

CONSTRUCTION
ENGINEERING LAB

CIVIL ENGINEERING
SUB:CODE-315

MADIN Polytechnic College

INTRODUCTION

The art of construction on brick with common lime or mud mortar is called brick masonry. Bricks are obtained by moulding clay in rectangular block in uniform size and then drying and burning. The arrangement of brick without any vertical joint is known as bond.

Following are some bonds used in brick masonry.

- 1) English bond
- 2) Flemish bond
- 3) Stretcher bond
- 4) Header bond
- 5) Garden wall bond
- 6) Hacking bond

BRICK MASONRY

Mortar is used to keep the brick in position the following are the four types of mortar used in the brick masonry.

- 1) Lime Mortar
- 2) Mud Mortar
- 3) Cement Mortar
- 4) Surki Mortar

Mortar is prepared by mixing cement or lime with sand and adding water. Bricks are two types.

- 1) Wine cut bricks
- 2) Country burned bricks

The type of mortar depends upon the load coming on the stretcher. The gap between two bricks on a layer is known as lap joint. First, third, fifth etc layers are odd and second, fourth, sixth etc layers are even course.

BOND IN BRICK MASONRY

Bond is a process of arranging bricks and mortar. The bond can be classified as follows.

- a) Stretcher bond
- b) Header bond
- c) English bond
- d) Flemish bond

Stretcher bond:

In this type of bond all the bricks laid their length in a longitudinal direction of wall. All the stretchers are visible in direction.

Header Bond:

In this the bricks are laid in such a way that only heads are visible in elevation. Hence the heads are visible in elevation. Hence the header bond is given. This bond is suitable for the one brick wall and for curved construction. It is used for better transverse bond.

English Bond:

Alternate bond of stretcher and header are layered. A queen closer is placed after the first header in the header course to strengthen the vertical joint of successive joints.

Flemish Bond:

In this type of bond the headers are distributed evenly and hence it creates a better appearance than the English bond. In every course the headers and stretchers are placed alternatively.

TECHNICAL TERMS

Closer:

A piece of brick when it used to closes up the bond at the end of the brick courses known as closer.It help in preventing vertical joints.

Mitred Closer:

This is obtained by cutting a rectangular portion at the brick through the width and making an angle of 15 and 48 degree with the length of brick.It is used for placing at corners.

Queen Closer:

This is obtained by cutting a brick longitudinally in two equal parts.A queen closer⁴ is generally provided where header obtained as necessary loop.

King Closer:

This is obtainedby cutting triangle portion of the brick which that half a header and half a stretcher are obtained on the adjusting at face.A king closer is used where door and window opening to get satisfactory arrangement of the mortar joint.

Brick Bat:

This is a piece of brick accordingly known as 1 1/2 or 3/4 bat.

Bevelled Closer:

This is obtained by cutting a triangular portion of the brick (half the width) out of the fully length.Abevelled closer appear as closer on one face and as header on the other face.

Bull Nose:

A brick mould with rounded angle is formed as bull nose and it is used for header quion.

Stretcher:

This is a brick levelled with length parallel to the face or front direction of the wall.The course containing stretcher is known as stretcher course.

Arrises:

The edge formed by the intersection of the plane surface of brick are called arrises and should also sharp square and free from damage.

Bed:

Lower surface of the brick when laid flat is known as bed of brick or stone and is called bed joint.

Lap:

The horizontal lap is the vertical joint in the successive courses is termed as lap and for a good bond it should be on the 4th the length of the brick.

Perpend:

The vertical joint separating the brick in the length or cross section direction is known as the perpend and for a good bond the perpend in the alternate course should be vertically one above another.

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TOOLS REQUIRED FOR BRICK MASONRY

Mason's Square:

It is used in masonry to set at right angles.

Spirit Level:

It is used to check the horizontality of the works.

Plumb Bob:

It is used to check the level of bed masonry.

Trowel:

It is used to check to place the mortar in the and finish the work.

Spade:

To make the ground surface level.it is also used to excavating earth and mortar mixing.

Pick Axe:

Used to excavating trunches.this is used in hard soil and it consist of two ends,one flat and and other pointed.This is also used to check rouhgly and to split the stone in quarts.

Mortar Pan:

It is used to carry the mortar to the work site.It is made of steel.When preparing mortar the mortar is used as a meassuring device by taking the cements and sand for clear preparation.

Showel:

It is used as very suitable to take the concrete and place it in the pan.It is also used for mixing small quantity of concrete.

Floating edge:

This tool is level the spreaded mortar on the surface.

Straight Edge:

This is long square wooden piece.It is used to place brick in proper level and line.

Mesh:

It is used to sieve the sand.

Concrete Mixture:

Mixing the concrete by machine is more sufficient and produce concrete for better quality in a short time. This is available in various type and capacities.

Rubber Basket:

It is used for carrying materials to the work site.

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SETTING OUT WORK

Aim:

To set out the centre line.

Apparatus:

Peg, string, hammer, Mason's square, steel tape etc.

Procedure:

Arrange the largest center line of the plan on the ground by laying the string on two pegs on the both ends. The length should be atleast 120 cm more than the actual length. The extra length is provided by keeping the pegs safely from the earth work excavation. Place another string 60cm away from the pegs clearly on already fixed to mark the shorten side of the sheet. This string is perpendicular to the main string using mason's square. Fix the string and peg at both ends. The lenth of the string should be 120cm more than actual length. similarly the other two ends are laid on the plan. The other end inner line also be marked in ground by providing necessary offsets on each side and the sring are fixing the pegs aare driven on the ground at each end of these line after completing inner and outer of the construction works can be carried out.

Expt No.

Date

ENGLISH BOND - ONE BRICK WALL

Aim

To construct five consecutive layer of one brick wall in English bond at a corner.

Tools required

Trowel

Mason's square

Straight edge,

Spirit level

Plumb bob

Line and pin

Tape

Procedure:

At first the ground was made level, Then the bricks were saturated with water so as to prevent absorption of moisture from the mortar. The required quantity of mortar was prepared by manual mixing. Then the first course of bond was arranged on the level ground to the required length. The corner and the sides are checked by using masons's square and straight edge. Then the mortar should completely cover the beds as well as the sides of bricks. Then second course was placed over the first course.

The brick work should be carried out as per line and level .The vertical face was checked by means of plumb bob and the level was checked by means of sprit level .This process was repeated till the five consecutive layer were completed.

Result

The five consecutive layer of one brick wall in English bond at a corner is thus constructed

(Fig.1)

Expt No.

Date:

ONE AND HALF BRICK WALL

Aim

To construct a right angled corner wall of one and half brick wall in English bond .

Tools required

Trowel

Mason's square

Straight edge,

Spirit level

Plumb bob

Line and pin

Tape

Procedure

At first the ground was made level, Then the bricks were saturated with water so as to prevent absorption of moisture from the mortar. The required quantity of mortar was prepared by manual mixing. Then the first course of bond was arranged on the level ground to the required length. The corner and the sides are checked by using masons's square and straight edge. Then the mortar was placed over the bricks by using trowel. Then second course was placed over the first course.

The brick work should be carried out as per line and level . The vertical face was checked by means of plumb bob and the level was checked by means of sprit level . This process was repeated till the five consecutive layer were completed.

Result

The five consecutive layer of one and half brick wall in English bond at a corner is thus constructed. (Fig.2)

Expt No.

Date:

FLEMISH BOND- ONE BRICK WALL

Aim

To construct a right angled corner wall of one brick wall in Flemish bond at a corner .

Tools required

Trowel

Mason's square

Straight edge,

Spirit level

Plumb bob

Line and pin

Tape

Procedure

At first the ground was made level, Then the bricks were saturated with water so as to prevent absorption of moisture from the mortar. The required quantity of mortar was prepared by manual mixing. Then the first course of bond was arranged on the level ground to the required length. The corner and the sides are checked by using masons's square and straight edge. Then the mortar was placed over the bricks by using trowel. Then second course was placed over the first course.

The brick work should be carried out as per line and level .The vertical face was checked by means of plumb bob and the level was checked by means of spirit level .This process was repeated till the five consecutive layer were completed.

Result

The five consecutive layer of one brick wall in Flemish bond at a corner is thus constructed.(fig.3)

Expt No.

Date:

ONE AND HALF BRICK WALL

Aim

To construct a right angled corner wall of one and half brick wall in Flemish bond at a corner .

Tools required

Trowel

Mason's square

Straight edge,

Spirit level

Plumb bob

Line and pin

Tape

Procedure

At first the ground was made level,Then the bricks were saturated with water so as to prevent absorption of moisture from the mortar.The required quantity of mortar was prepared by manual mixing.Then the first course of bond was arranged on the level ground to the required length.The corner and the sides are checked by using masons's square and straight edge.Then the mortar was placed over the bricks by using trowel. Then second course was placed over the first course.

The brick work should be carried out as per line and level .The vertical face was checked by means of plumb bob and the level was checked by means of sprit level .This process was repeated till the five consecutive layer were completed.

Result

The five consecutive layer of one and half brick wall in Flemish bond at a corner is thus constructe.(fig.4)

Expt No.

Date:

BRICK PIERS IN ENGLISH BOND

Aim:

To construct a brick piers in English bond of brick thickness 1,1½ and 2.

Apparatus:

Manson's square
pegs
spirit level
plumb bob etc.

Materials:

Brick
cement
sand

water.

Procedure:

At first the surface was leveled and made even using an iron peg and thread. Two mutually perpendicular lines were set out that represent the outer edge of the cross wall and main wall. The bricks are arranged in odd and even courses as a pier pattern as shown in figure. In the one layer of cross wall a queen closer is placed as shown. The horizontality and verticality is checked with spirit level and plumb bob etc. respectively.

Expt No.

Date:

BRICK PIERS IN FLEMISH BOND

Aim:

To arrange consecutive courses of brick piers in Flemish bond.

Apparatus:

Mason's square
plumb bob
spirit level
trowel string peg
straight edge etc.

Principle:

In Flemish bond the headers and stretchers are placed alternately in each course. A pattern figure is adopted to avoid continuous vertical joints.

Procedure:

At first the ground surface was leveled and made even using iron pegs and threads two mutually perpendicular lines are set out and representing the arrangement in pattern shown in figure. In order to avoid continuous vertical joints, the queen clovers are used at suitable places.

Expt No.

Date:

T- JUNCTION 1½ WITH BRICK WALL IN FLEMISH BOND

Aim:

To construct a consecutive course of T – junction of 30cm external wall and 20cm internal wall in Flemish bond.

Apparatus:

Manson's square
peg
plum bob
spirit level
trammel etc.

Procedure:

First prepare a neat sketch showing the arrangement of section shown for bond. Level the ground surface and set out two mutually perpendicular lengths, using peg with thread representing outer edge of main wall and cross wall. The bricks are arranged in the portion shown in figure for odd and even course with one at their edge abounding again threads. In one of the layer of the cross wall a queen closer is placed at the starting portion in order to break the continuous vertical joint. The straightness and verticality are checked by spirit level and plumb bob respectively.

Expt No.

Date:

T- JUNCTION 1½ WITH BRICK WALL IN ENGLISH BOND

Aim:

To construct consecutive course T- junction of 30cm thick in external wall and 20 cm thick internal wall in English bond.

Apparatus:

Manson's square

string

peg

plum bob

spirit level

trowel

straight edge etc.

Procedure:

Set out two mutually perpendicular lines to make s the side of the main wall and cross wall. The bricks are arranged as shown in figure. After placing the morlar on odd and even course with one of their ends obtaining against the threads. Queen closer is used to avoid continuous vertical joint. The straightness and verticality are checked by using the straight edge.

PLUMBING

Introduction

Plumbing deals with the laying of a pipeline. A craftsman may be perfectly proficient with the hammer, saw and other tools, but the faces difficulties with leaking pipes and overflowing toilets. Many people rush to a plumber on seeking a tripping pipe, but a person with a little knowledge of the sanitary system can control this problem easily, saving time and, one with help of few tools.

Plumbing tools

The tools used by a plumber can be classified as follows

1. Pipe wrench
2. Hacksaw
3. Plumb bob
4. Pipe vice
5. Dies
6. Pipe cutter
7. Files and Rasps

Pipe wrench

A pipe wrench is used for holding and turning the pipes, rods and machine parts. Wrenches are classified as follows.

1. Fixed wrenches
2. Adjustable wrenches.

Pipe vice

A pipe vice is fitted on the work bench. This has a set of jaws to grip the pipe and prevent it from turning while cutting, threading and fitting of bends, couplings etc. The yoke vice is commonly used in plumbing used in plumbing practice.

Pipe cutter

The pipe cutter mainly consists of three wheels which are hardened with sharp cutting edges along their periphery. Of these three wheels, one can be adjusted to any desired distance to accommodate different size of pipes. After adjusting the cutter on a pipe, it is around the pipe, so that the cutter wheels cut the pipe along a circle as shown in fig.

Hack saw

Threading dies and taps

It is used for cutting external thread on pipes. Threads are produced in various shape and sizes which are used for fitting inside a handle.

Files and rasps

The file surface is covered with sharp edged teeth and its used for removing metal by rubbing. A rasp is used for finishing the surface of the work piece.

It is used for check the vertical line and made up of steel or brass.

Pipe fittings

Pipe fittings are made up of wrought iron. The size of pipe fitting is designated by the size of the pipe on which it fits. some of the common pipe fittings are shown in fig.

Coupling:

It is a short a cylindrical sleeve with internal threads throughout. A couplings is used for joining two pipes in a straight and bend where at least one pipe can be turned.

Union

A union is used for joining two pieces of pipes, where either can be turned. It consists of three parts, two parts joint can be screwed, in to two pipe ends, and the third on for tightening called centre part.

Nipple:

A nipple is a short piece of pipe with external threads at both ends. It is used to make up the required length of a pipe line.

Elbow

An elbow is to make an angle between adjacent pipes.

Tee

A tee is a fitting that has one side outlet at a right angle to the run. It is used for a single outlet branch pipe.

Reducer

It is used to connect two different sized of pipes

Plug

It is used to screw on to a threaded opening, for closing it temporarily.

Valves

Valves are used for regulating the flow of fluid through a pipe. The commonly used valves in plumbing's are

1. Gate valve
2. Globe valve
3. Plug valve
4. Check valve
5. Air relief valve.

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