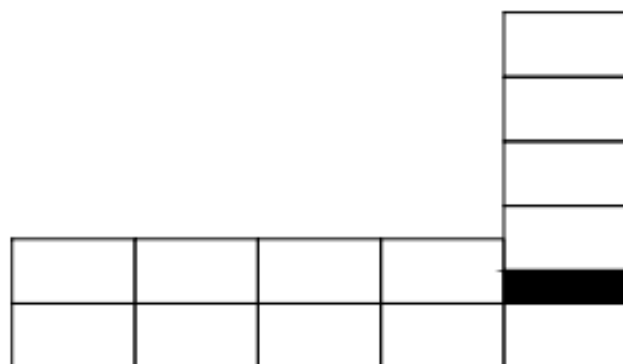
(b) Plan



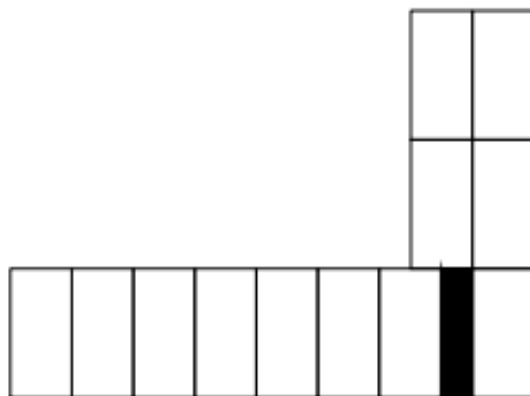
3. ENGLISH BOND

English bond in brick masonry has **one course of stretcher only** and a course of **header above it**, i.e. it has two alternating **courses of stretchers and headers**. Headers are laid centered on the stretchers in course below and each alternate row is vertically aligned.

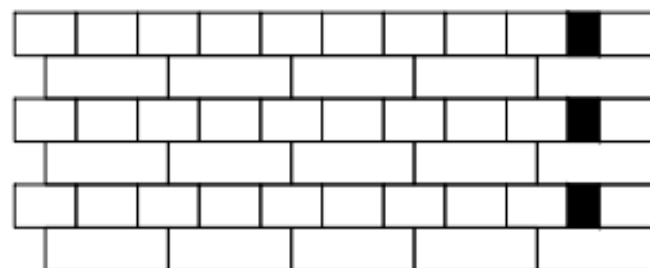
To break the continuity of vertical joints, quoin closer is used in the beginning and end of a wall after first header. A quoin close is a brick cut lengthwise into two halves and used at corners in brick walls.



Plan 1,3,5



Plan 2,4,6



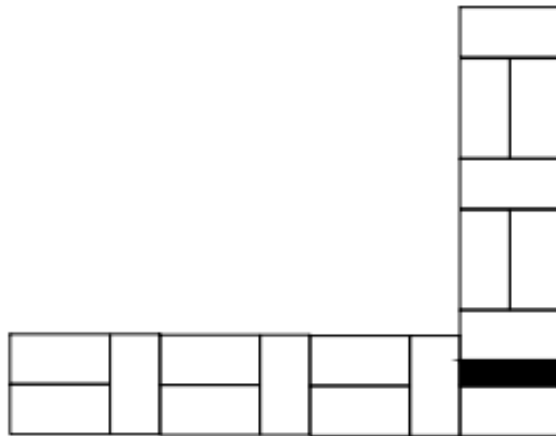
English Bond
Elevation

4. FLEMISH BOND

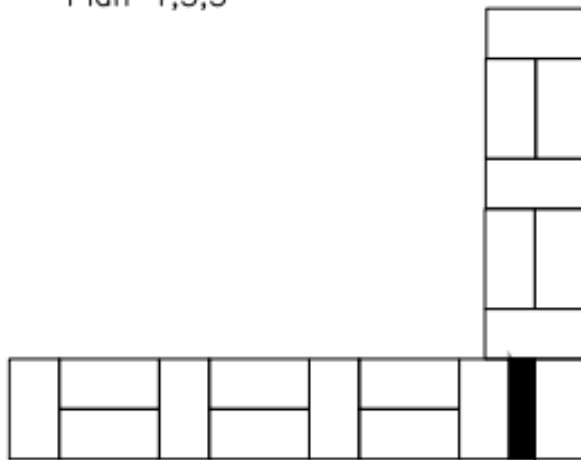
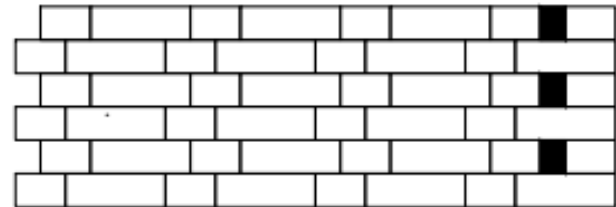
Flemish bond, also known as **Dutch bond**, is created by laying **alternate headers and stretchers in a single course**. The next course of brick is laid such that header lies in the middle of the stretcher in the course below, i.e. the alternate headers of each course are centered on the stretcher of course below. Every alternate course of Flemish bond starts with header at the corner.

The thickness of Flemish bond is minimum **one full brick**.

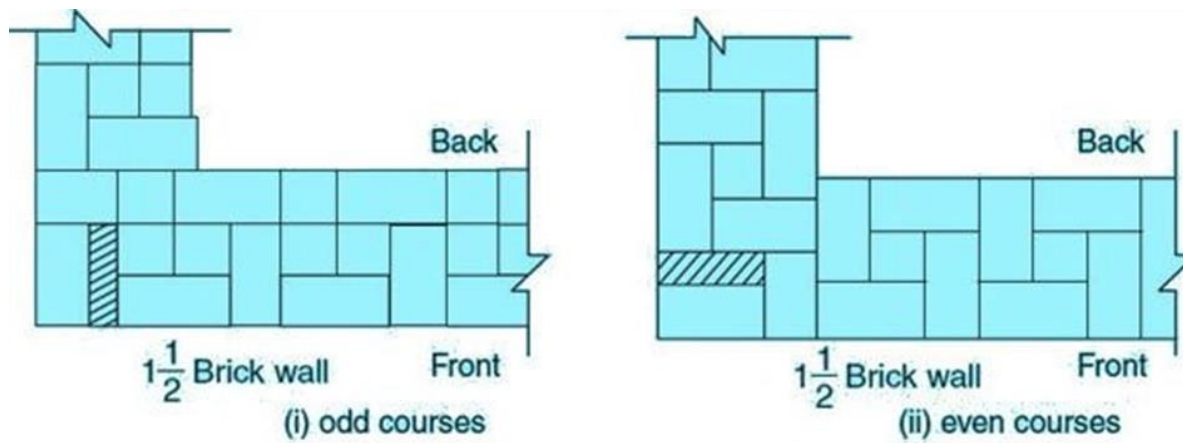
Flemish bonds have better appearance but are **weaker than English bonds for load bearing wall construction**.



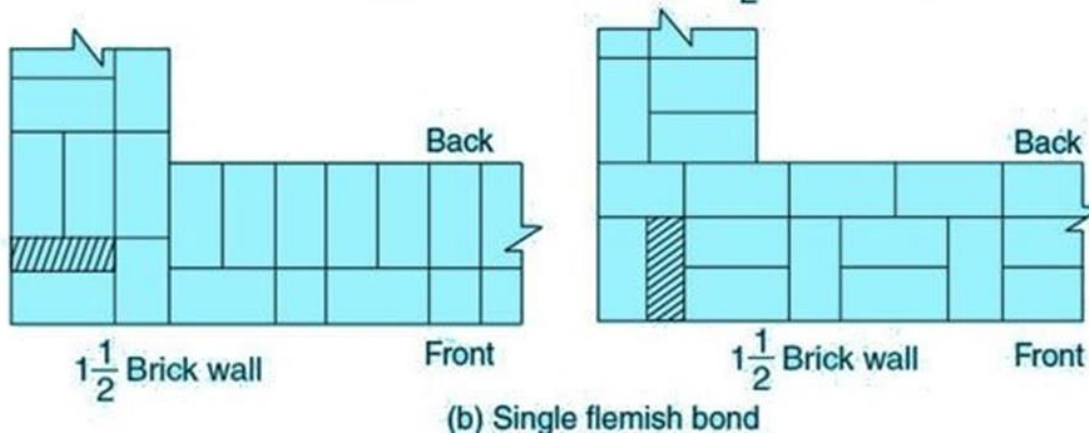
Plan 1,3,5



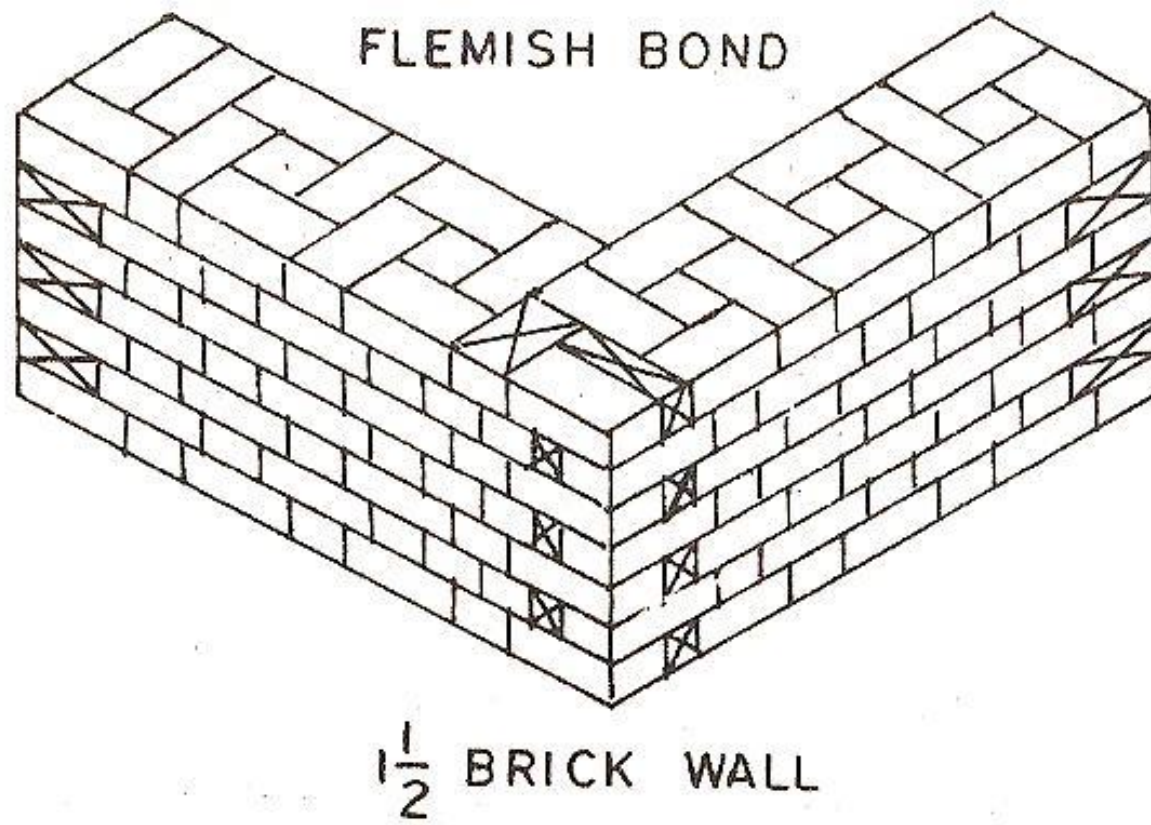
Plan 2,4,6



(a) Double flemish bond ($1\frac{1}{2}$ brick thick)



(b) Single flemish bond





**THANK
YOU**