

# 12

## ROOF

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### 12.1 INTRODUCTION

The structure provided to cover the house surface (floor) is known as roof. For different situation and requirement, it is made of different materials and methods such as RCC roof, Tiles roof, factory roof etc.

### 12.2 OBJECTIVES

After reading this lesson you will be able to:

- describe the importance of roof in a house;
- explain the various types of roof;
- explain the precautions to be taken in construction of roof;
- describe the construction activities in different types of roof.

### 12.3 IMPORTANCE OF ROOF

Predominantly, walls are used in the house for providing safety from different weather conditions. Roof made on the walls provides a cover from rain. The safety of a house is related to the strength of a roof.

### 12.4 TYPES OF ROOF IN A HOUSE

There are three important types of roofs such as:

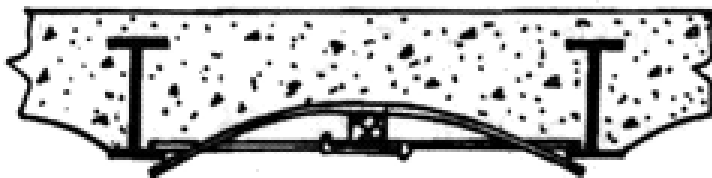
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1. Jack arch roofs
2. Sloppy roofs
3. Flat roofs

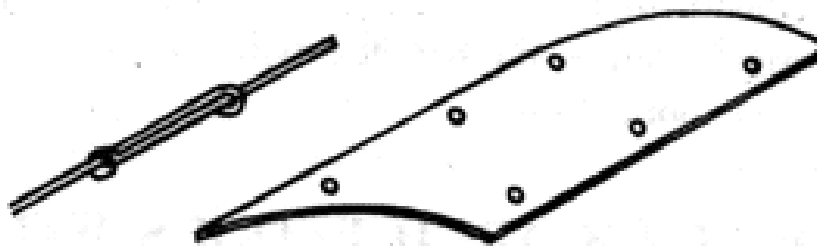
Besides above, another types of roofs are Tin, Cement sheets, T-iron, Stone slab, R.B.C and RCC slab.

#### 12.4.1 Jack arch roofs

In Jack arch roofs, Joist of appropriate size are kept parallel at interval of 1 m (approx) so as to complete span of a room is divided into one meter span. Arches are made on a pair of two girder. Dot of bricks are constructed at the lower flange by temporarily centering.



**Fig. 12.1:** Method of Jack Arch roofs construction



**Fig. 12.2:** Centering (Mould of Jack Arch roofs)

After 4-5 days of construction of dot at all span, centering is removed after hardening of mix and can be reused.

Although construction of this roof is easy and moulding is easy but upper surface is circular curve. Upper surface is made flat by filling concrete.

Steel bars with plate and bolt are provided at one meter interval in construction of last spans dot.

The use of concrete for upper surface and necessarily of girder makes these roofs redundant.

### 12.4.2 Sloppy (Inclined) Roofs

Sloppy roofs are used in those places where upper surface of roofs is not in use, span is large and aesthetic view is not required in inner surface. In hilly areas due to the possibility of snowfall, the top floor, roofs are made sloppy. The shade of workshops are also made sloppy. A sufficient capacity frame is provided to support the surface load of sloppy roofs. There are two types of sloppy roofs:

1. One sided slope
2. Two sided slope

For small span (2.5 to 3 m) one sided sloppy roofs are provided viz. verandah.

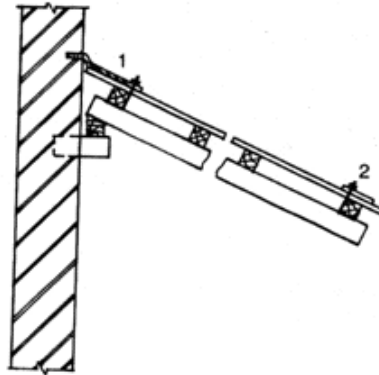
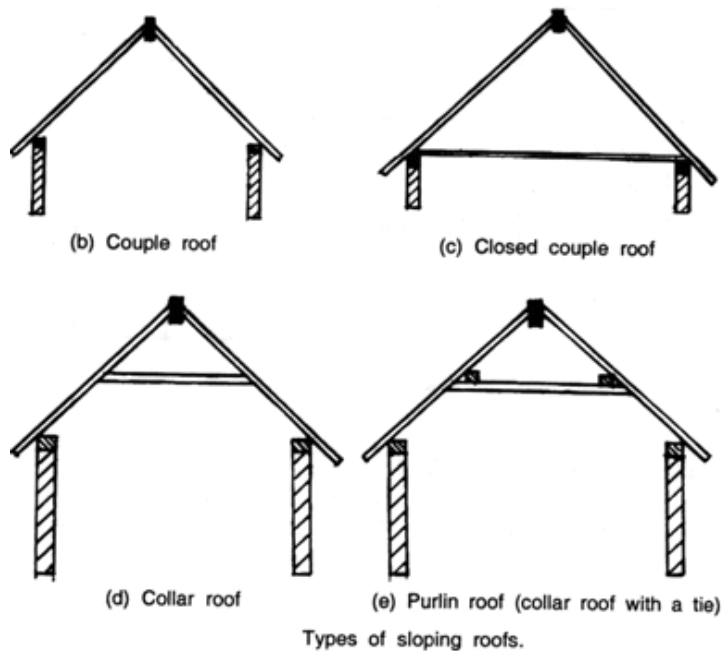


Fig. 12.3: One sided slope

Various materials are used to cover sloppy roofs.



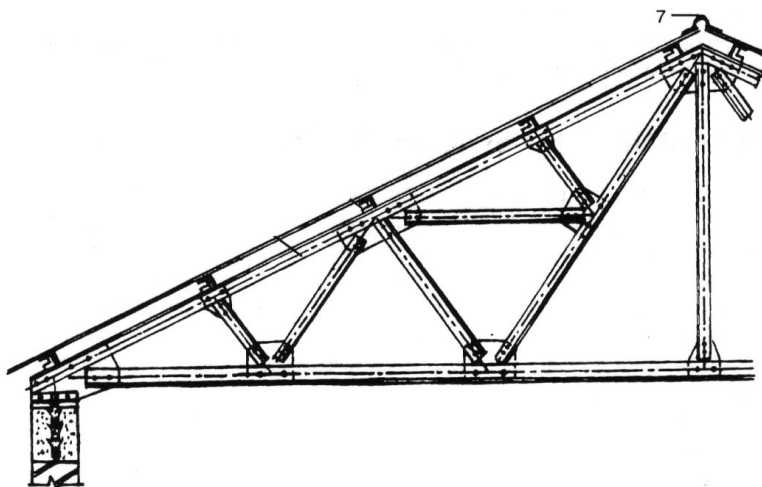
Types of sloping roofs.

Fig. 12.4: Both sided sloppy roofs

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Normally two sided sloppy roofs are couple roofs, attached at base level are closed. Couple, attached at mid level are collar roof and purlin with collar are known purlin roof.

Rain water falls from both side of roof for which gutters are provided at lower side. Both sloppy sides are met at ridge and gap is covered with special size ridge sheets.



**Fig. 12.5:** Roof truss

These are two types. Grooved (width 1 mm after fixing) and Traffered. In grooved sheets, six grooves are provided as shown in fig. 12.6.

### 1.Grooved Sheets

Sheets are made of zinc coated thin steel sheets, asbestos sheets, aluminum sheets. The fabrication procedure of these sheets are same.

Lower section is made of wood (sequence sect.) iron pipe or iron angle section.

All sloppy roofs are started from bottom and end to top. Sheets are attached to lower frame with the help of clamps or nut-bolts.

When span is large, both sided sloppy roofs are used. The frame work required to support these roofs is known as truss. Truss is made of angles, revetted or welded plates. These trusses can be seen as a roof support trusses at railway station platform.



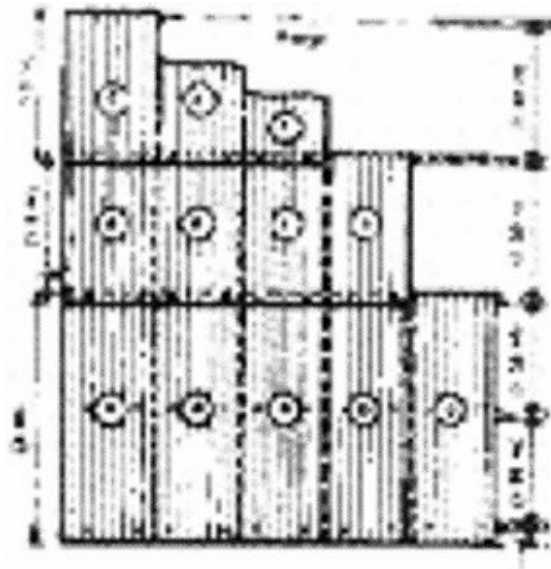
**Fig. 12.6:** Traffered and plane corrugated sheet.

Plane sheets are without any grooves.

### Method of laying AC sheet

(see fig. 12.7 and 12.8)

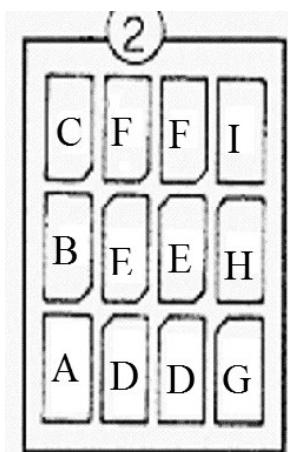
1. Before laying the sheets, it is required to check the distance of both purlin and length of sheet so as minimum overlapping of 150 mm in sheet length, maximum, projection at caves, 300 mm and overlapping of 75 mm is available at ridge.
2. The rough surface should be inner side.



**Fig. 12.7:** Method of laying AC sheets.

3. To adjust next sheet on previous one, the lower groove should be at left and upper groove should be at right on previous one by moving, left to right from the eaves. (In fig. A, B, C D). In this manner, first line has been laid. All sheets should be mitred at upper left except 1<sup>st</sup> sheet of left corner.
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4. Now the lower right corner of first sheet of 2<sup>nd</sup> line should be mitred, other sheets (except the last one) are nitred at two corner (upper left and lower right). Last sheet is mitred at upper left corner.

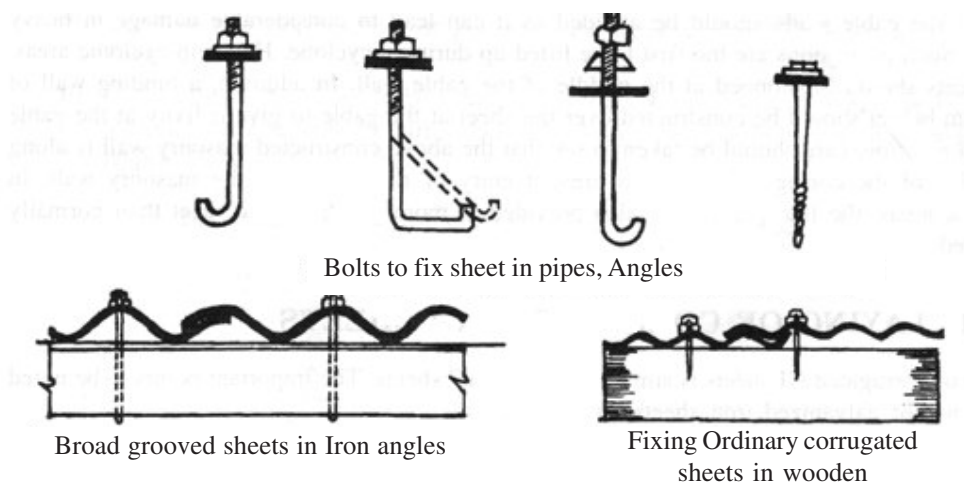


**Fig. 12.8:** Method of laying AC sheets

#### 12.4.4 Asbestos Cement Roof

All sheets are laid according drawing. Purlins (pipe etc.) should be horizontal. Smooth surface should be outer side. Sheets are laid from left to right. Side lap should be half groove and lower side lap should not be more than 30 cm, out the wall.

At joints J or L shape look bolts are used. Size of bolt should be 8 mm. At the time of bolting, a bitumen washer is used below a tin washer to check the water from bolt gap.



**Fig. 12.9:** Method of laying asbestos cement roof

In laying GIC, lap are provided at width and length, 2.5 times of groove size and 15 mm respectively. The shape of AC sheet is such that the side lap of half groove.

In sloppy roof (couple roof), on upper function viz. ridge, in A.C. sheet both sided A.C. ridge is provided to close completely ridge function and in GIC sheeting; plain GIC sheet flasing is used.

To tie the sheets in high pressure of wind, in lower purlin position, a flat iron strip is provided covering all sheets. This is known as wind tie.

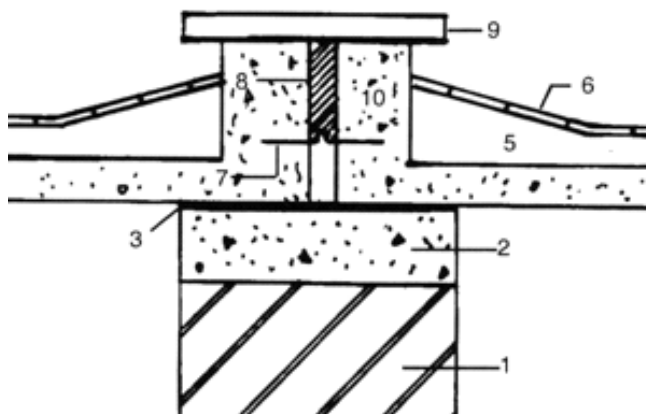
The edge of roof is known as eave.

For rain water, gutter is provided at appropriate slope. A rain water pipe is provided at the end with special size gutter end.

#### 12.4.5 Flats roofs

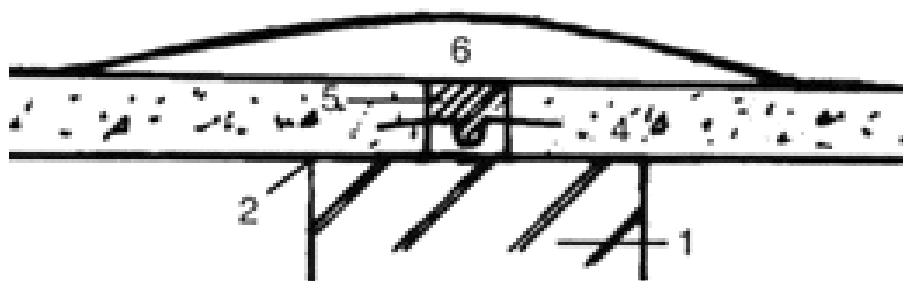
These are following types:

1. **Kachi roof:** They are made of wood planks on ballies.
  2. **Stone slabs:** Square shape stone slab are kept on Angle or T iron. These are permanent and are in use now days due to simple construction.
  3. **Prefabricated roofs:** They are used at important places where prefabrication facilities are available.
  4. **RCC roof:** Wood planks, plywood or iron plates are used as shuttering. Reinforcements are placed according to the drawing. Generally cement, sand and aggregates are mixed in 1:2:4 ratio. Vibrators are used in casting of roof. After 24 hrs. curing starts which remains till next 14 days. After 14 days shuttering is removed.
  5. **Expansion joints:** Following two figures show the expansion joints. This joint is provided at adjacent roofs and structured in such a way that rain water can not enter.
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(a) Expansion joint at both side of beam

1. Brick wall work 2. Concrete brick, 3. Craft paper 4. Slab 5. Brick Jale concrete 6. Membrane water proofing 7. Wafers 8. Joint filler 9. Two layer of concrete 10. Beam.



(b) Expansion joint in slab on walls at both side

1. Brick wall work 2. Craft paper 3. Slab 4. Water slope 5. Joint filler 6. Water proofing.

**Fig. 12.10:** Expansion joint

6. **Mud Phuska :** If bitumen paint is provided at the RCC roof, the following method should be followed:

The RCC slab is cleared off dust and loose materials.

Normally 80/100 bitumen is used. After boiling it is spread over so as white spot do not remain. It is painted upto 6" height parapet wall.

Immediately after painting, a layer of coarse sand is spread over the coat of bitumen at the rate of  $0.6 \text{ m}^3$  of sand per  $100 \text{ m}^3$  of roof surface.

Mud phuska is prepared from puddled clay mixed phuska at the ratio of about 8 kg of bhusa/ $\text{m}^3$  of clay. From mud phuska 5 cm slope is provided at roof. After 24 hrs. brick tiles are laid, with 1 cm gap. After this the joints are filled with 1:3 cement mortar. After drying flush pointing is done.



This is for one floor house. But nowadays homes are multistoried, in which top roof is covered with glazed tiles to reflect the sun rays. This reduces heat in roof.

### **12.5 DRAINING OF WATER FROM ROOF**

Pipes are used to drain rain water from roof. These are known as rain water pipes. Earlier CI and cement pipe were used. But now plastics pipes are used. The diameter, bends, sockets etc. are shown in detail drawing of a house.

### **12.6 WHAT HAVE YOU LEARNT**

- Roof construction in a house
- Types of roofs
- Methods of water drain from roofs

### **12.7 TERMINAL QUESTIONS**

1. How many types of method are used for constructing roofs in a house?
  2. How many types of sheets are available to construct the roofs in a house?
  3. What precautions should be taken in construction of roofs?
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