

MASONRY

SUBJECT: CONSTRUCTION TECHNOLOGY

CODE: CE402

UNIT III : Masonry and walls

**Topic Cover-Masonry, Types, Terms in
Masonry, Brick Masonry and Bonds**



By

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LAKSHMI NARAIN COLLEGE OF

TECHNOLOGY

BHOPAL- 462021 (INDIA)



MASONRY

DEFINITION:

The construction of building units bonded with mortar.

TYPES:

- ❖ Stone Masonry
- ❖ Brick Masonry
- ❖ Hollow Concrete Block Masonry
- ❖ Reinforced Brick Masonry
- ❖ Composite Masonry



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TERMS IN MASONRY



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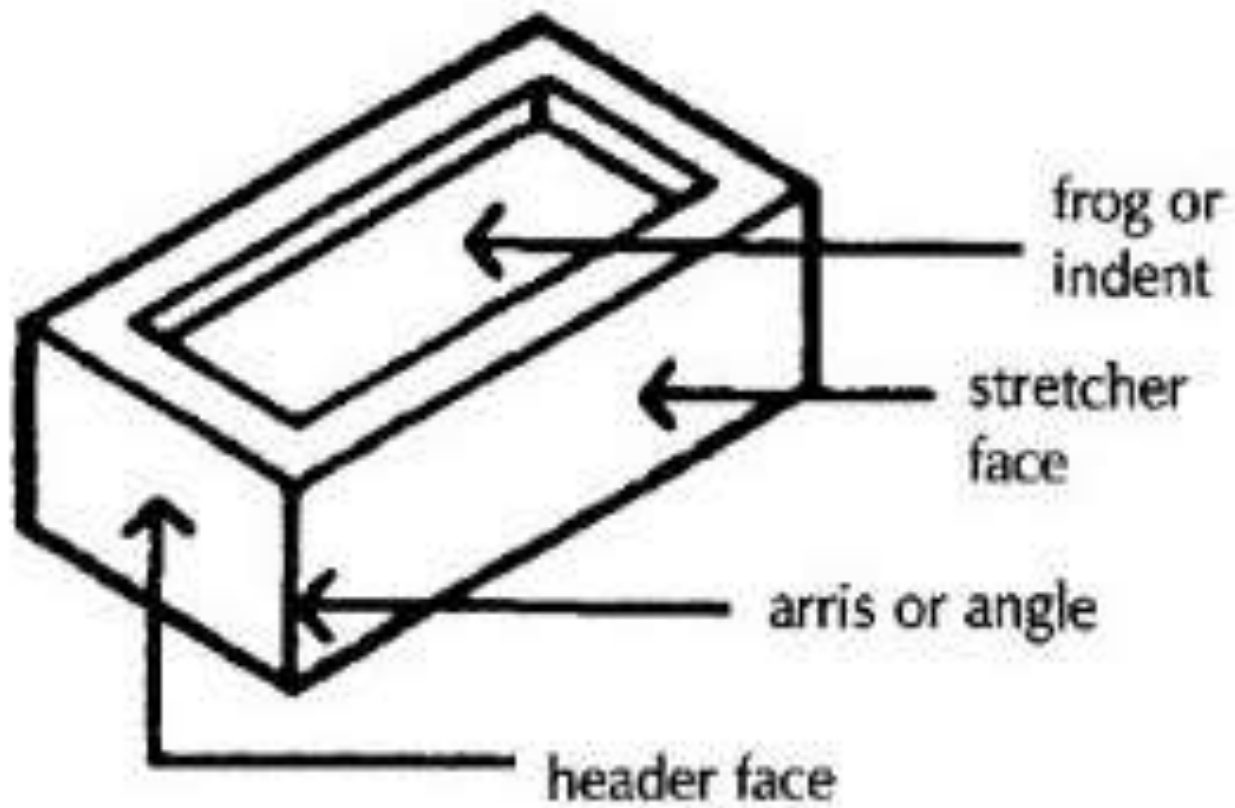
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- **Course** : It is a **horizontal layer** of masonry unit. The thickness of course is equal to thickness of stone or brick plus one mortar joint.
- **Header** : The **shorter face** of the brick or stone.
- **Stretcher** : The **longest face** of the brick or stone.



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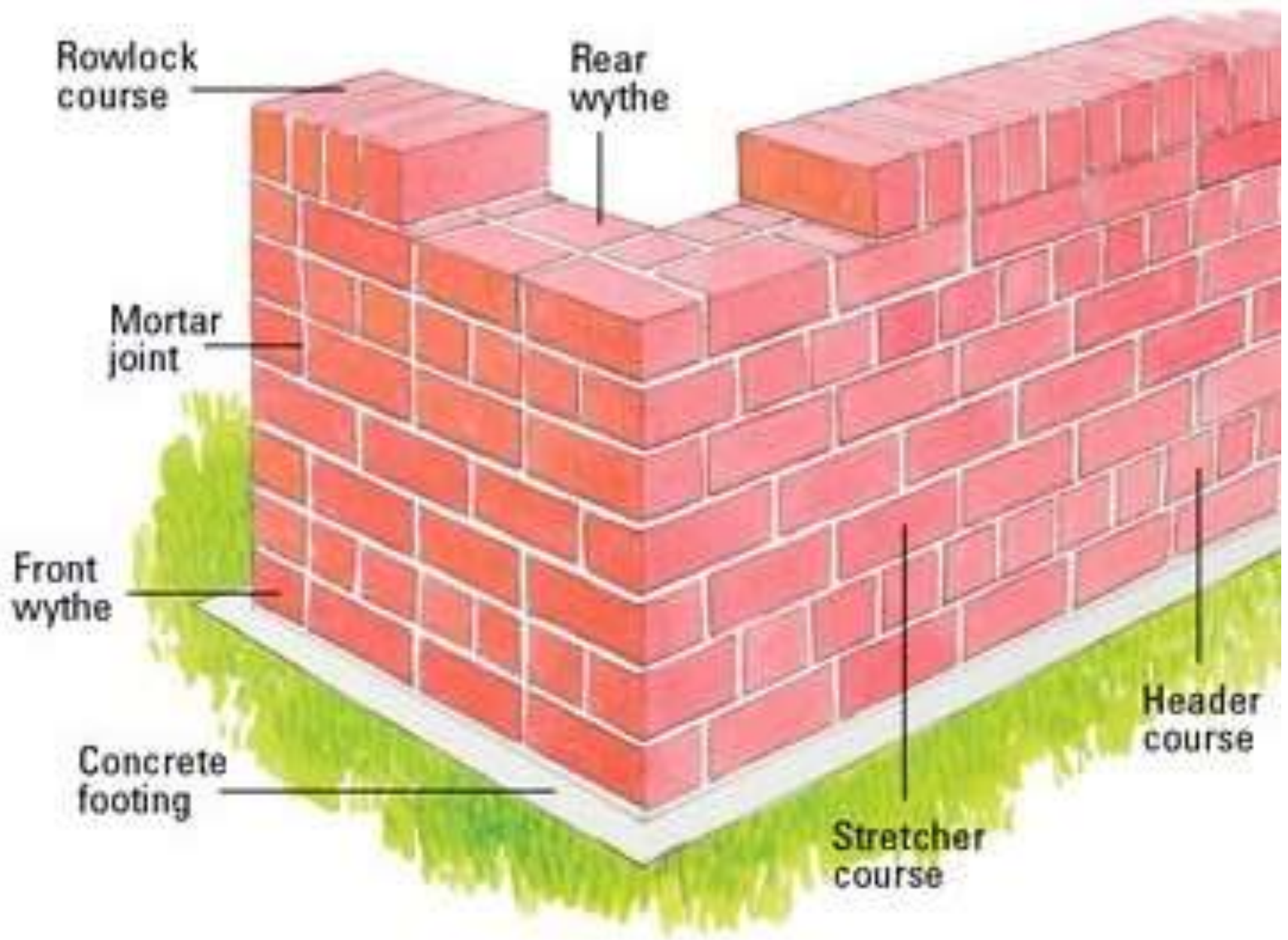


- **Header Course** : A **course** of brick or stone in which **all bricks are laid in header**.
- **Stretcher Course** : A **course** of brick or stone in which **all bricks are laid in stretcher**.
- **Bed** : This is **lower surface** of brick or stone **in each course**.
- **Bond** : A systematically **overlapping or alternating arrangement** of bricks or stones in a wall

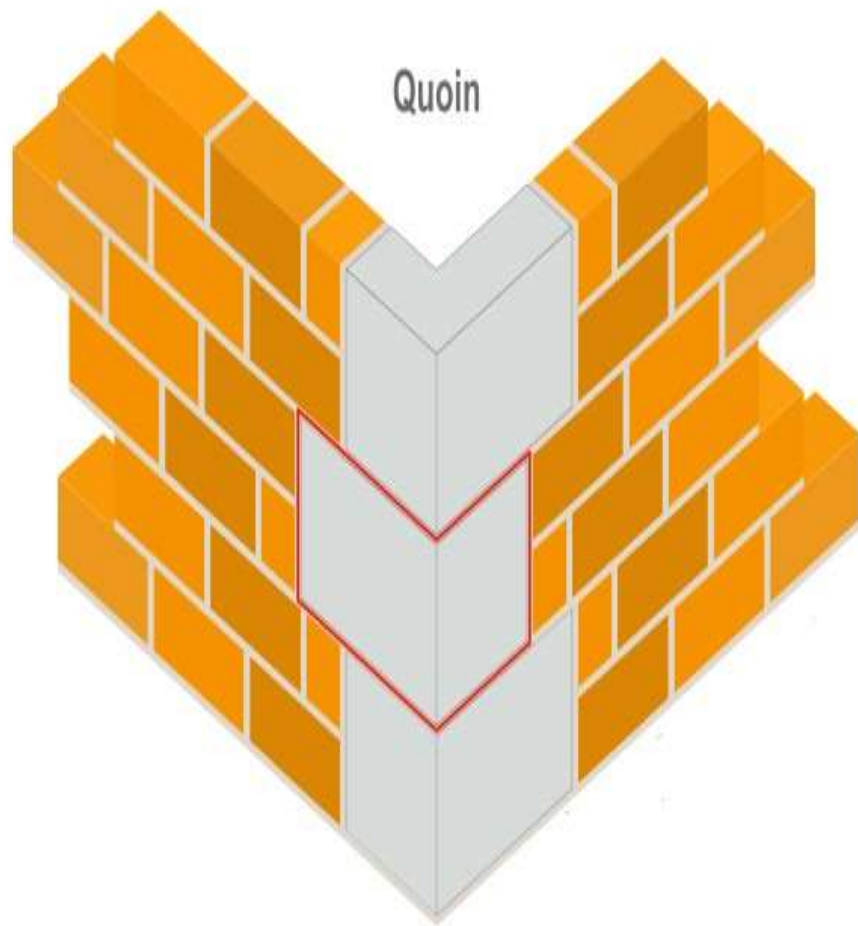


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- **Quoins** : Quoins are masonry **blocks** at the **corner** of a wall.



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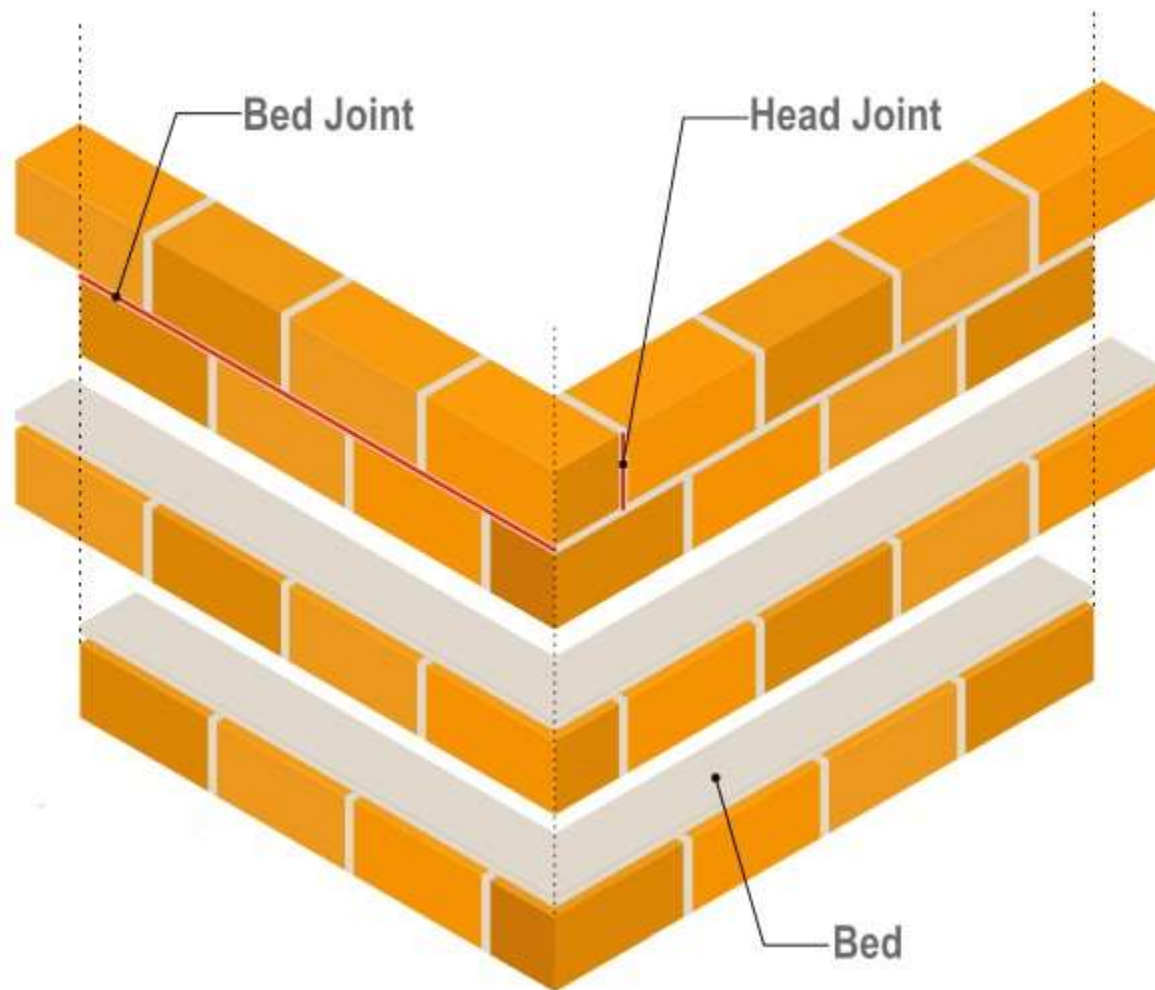
- **Face** : It is surface of wall **exposed** to weather.
- **Back** : It is inner surface of wall **not exposed** to weather.
- **Facing** : The materials used in the **face of the wall** is known as facing.
- **Hearting** : The inner portion of **wall between facing and backing**.
- **Frog** : It is an **indentation or depression** on the top face of a brick made with the object of **forming a key for the mortars**.



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- **JOINT** : The junction of adjacent units of brick or stones.



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- **Closer:** It is the portion of the brick cut length wise in such a manner that its one long face remains uncut.
- **Queen closer:** It is the portion of brick obtained by cutting a brick length wise into two portions.
- **King Closer:** These are the portions of a brick obtained by cutting off the triangular piece between the centre of one end and the centre of one side.



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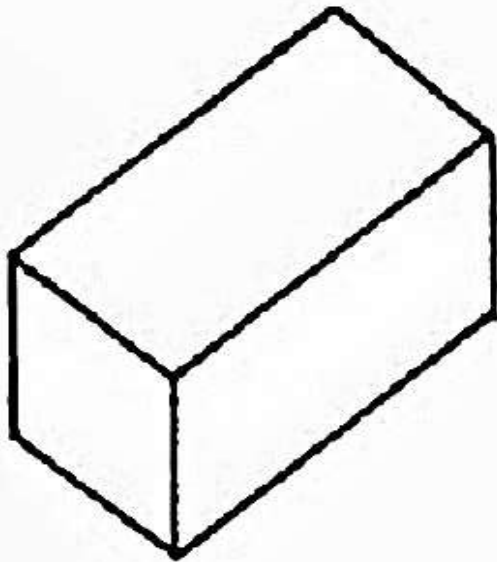
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- **Bevelled Closer:** It is that portion of a brick in which the whole length of the brick is bevelled for maintaining **half width at one end and full width at the other.**
- **Mitred Closer:** It is a brick whose **one end is cut splayed or mitred for full width.** The angle of splay may vary from **45° to 60° .**

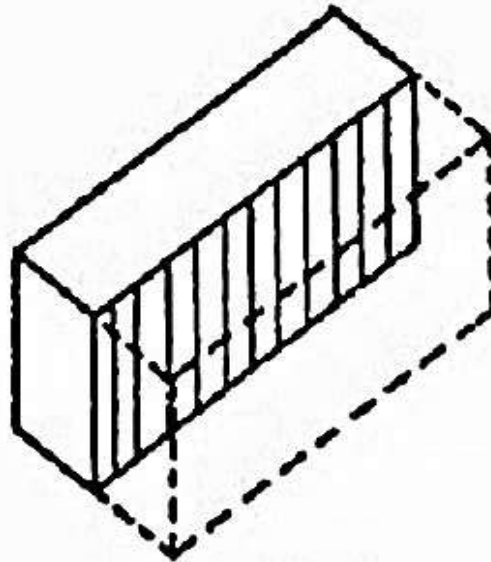


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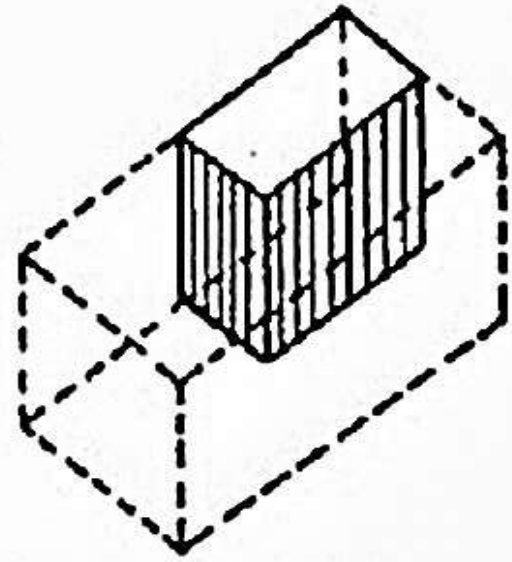
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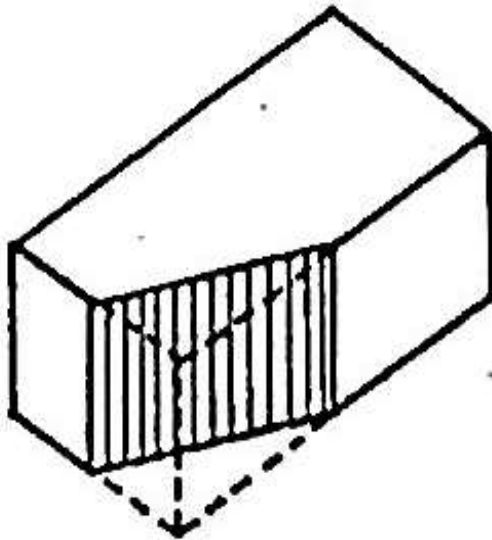
Full
Brick



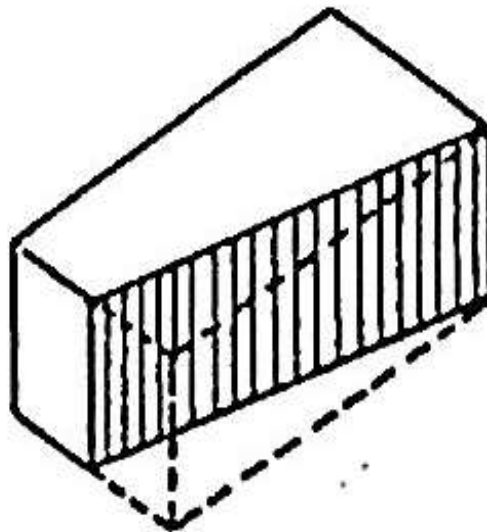
Queen - Closer
(Half)



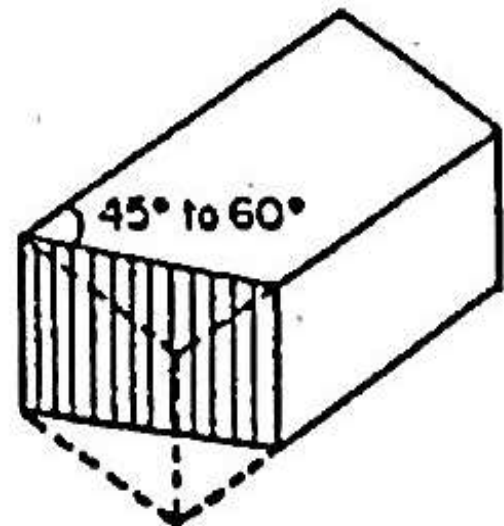
Queen - Closer
(Quarter)



King Closer



Bevelled Closer



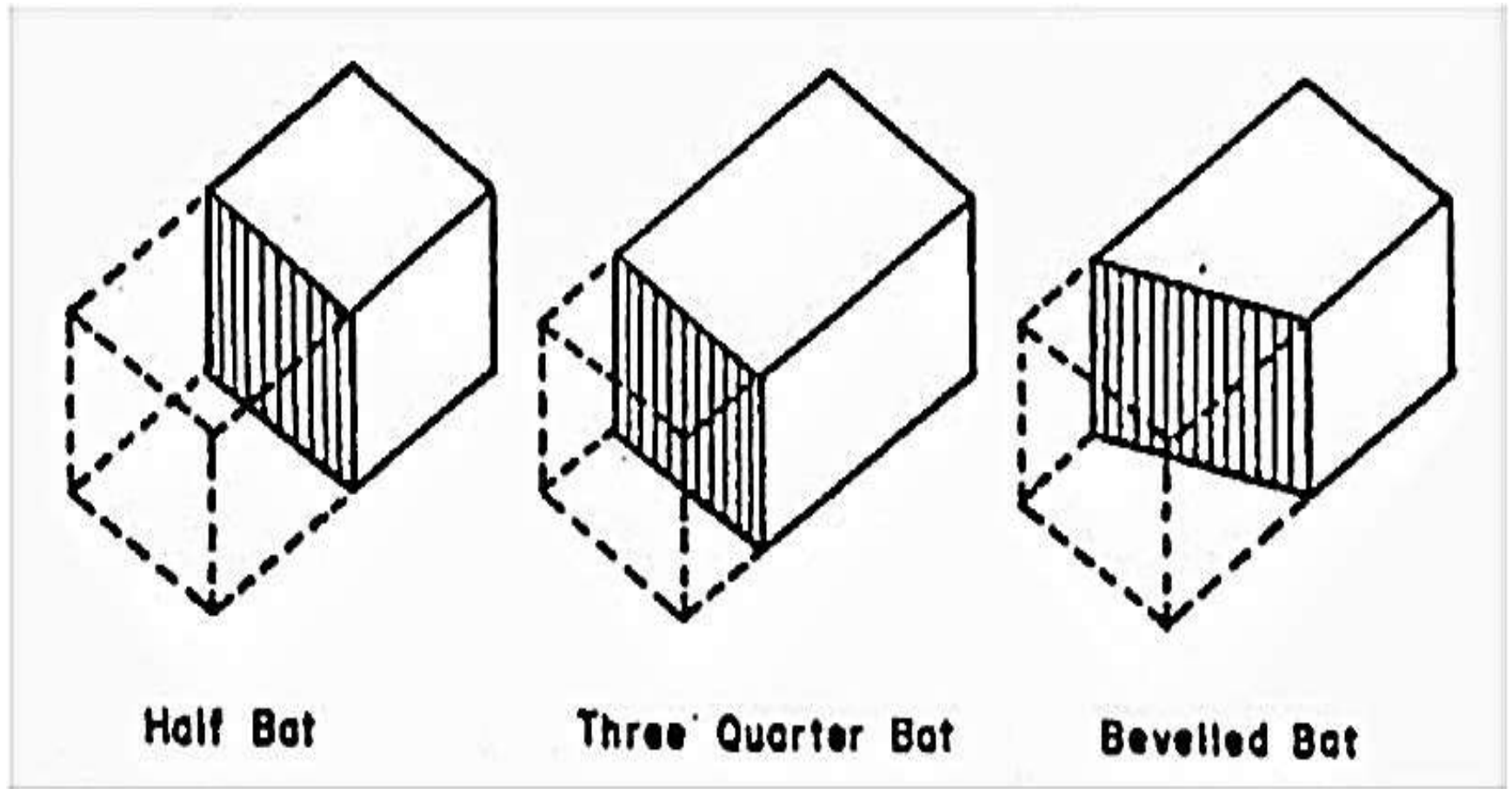
Mitred Closer



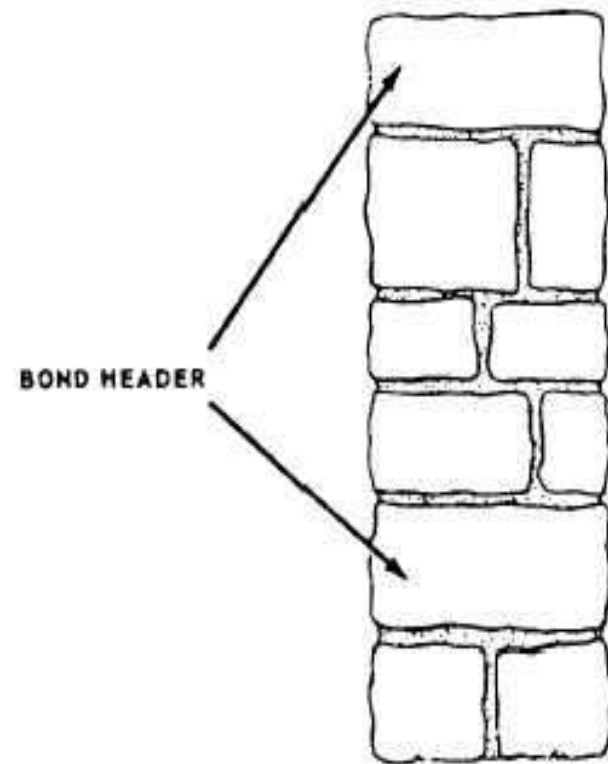
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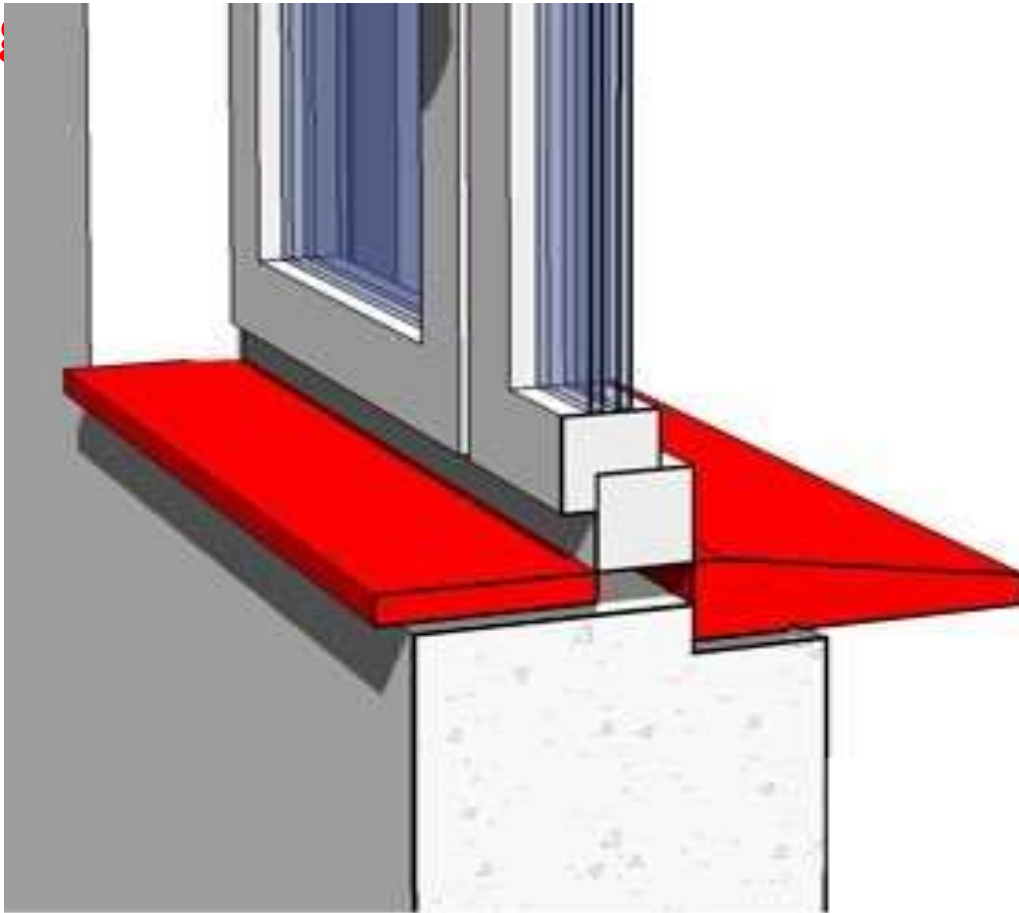
- **Bats:** it is the portion of brick cut across the width.



- **Through Stone:** A **bond stone** that extends through the **full thickness of a wall**.



- **Sill:** it is a **horizontal member** of stone, concrete or wood, employed for the purpose of shedding off rain water from the face of wall **immediately below the window opening**



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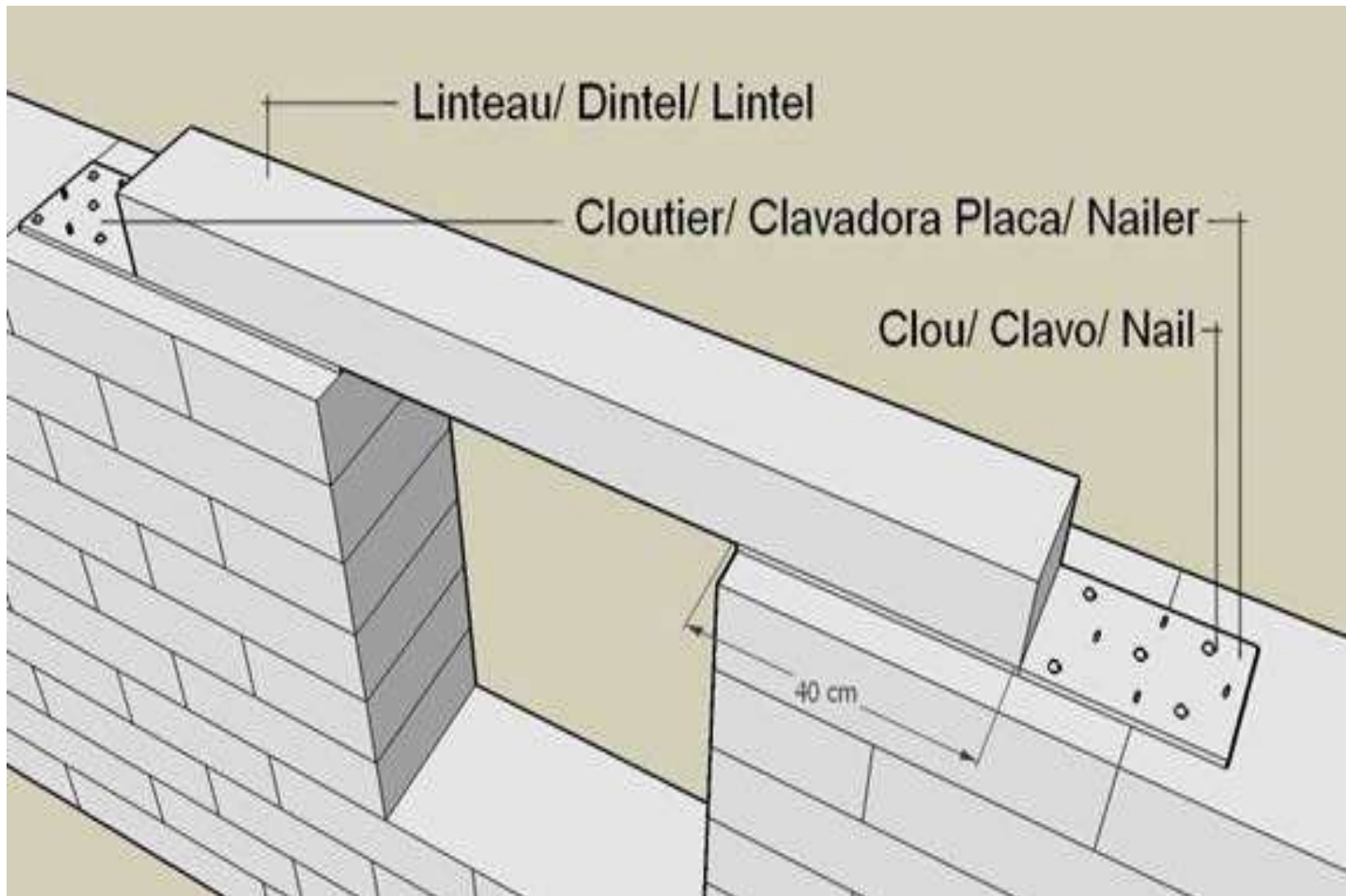
Two Types of Sills



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- **Lintel:** it is a horizontal member of stone, brick, wood, iron or RCC used to support the masonry or load above an opening.



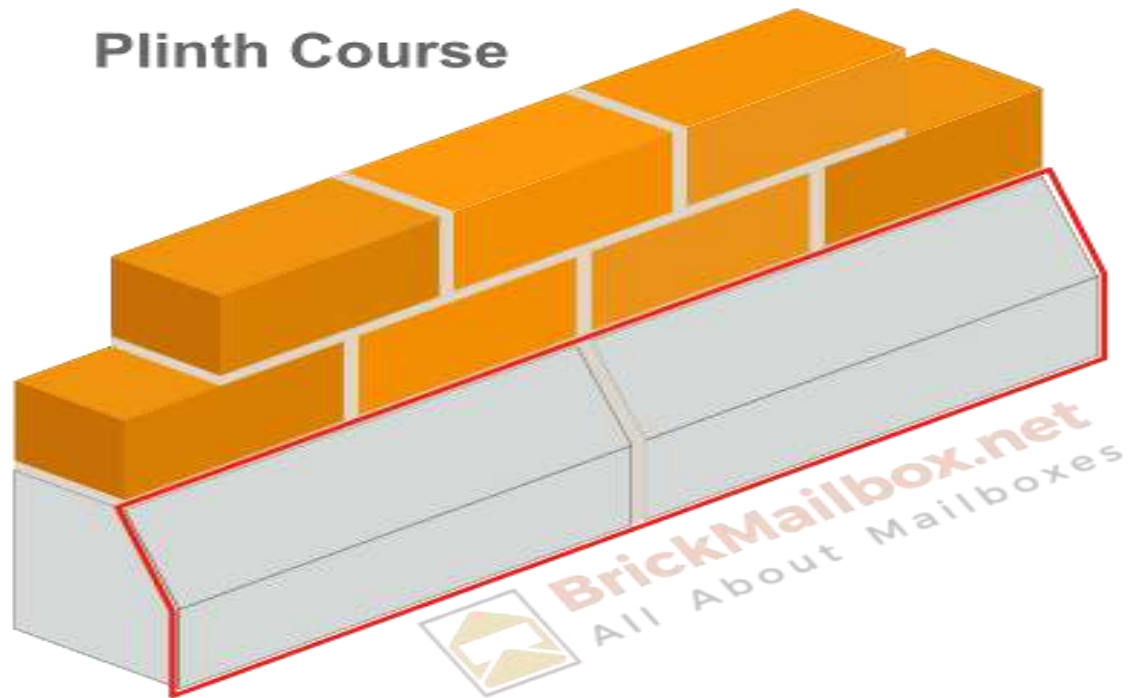
- **Plinth:** It is the horizontal course of stone or brick provided at the **base of the wall above ground level**. It indicates the **height of the ground level above the natural ground level**. It protects the building from **dampness**.
- **Plinth Course:** It is the **top most course** of the plinth masonry.



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Plinth Course



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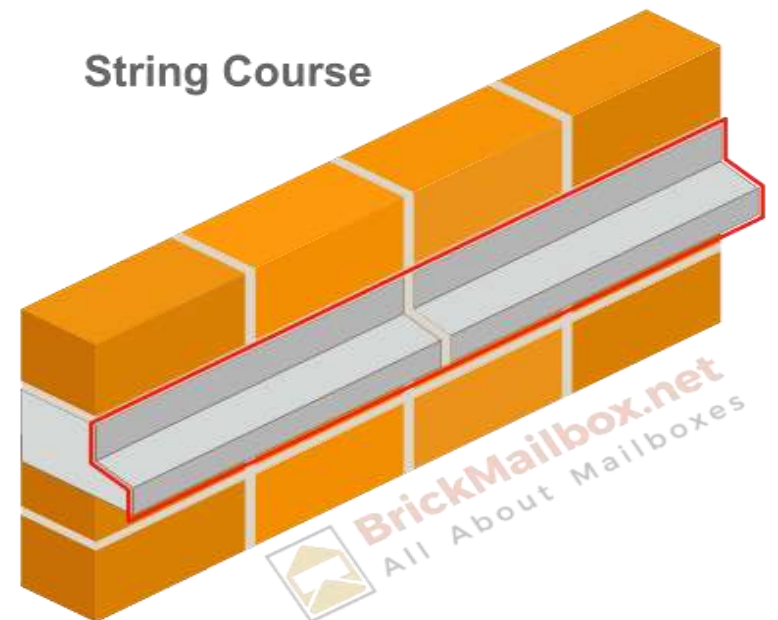
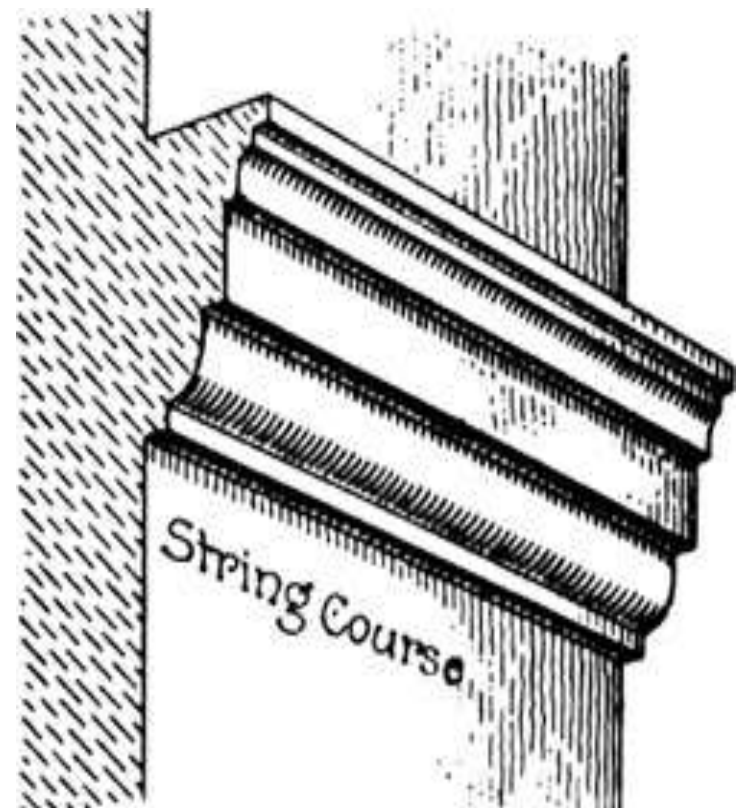
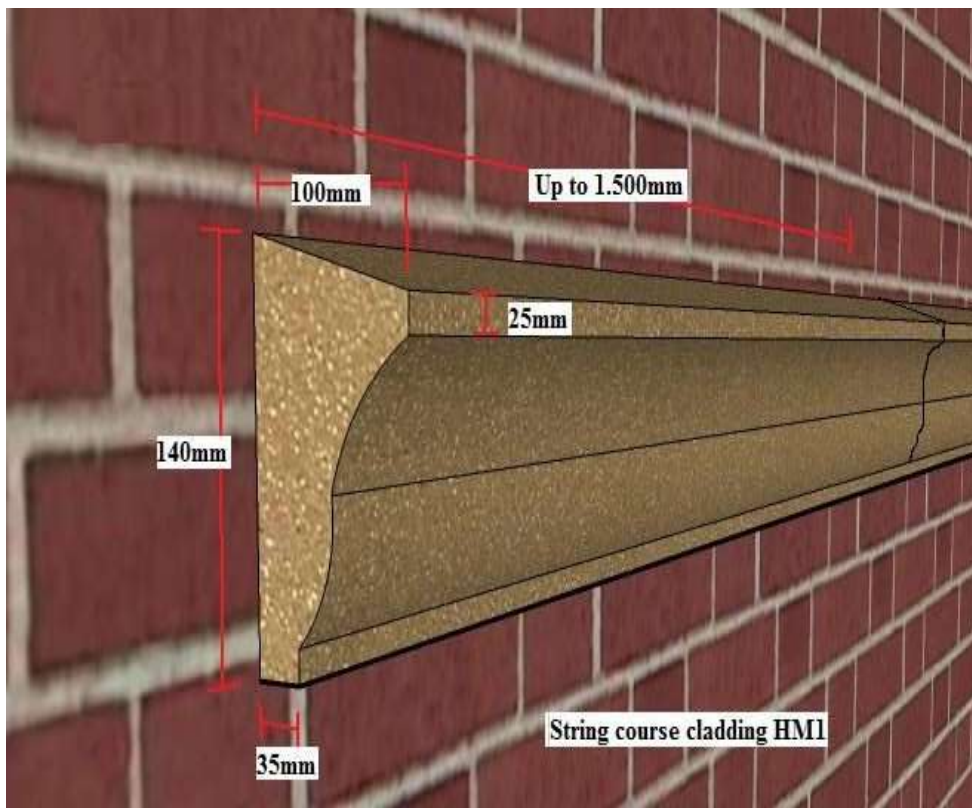
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- **String Course:** It is a horizontal projecting course of masonry projecting out of the face of the wall for shedding rain water off the face. It imparts an aesthetic appearance to the structure and is generally provided at every floor level.
- **Blocking Course:** It is a top most course of stone masonry provided immediately above the cornice to prevent the tendency of the cornice to overturn. It also adds to the aesthetics of the cornice.



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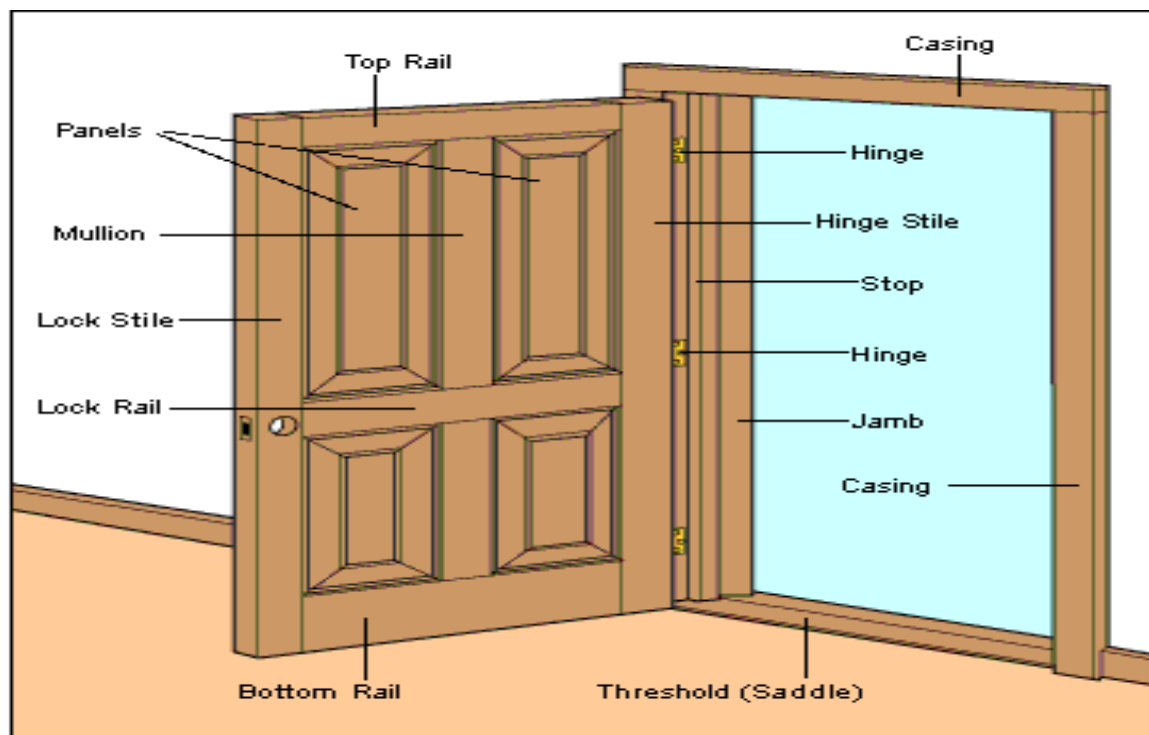
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- **Jambs:** These are the **vertical sides of an opening for doors and windows**. These may be **plain or splayed** or may be provided with recesses to receive the frames of doors and windows.
- **Reveals:** These are **exposed vertical surfaces left** on the sides of an opening after the door or window frame had been fitted in position.
- **Cornice:** It is a **projecting ornamental course** near the top of a building or at the junction of a wall and ceiling.



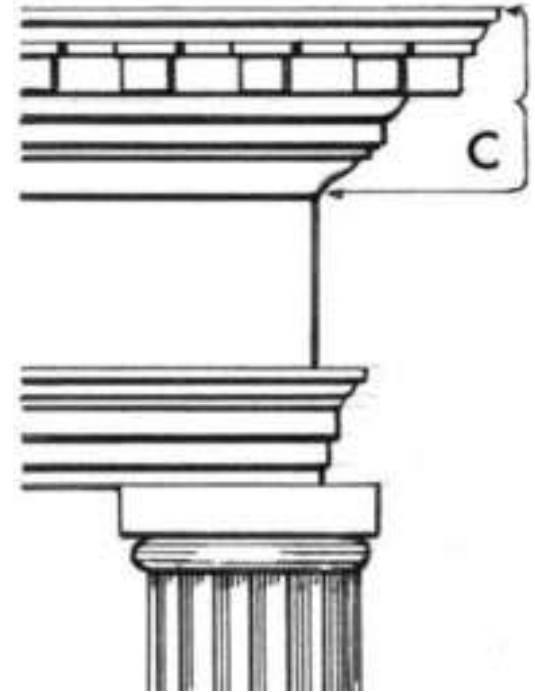
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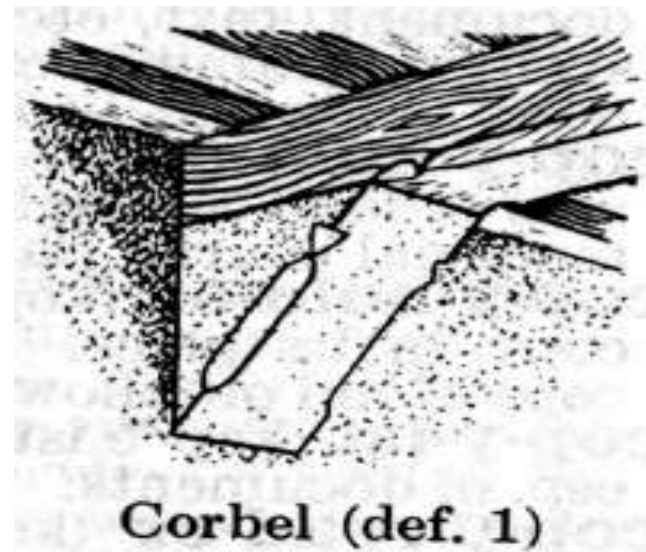
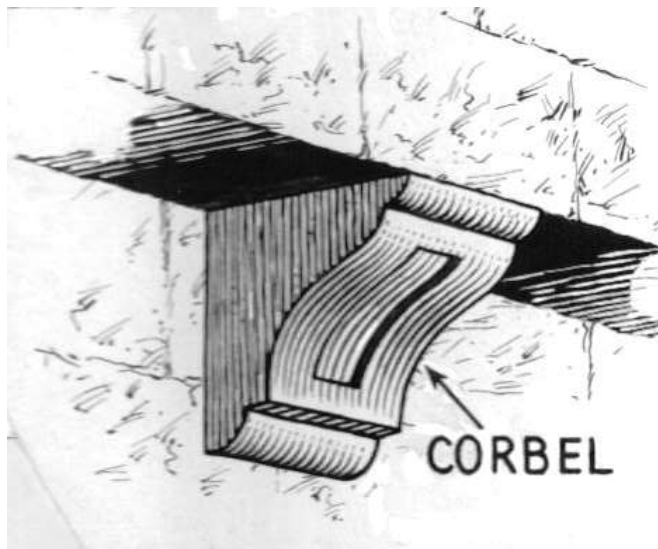
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- **Coping:** It is a course placed upon the **exposed top of an external wall** to prevent the seepage of water.
- **Corbel:** It is the **extension** of one or more course of stone or brick from the face of a wall to serve as a **support for wall plates**.
- **Toothing:** Bricks **alternately projecting** at the end of a wall, in order to be bonded into a continuation of it when the remainder is carried up.



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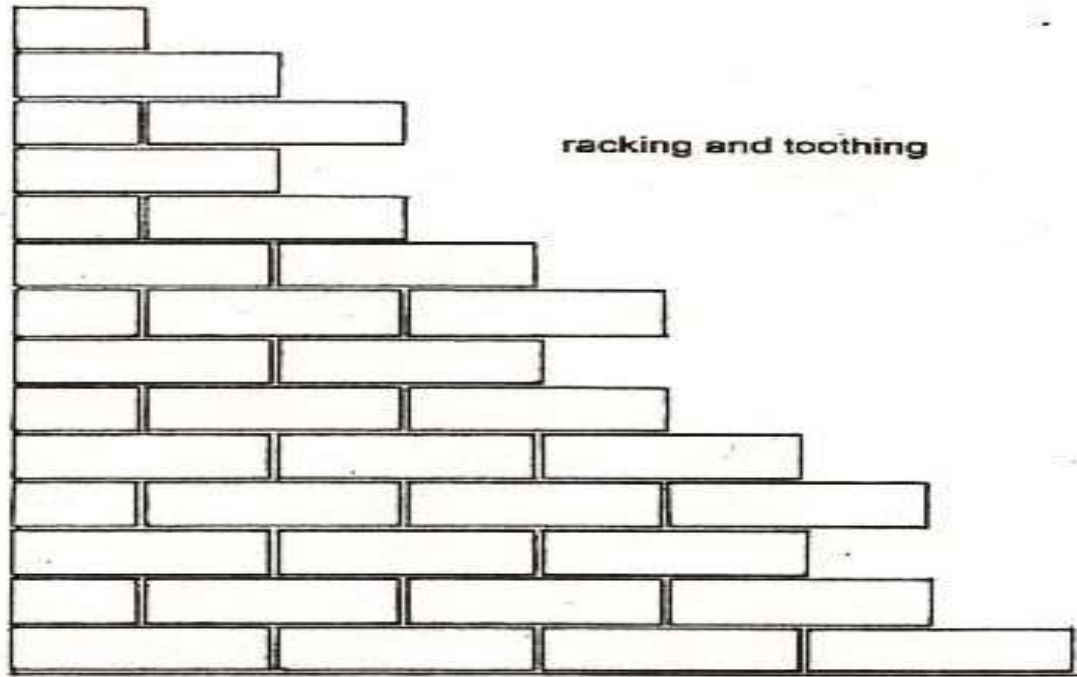
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BRICK MASONRY



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What is Brick Masonry?

- ▶ Brick masonry is made of brick units bonded together with mortar



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TYPES OF BOND IN BRICK MASONRY



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TYPES OF BOND IN BRICK MASONRY

- ✓ Stretcher bond
- ✓ Header bond
- ✓ English bond
- ✓ Double Flemish bond
- ✓ Single Flemish bond
- ✓ Facing bond
- ✓ Raking bond
 - ✓ Herring bone bond
 - ✓ Diagonal Bond
- ✓ English cross bond
- ✓ Dutch bond
- ✓ Brick on edge bond
- ✓ Garden wall bond
 - ✓ English Garden Wall bond
 - ✓ Flemish Garden Wall bond
 - ✓ Monk bond



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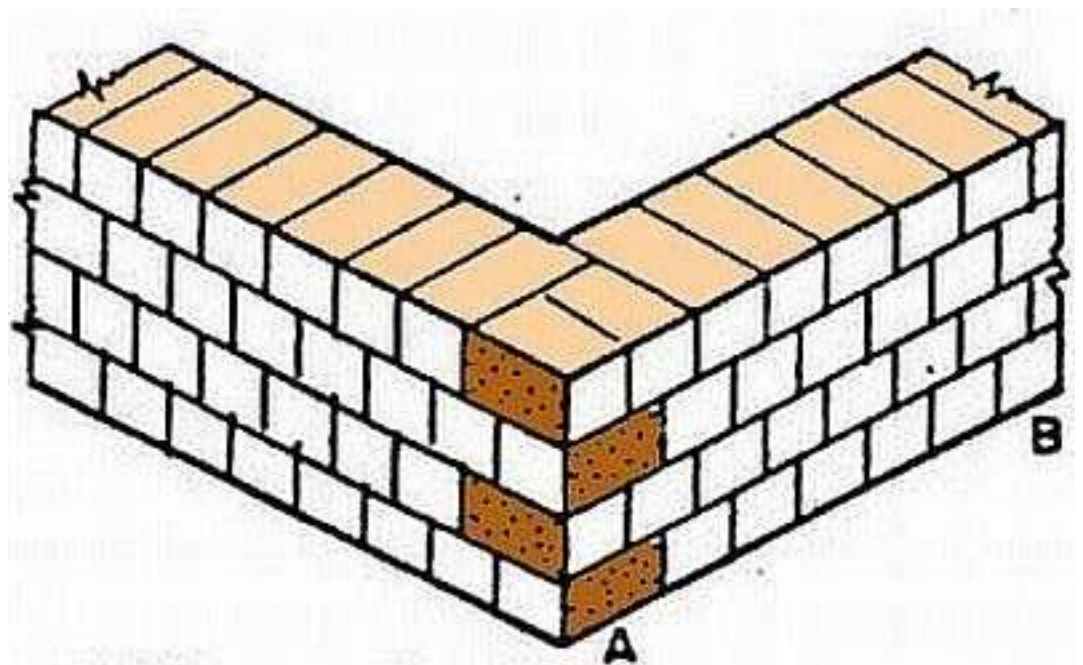
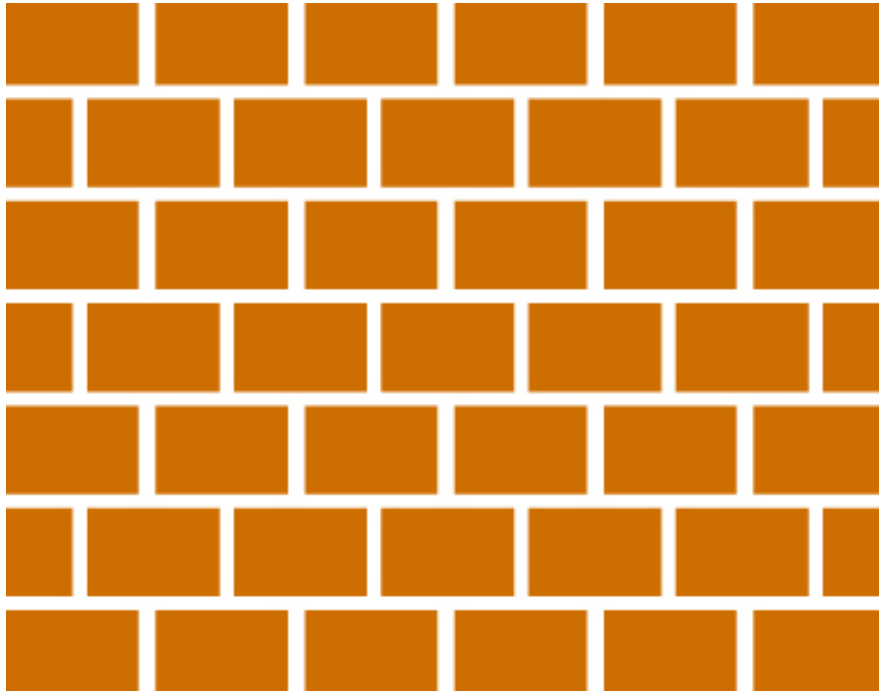
1. Header Bond:

- ❖ In this all bricks are laid as headers on the faces of wall
- ❖ Used when wall thickness = 1 brick size
- ❖ Overlap = $\frac{1}{2}$ width of brick
- ❖ It is achieved by providing $\frac{3}{4}$ Bat in alternate courses as quoins
- ❖ Not suitable for load bearing walls
- ❖ Used in curved walls and footing construction



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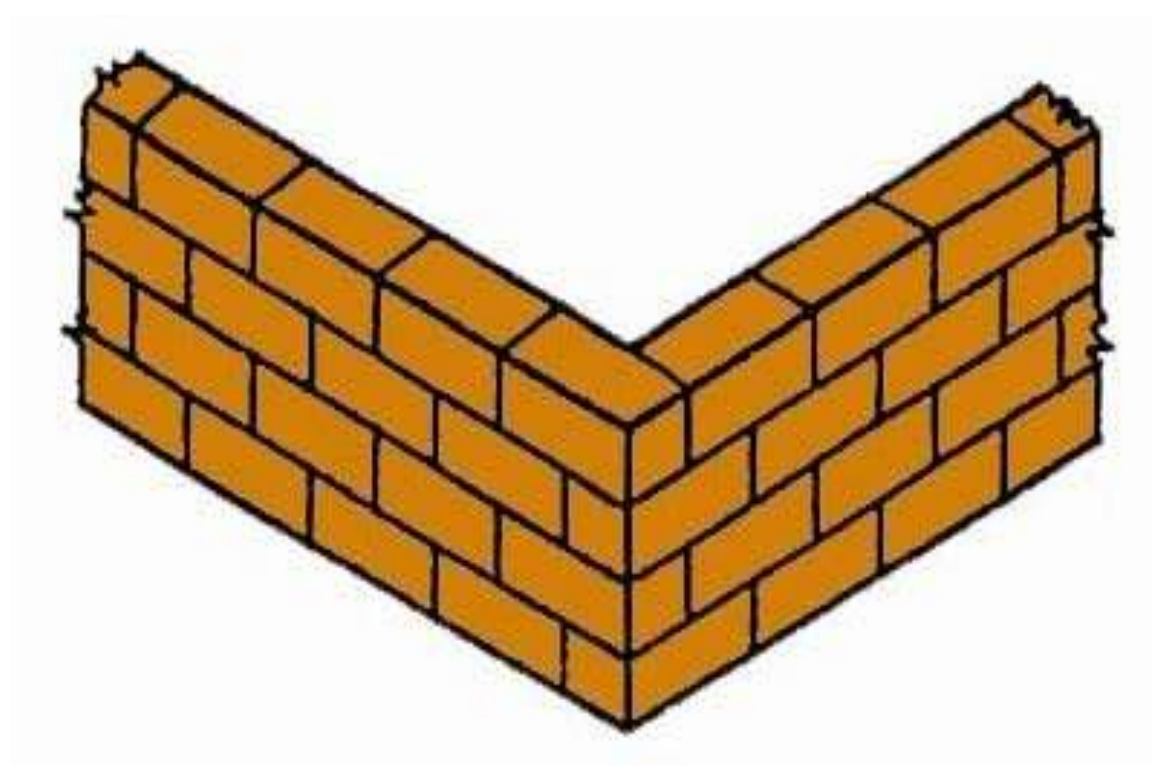
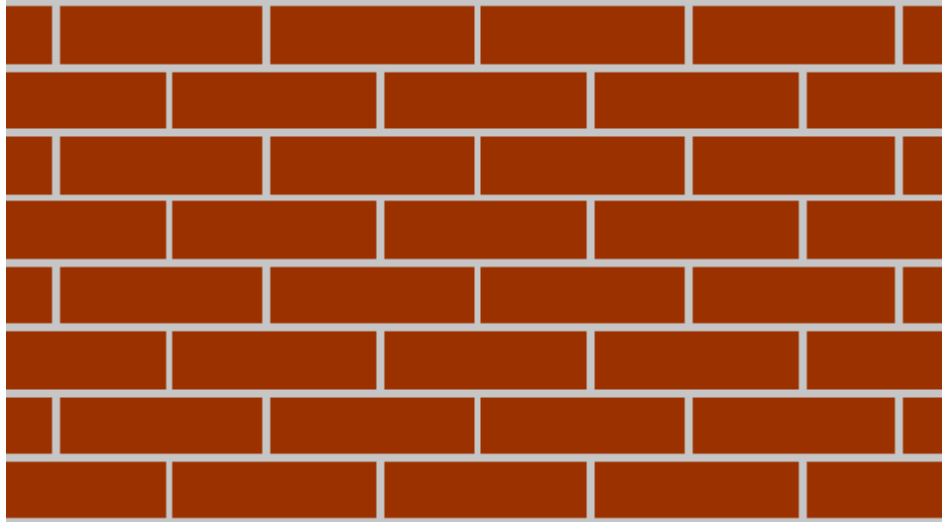
2. Stretcher Bond:

- ♣ In this all bricks are laid as Stretchers on the faces of wall
- ♣ Used when wall thickness = $\frac{1}{2}$ brick size
- ♣ Used as cavity walls, partition walls, division walls, chimney stacks, etc.,



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3. English Bond:

- ❖ Alternative courses of headers and stretchers
- ❖ Each alternate header should be centrally placed over a stretcher
- ❖ Queen closer will be provided after quoin header
- ❖ No continuous vertical joints
- ❖ Wall thickness = 2,4,6.. X half brick, both faces of wall will have same appearance



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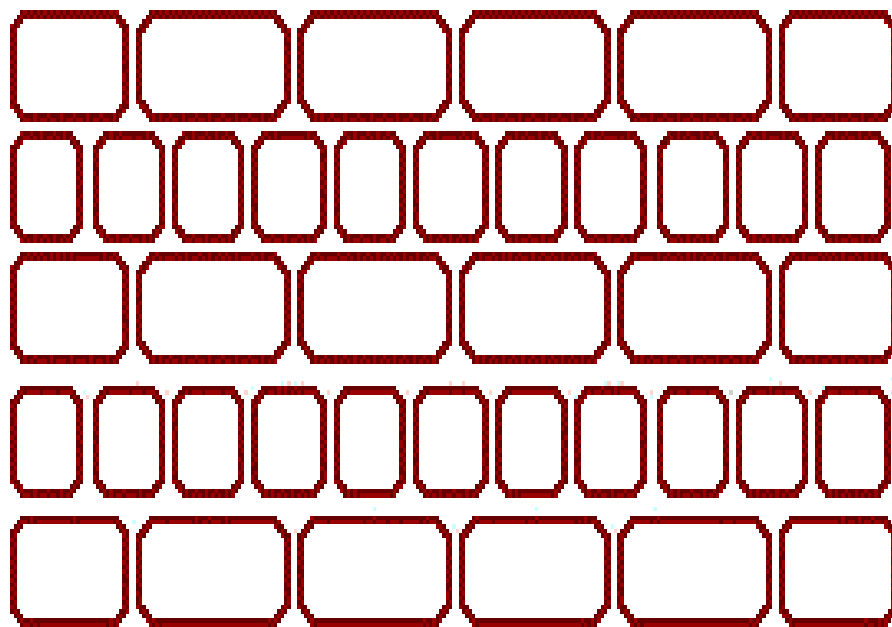
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- ❖ Wall thickness = 1,3,5.. X half brick, same course will have **headers** on one face and **stretcher** on other face of wall
- ❖ **Hearting** of thicker walls should have **only headers** in them.
- ❖ Most widely used bond.
- ❖ Heavy load carrying capacity.
- ❖ Uses of bats is avoided.

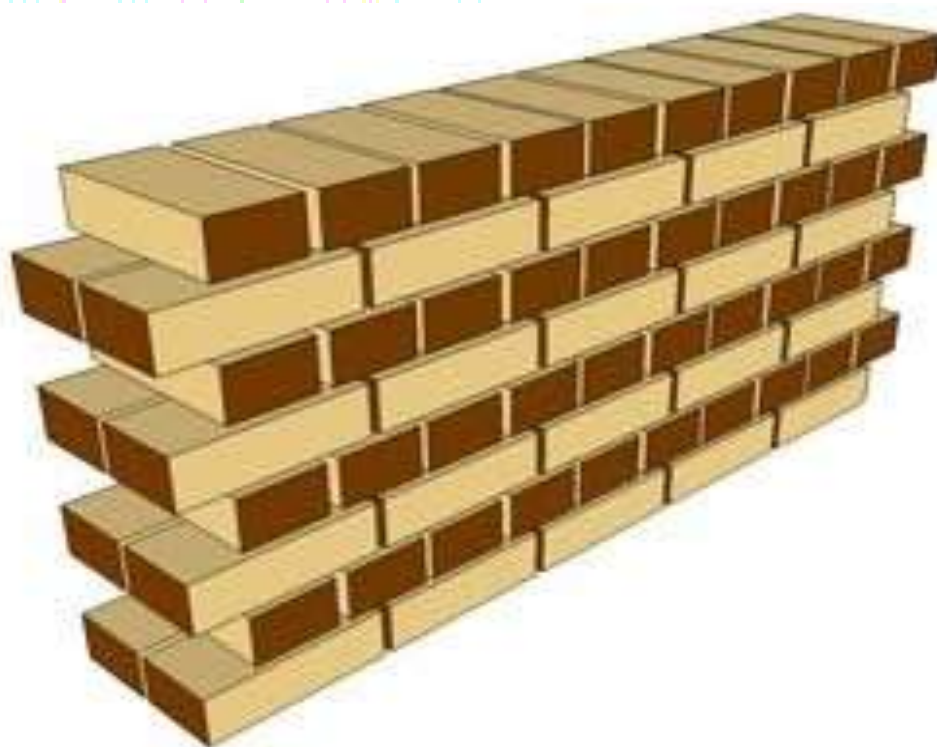


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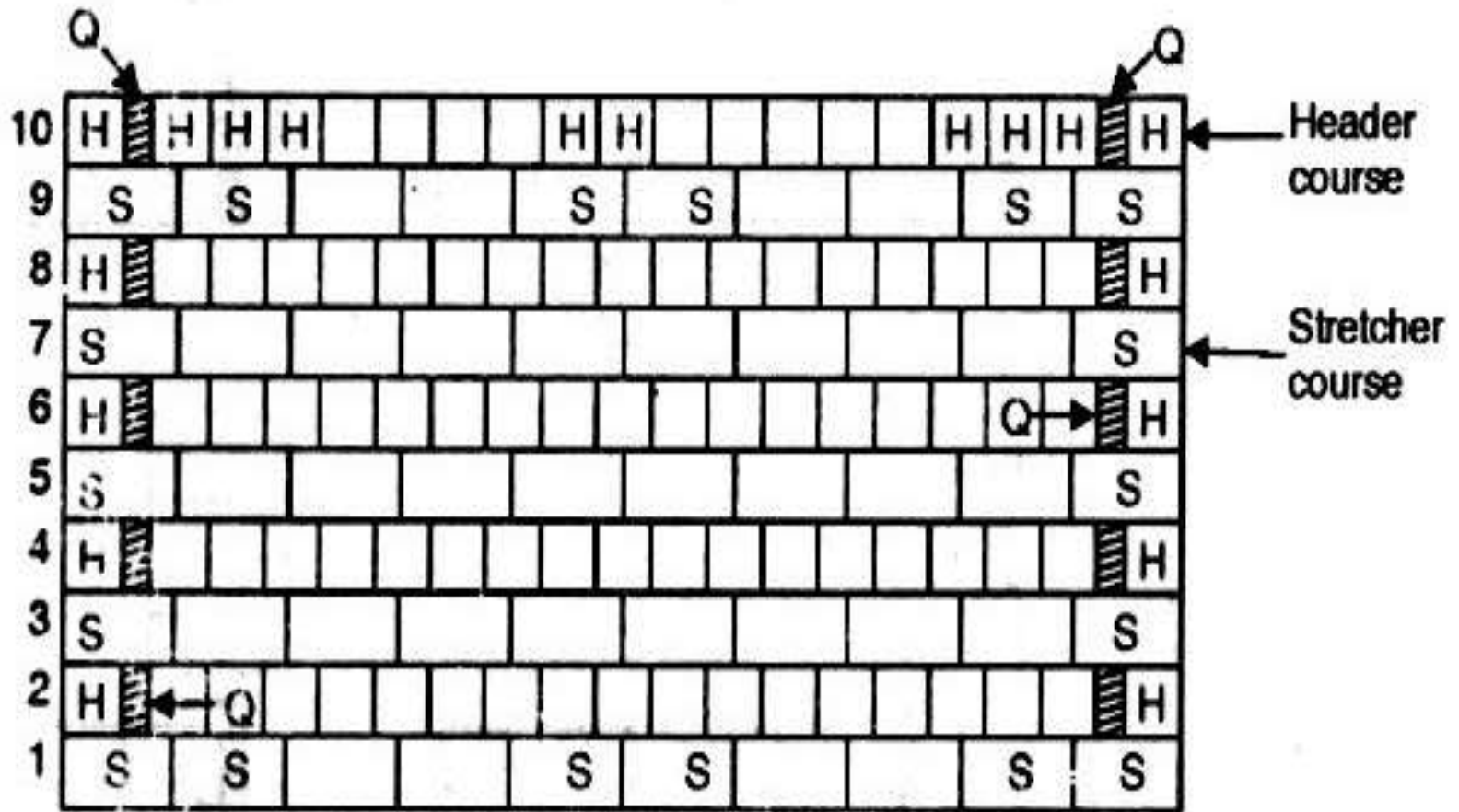


English



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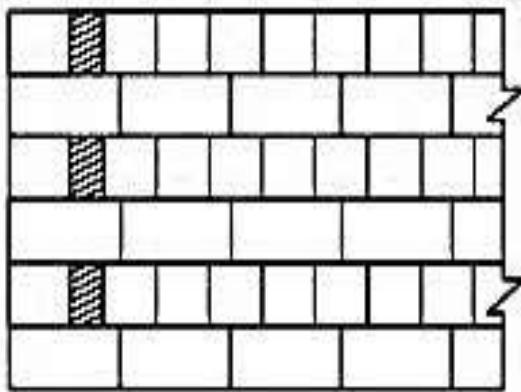
S = Stretcher ; H = Header ; Q = Queen closer

ENGLISH BOND.

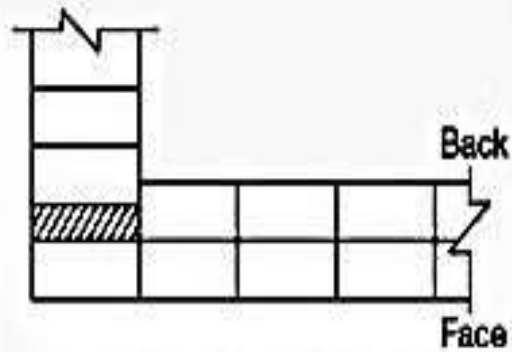


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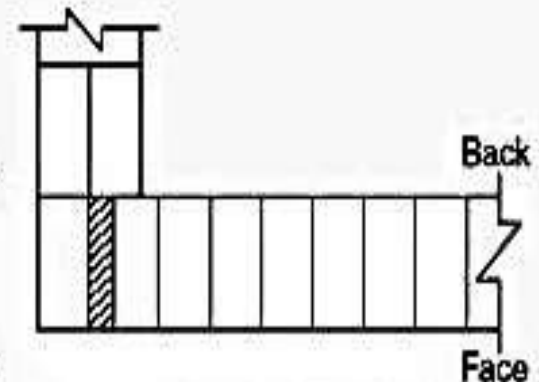
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Elevation

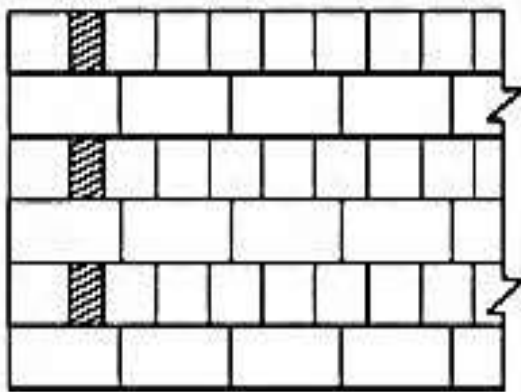


Plan of stretcher course

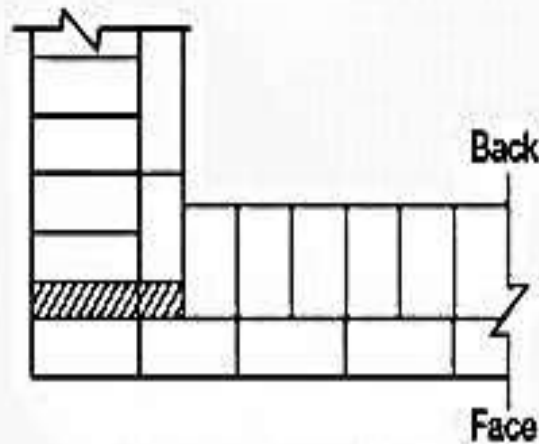


Plan of header course

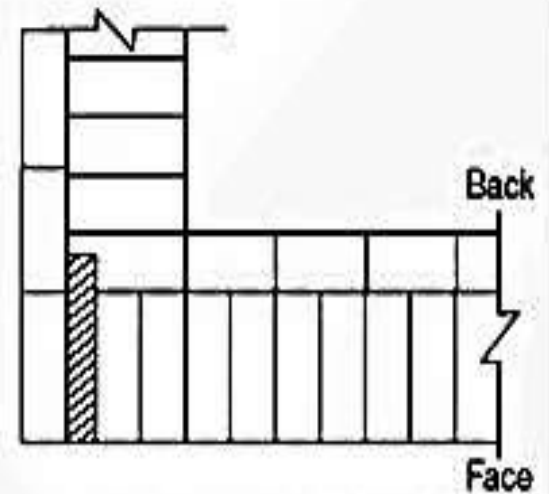
(a)



Elevation



Plan of stretcher course



Plan of Header course

(b)

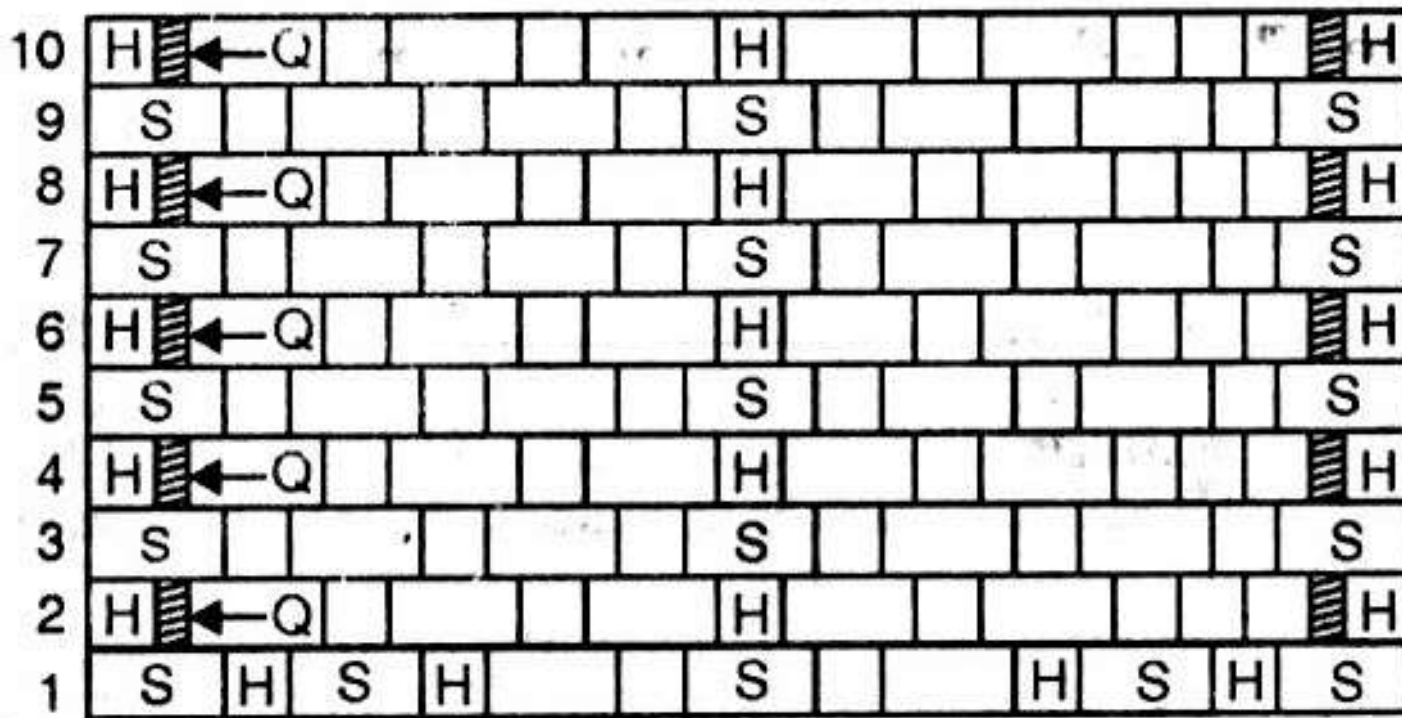
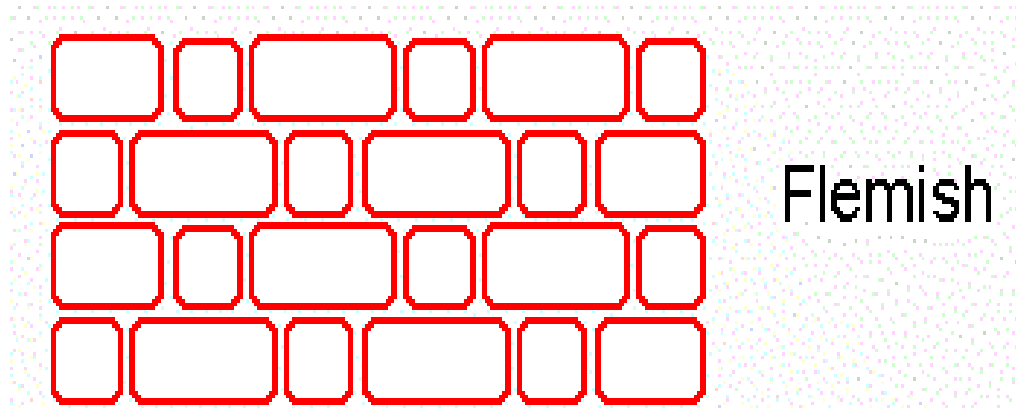
4. Double Flemish Bond:

- ❖ Every course consist of header and stretcher alternately
- ❖ Facing and backing of a course will have same appearance
- ❖ Queen closer will be provided after quoin headers in alternate course
- ❖ Wall thickness = 1,3,5.. X half brick, $\frac{1}{2}$ bats and $\frac{3}{4}$ bats are used
- ❖ Wall thickness = 2,4,6.. X half brick, no bats are used
- ❖ Better appearance than English bond.

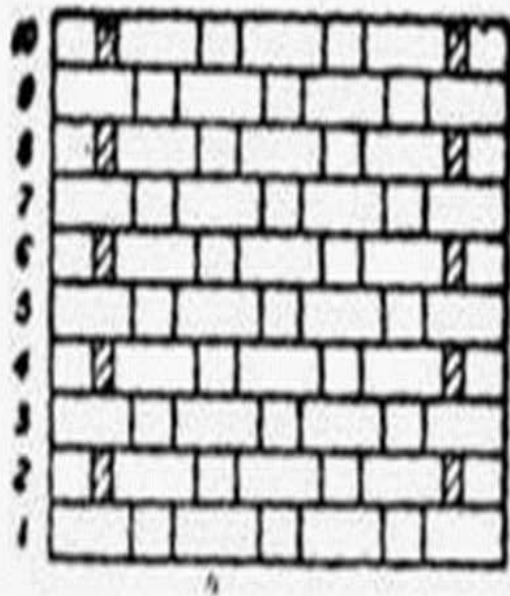


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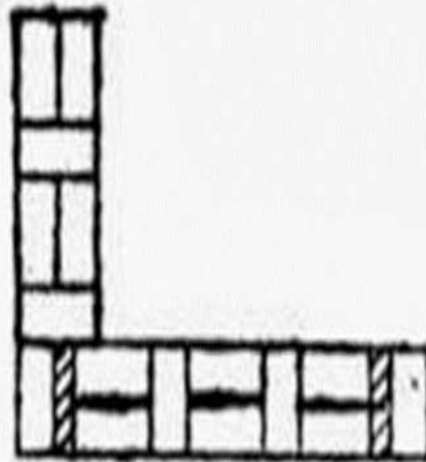
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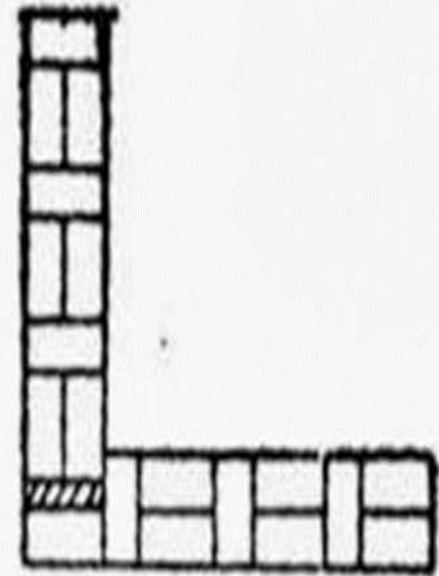
DOUBLE FLEMISH BOND (ELEVATION).



Elevation



Plan for 2,4,6 Courses



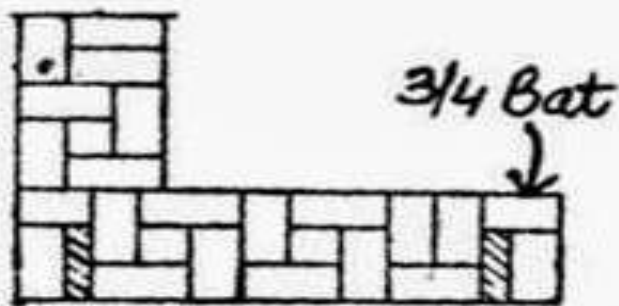
Plan for 1,3,5 Courses

One-brick wall double flemish bond.

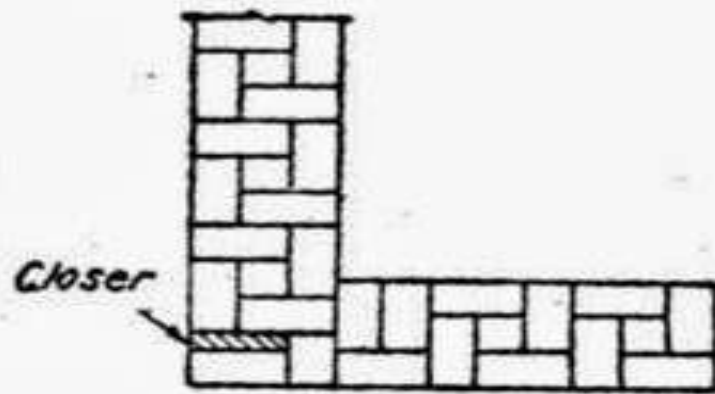


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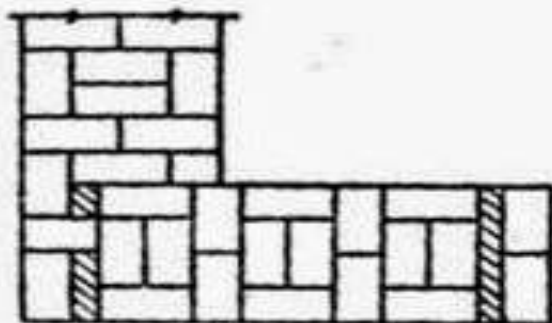


Plan for 2, 4, 6 courses

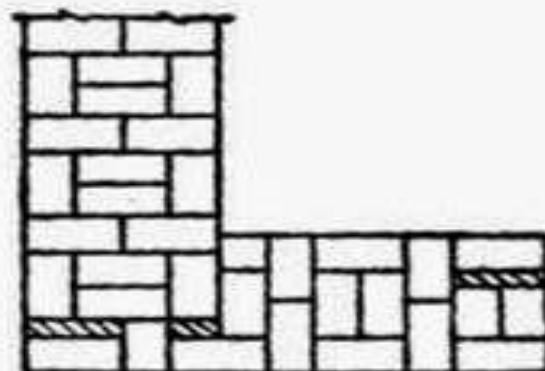


Plan for 1, 3, 5 courses

One-and-a-half-bricks double flemish bond.



Plan for 2, 4, 6 courses



Plan for 1, 3, 5 courses

Two-bricks double flemish bond.

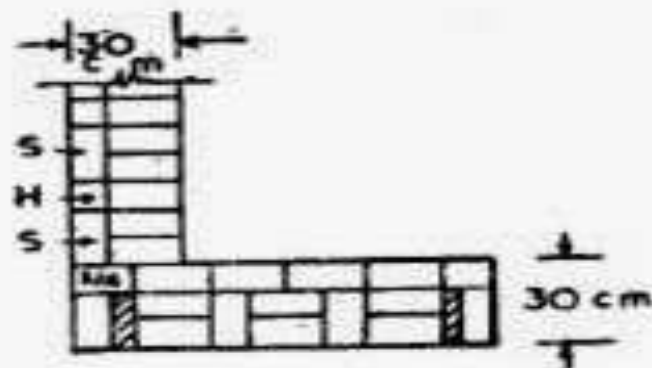
5. Single Flemish Bond:

- ❖ Double Flemish bond in facing & English bond in backing and hearting in each course
- ❖ It uses strength of English bond and appearance of Flemish bond
- ❖ Used only when wall thickness = 1.5 brick (min.)
- ❖ Good quality bricks in facing
- ❖ Cheaper bricks in backing and hearting

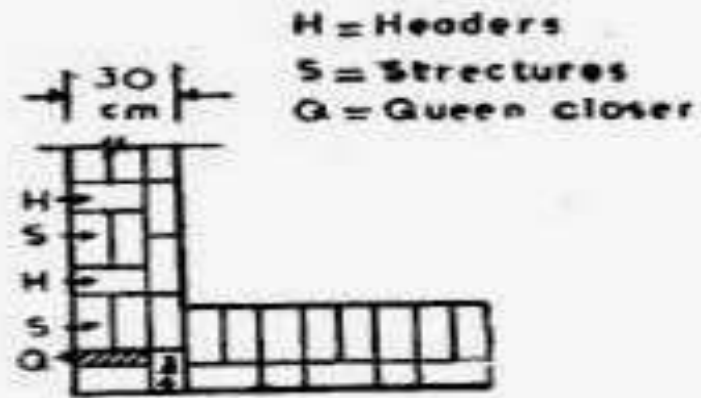


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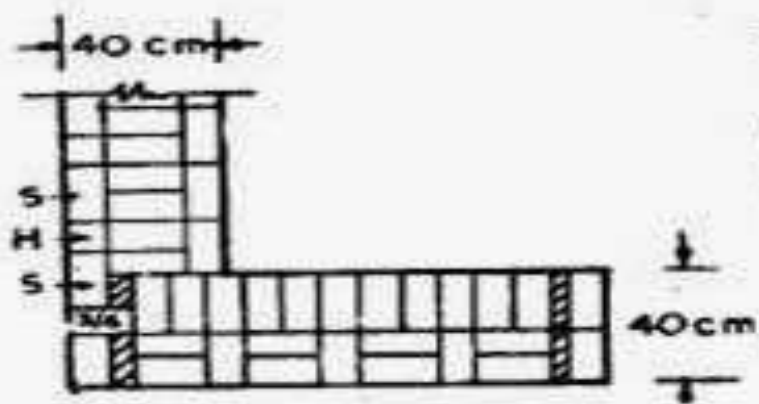


Plan for 1, 3, 5 courses

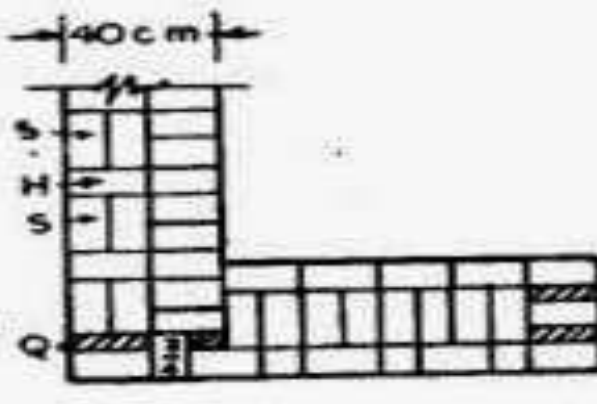


Plan for 2, 4, 6 courses

(i) ONE AND A HALF BRICK WALL IN SINGLE FLEMISH BOND



Plan for 1, 3, 5 courses



Plan for 2, 4, 6 courses

(ii) TWO BRICK WALL IN SINGLE FLEMISH BOND



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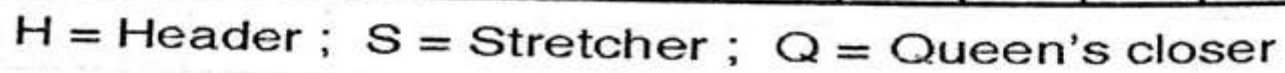
6. English Cross Bond :

- ❖ **Modification** of English bond
- ❖ Combines both **beauty** and **strength**
- ❖ Alternate header and stretcher courses
- ❖ Queen closer placed near quoin header
- ❖ **A Header** is introduced near **quoin stretcher** in alternate course



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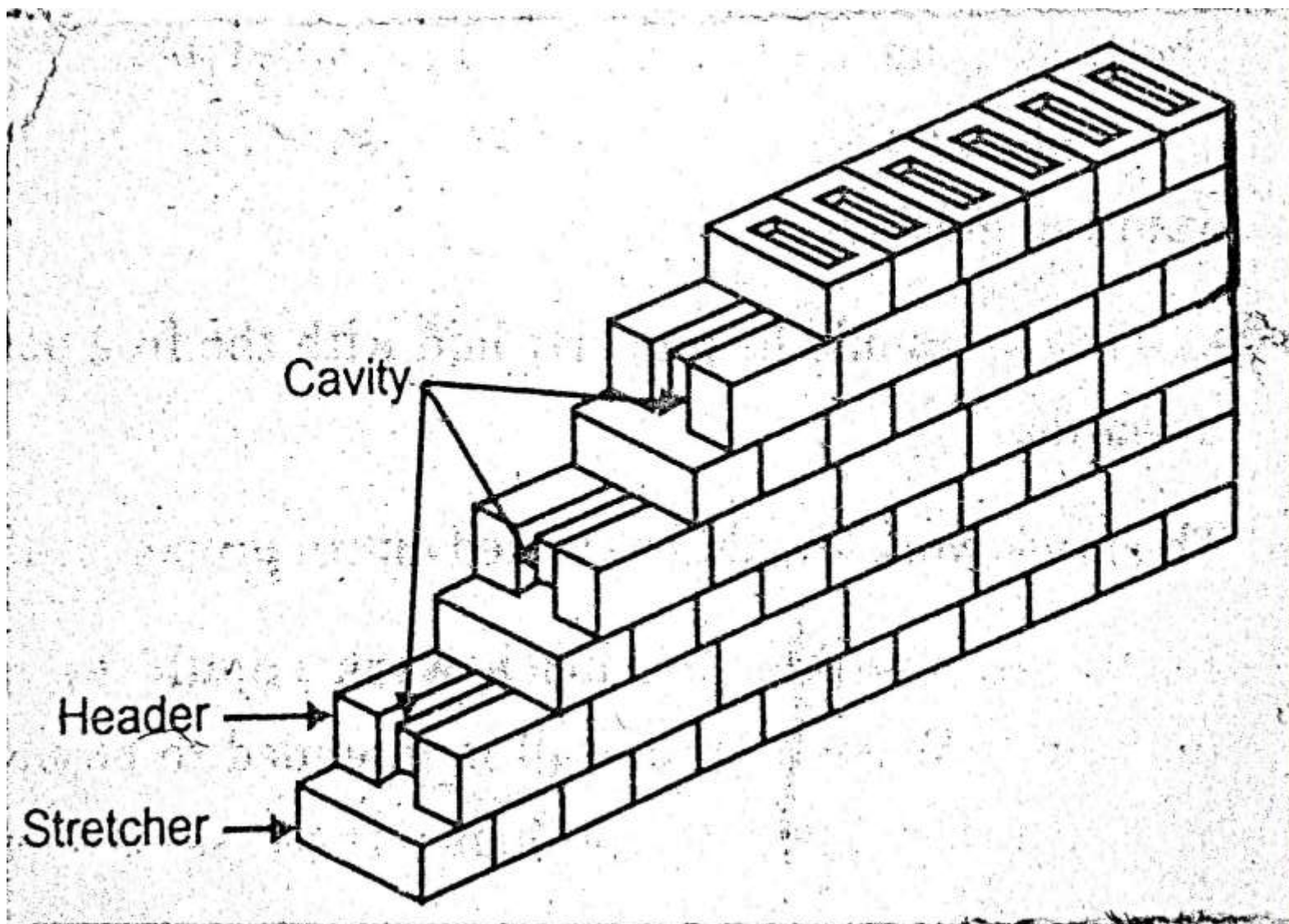
7. Brick on Edge Bond:

- ❖ Alternate header and stretcher course are laid
- ❖ Header as bed & stretcher on edges of wall
- ❖ So it forms continuous cavity throughout length
- ❖ Its is also called Sliverlock's bond or Cavity bond
- ❖ Used in compound walls, garden walls, boundary walls, etc.,



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8. Dutch Bond:

- ❖ **Another Modification** of English bond
- ❖ Alternate header and stretcher courses
- ❖ Every **stretcher course** starts with $\frac{3}{4}$ bats as quoin
- ❖ In that course, **header** also provided **next to** $\frac{3}{4}$ bats



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B ₃	H	S	S	S	H	B ₃	8
H	H				H		7
B ₃	H	S		S	H	B ₃	6
H	H				H		5
B ₃	H		S		H	B ₃	4
H					H		3
B ₃	H	S		S	H	B ₃	2
H					H		1

H = Header ; S = Stretcher ; B₃ = 3/4 brick bat

DUTCH BOND.



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9. Raking Bond:

- ❖ Bricks are placed **inclination** to the direction of wall
- ❖ Between **external stretchers course**
- ❖ Raking should be in **opposite direction** in alternate courses
- ❖ Provided between **4 to 8 courses** in height of wall
- ❖ Used in thick walls
- ❖ Wall thickness = **2,4,6.. X half brick**

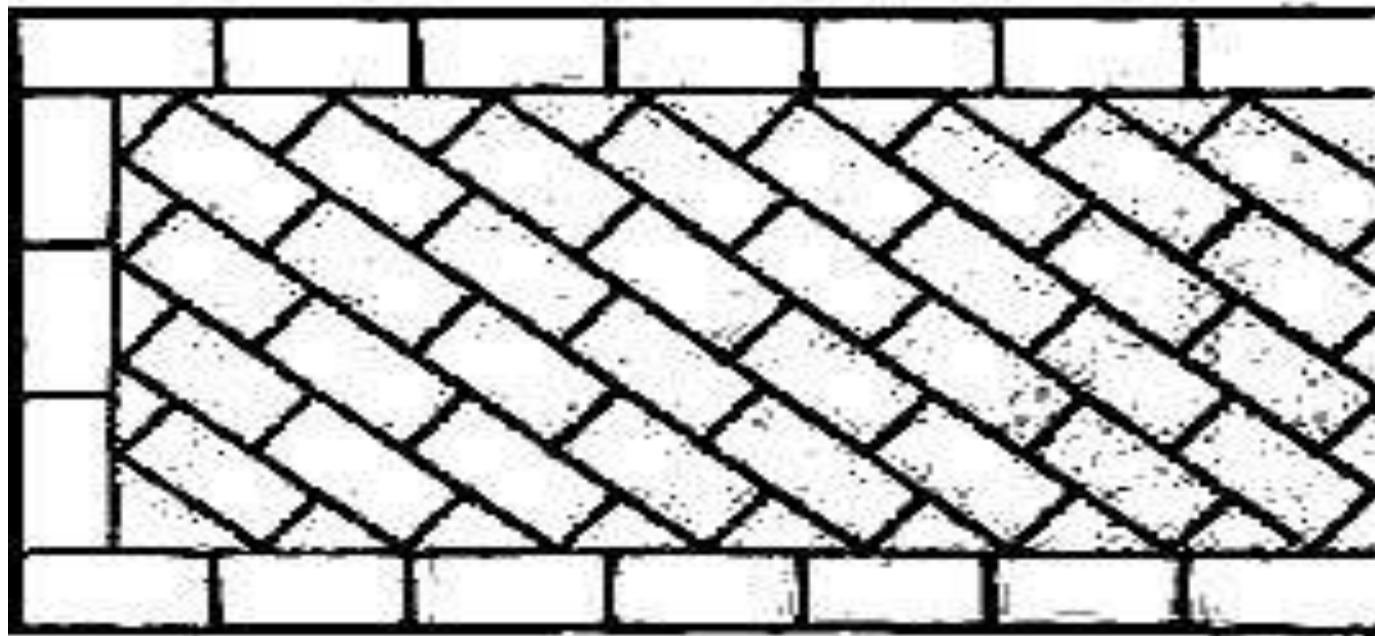


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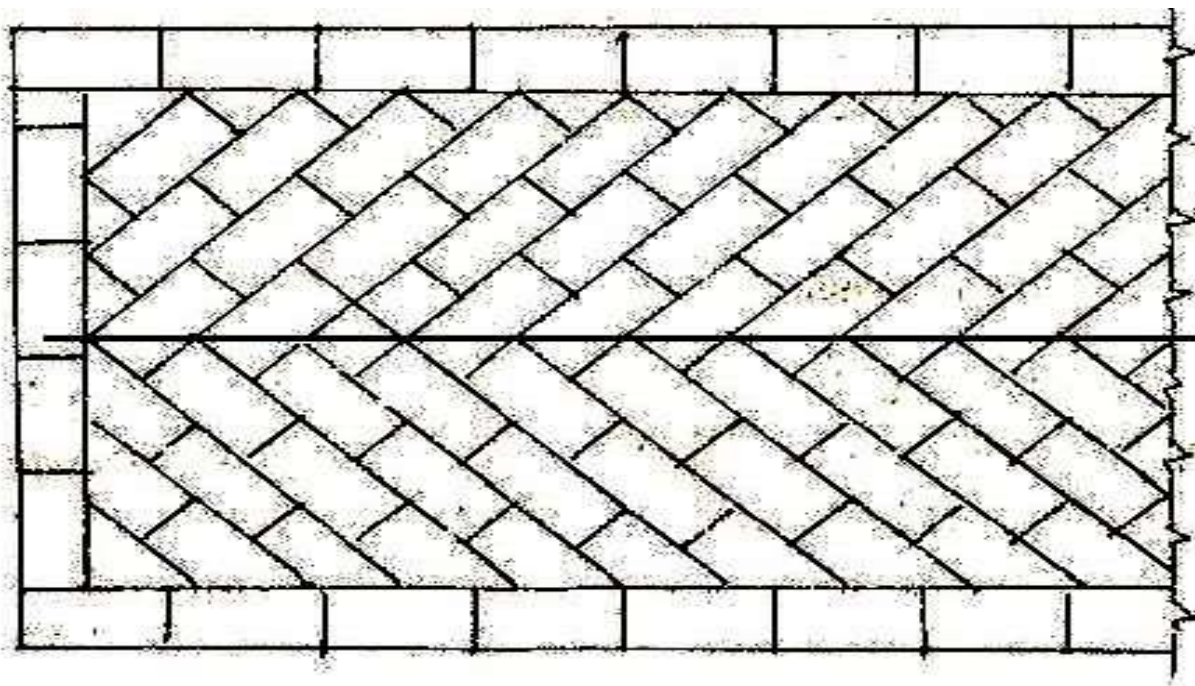
(i) Diagonal bond:

- ❖ Bricks are arranged at 45° to stretcher course
- ❖ Triangular pieces are used near the sides
- ❖ Suitable for wall thickness = 2 to 4 bricks



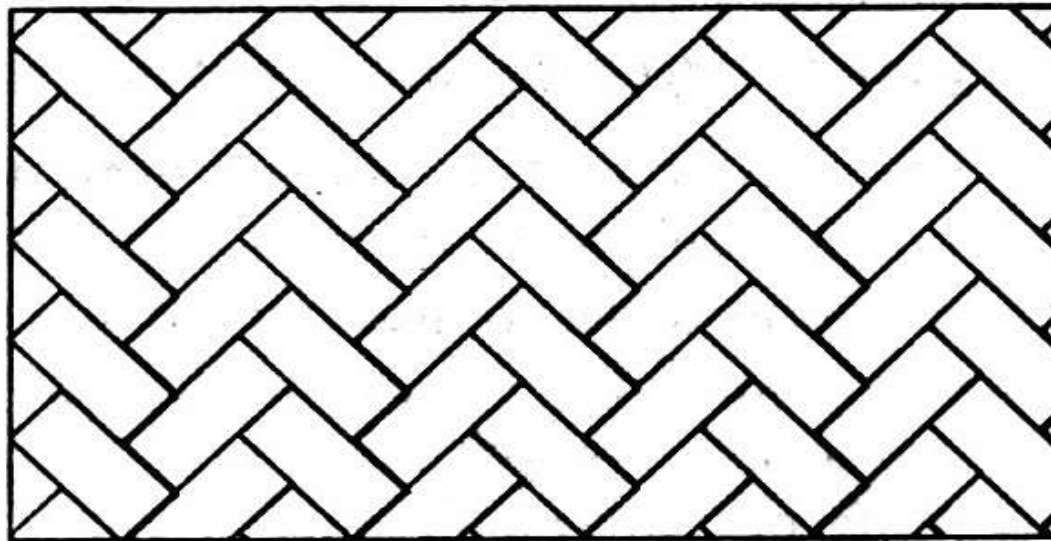
(ii) Herring Bone Bond:

- ❖ Bricks are arranged at 45° in two opposite direction from centre of wall
- ❖ Suitable for wall thickness = > 4 bricks
- ❖ Used in ornamental finish of face work and brick flooring



10. Zig-Zag Bond:

- ❖ It is like Herring bone bond
- ❖ Laid in the **Zigzag Manner**
- ❖ Used in the **ornamental Panels in brick flooring**



ZIG-ZAG BOND

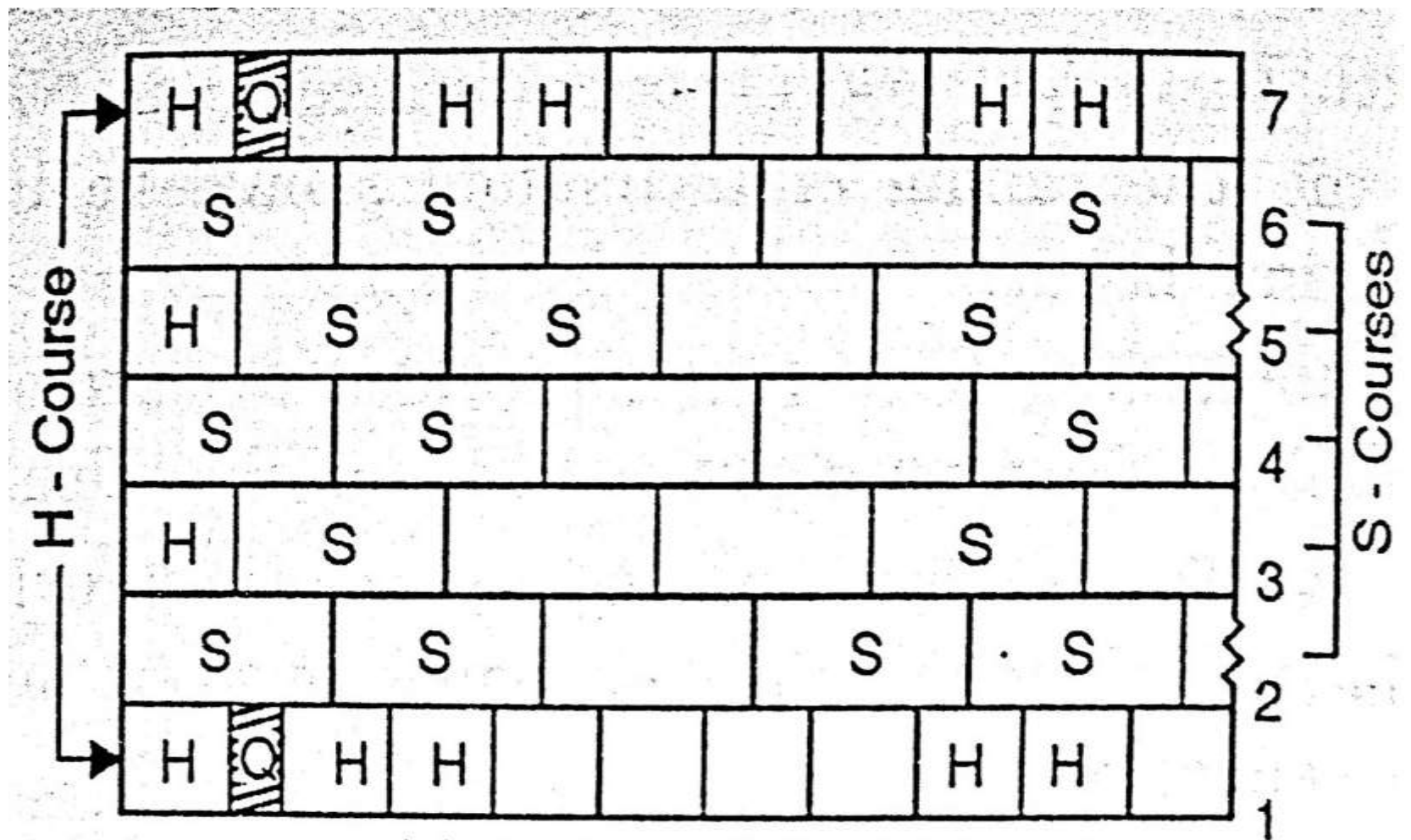
11.a English Garden Wall Bond:

- ❖ **Header course** is placed only after **3 to 5** **stretcher courses**
- ❖ In that course **Queen closer** placed near **quoin header**
- ❖ **Quoin header** placed alternatively in **stretcher course**



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(a) Garden wall English bond

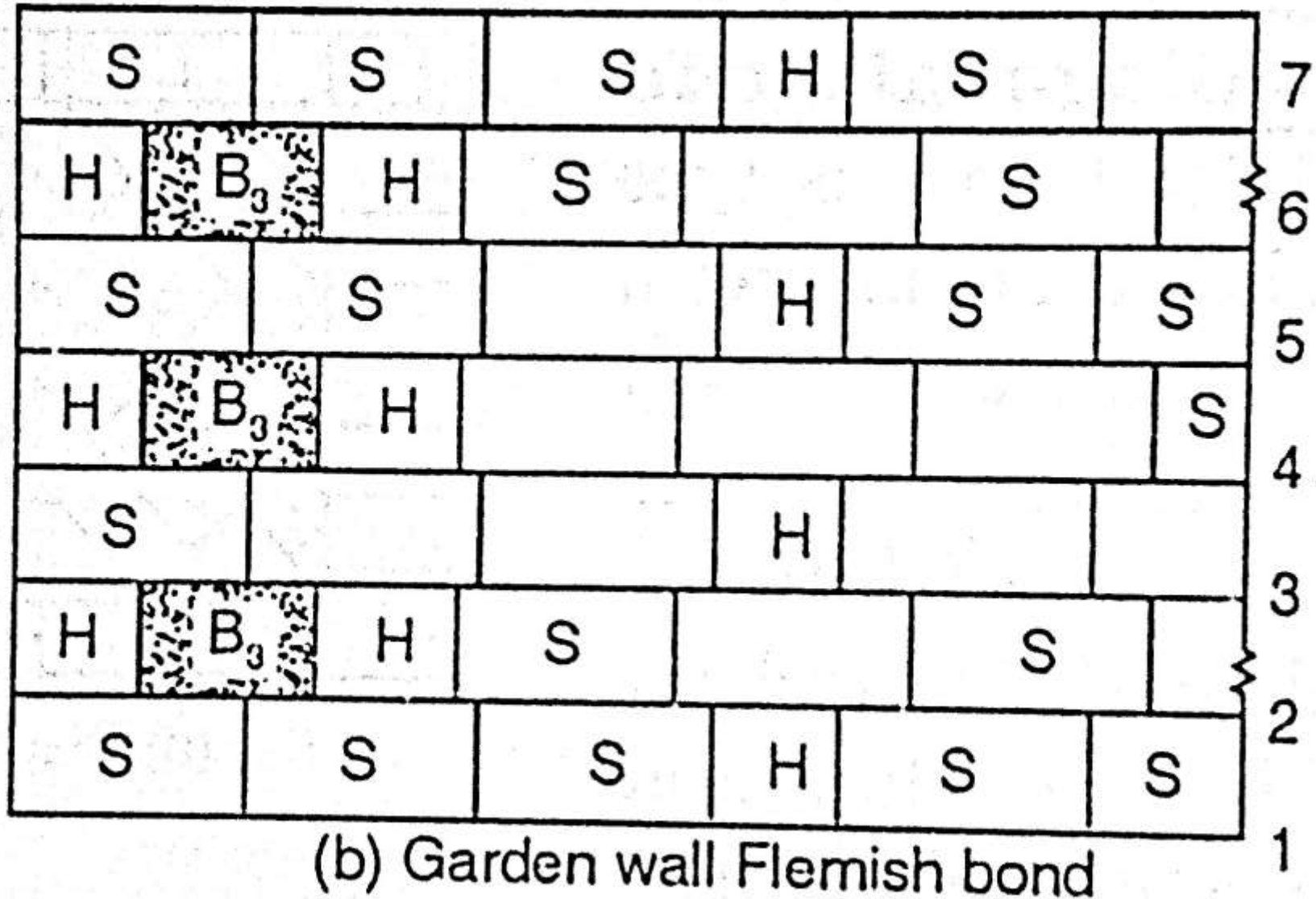
11.b Flemish Garden Wall Bond:

- ❖ A Header is placed after 3 to 5 stretcher in all courses throughout length
- ❖ Each alternate course will have $\frac{3}{4}$ bats after quoin header and a header is placed after $\frac{3}{4}$ bats
- ❖ It is also called Scotch bond or Sussex bond



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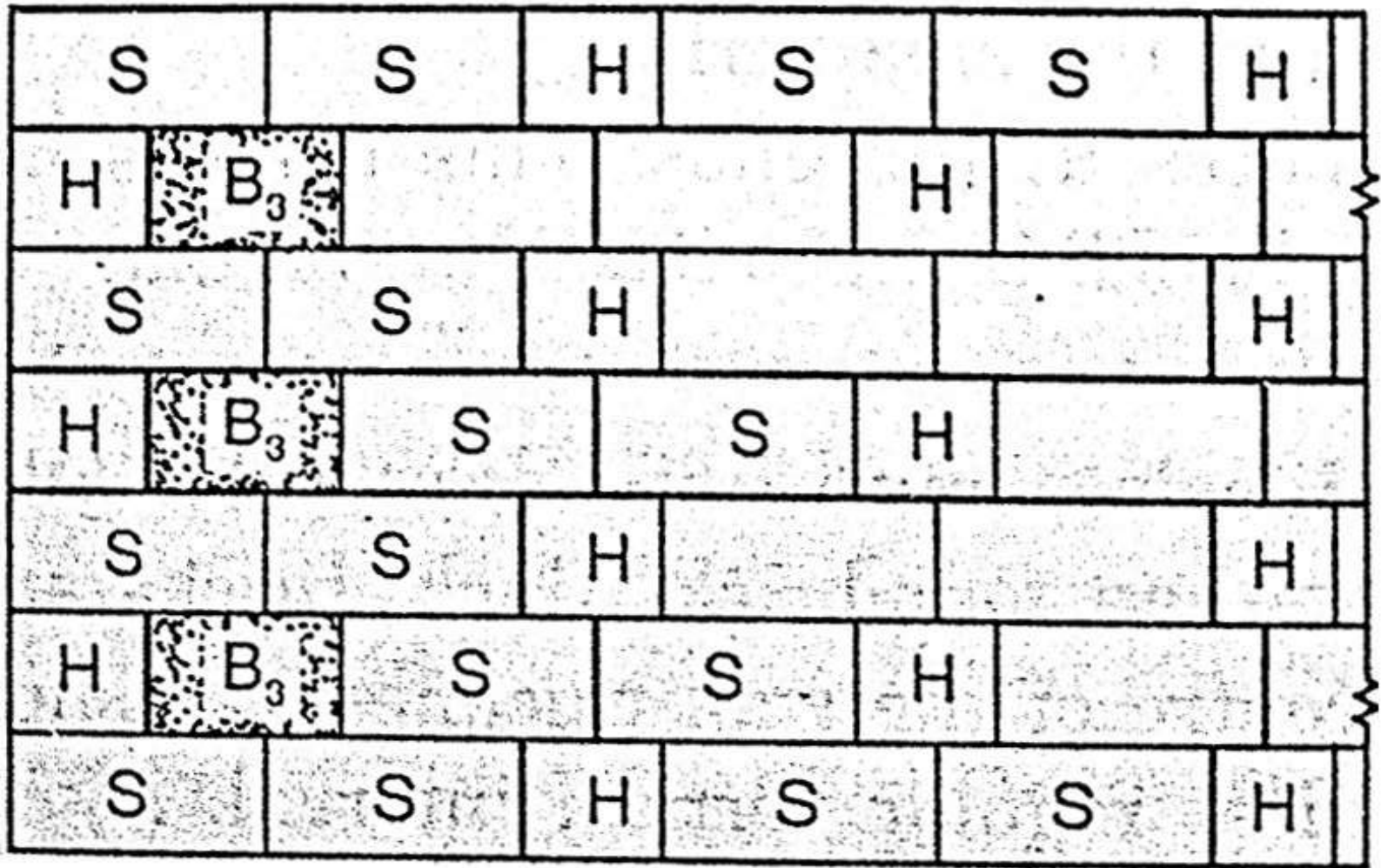
11.c Garden Wall Monk bond:

- ❖ A Header is placed after 2 stretcher in all courses throughout length
- ❖ Each alternate course will have $\frac{3}{4}$ bats after quoin header



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(c) Monk bond

Points to be considered in Brick Masonry

- ❖ Brick should be **Uniform** in size
- ❖ Bricks must be **soaked** in water before use
- ❖ Uniform **Lapping** is must
- ❖ Lap = $\frac{1}{4}$ **Brick** along **Length** of wall
- ❖ Lap = $\frac{1}{2}$ **Brick** along **thickness** of wall
- ❖ Use of **Bats** must be **reduced**
- ❖ **Vertical joints** must be in **same preperend**



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- ❖ As far as possible brick work should be raised uniformly throughout length
- ❖ **Height** of masonry construction in a day is restricted to **1.5 m**
- ❖ After brickwork it must be watered for **1 to 2 weeks**
- ❖ **Single scaffolding** must be used.
- ❖ For scaffolding **only headers** have to be removed
- ❖ **Stretchers** are used only in **facing**
- ❖ **Hearting** must be done only with **headers**



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