

1.3 THERMAL INSULATION

- The materials which are used to insulate the building thermally are known as thermal insulating materials.
- Thermal insulation is to reduce the flow of heat to and from a body. It is a material that reduces the rate of heat flow.
- The aim of thermal insulation is to minimize the transfer of heat between inside & outside of building

GENERAL PRINCIPLES OF THERMAL INSULATION

- ❖ The thermal resistance of an insulating material is directly proportional to its thickness.
- ❖ The provision of an air gap is a very important insulating agent.
- ❖ The thermal resistance of a building depends on its orientation also.
- ❖ Heat energy that flows from one region to another is due to the difference in temperature between the two regions. The heat is transferred by conduction, convection or radiation.

CLASSIFICATION OF THERMAL INSULATING MATERIALS

Thermal insulating materials are classified as

- Organic materials
Silk, Wool, Cardboard, Paper, Leather
- Inorganic materials
Air, Mineral wool, Glass wool, Charcoal

METHODS OF ACHIEVING THERMAL INSULATION

- ❖ Use of materials with low conductivity
- ❖ Thickness of walls & roofs
- ❖ Provision of air spaces
- ❖ Heat insulation by orientation
- ❖ Thermal insulation by shading
- ❖ Providing sufficient height of ceiling

By using thermal insulating materials, it is possible to achieve the desired degree of thermal insulation. The methods of such thermal insulation of roof, external walls, doors & windows.

THERMAL INSULATION OF ROOFS

- Thermal insulating materials may be laid over the roofs, but a water proof course is essential below them.
- Providing a 25 mm thick concrete mixed with coconut pith is one such method of thermal insulation.
- Another method of external insulation is by providing AC sheets on bricks.

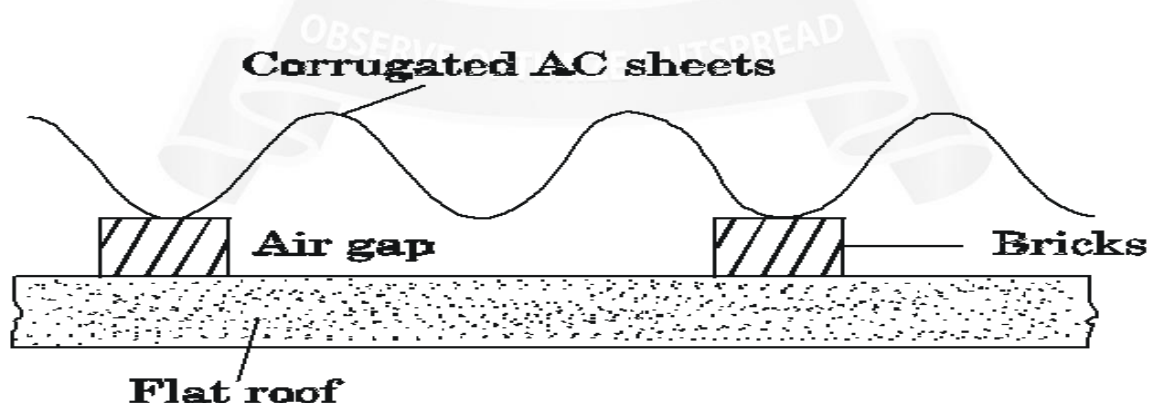


Fig 1.1.1-Insulation of Roofs

- Method of include fixing shiny & reflective materials to the top surface.
- A false ceiling of insulating material may be provided to leave an air gap between the roof and ceiling.
- It is necessary to make the ceiling airtight to achieve it.

THERMAL INSULATION OF WALLS

The following treatments may be adopted for thermal insulation of walls

- i. Fixing heat insulating materials on the inside & outside of the exposed walls.
- ii. Applying light coloured whitewash or distemper on the wall.
- iii. Creating air space in partition walls by fixing the sheathing of hardboards.
- iv. The suitable thickness of wall may be provided.
- v. The hollow wall or cavity wall construction may be adopted.
- vi. For partitions, an air space may be created by fixing hardboard & battens.

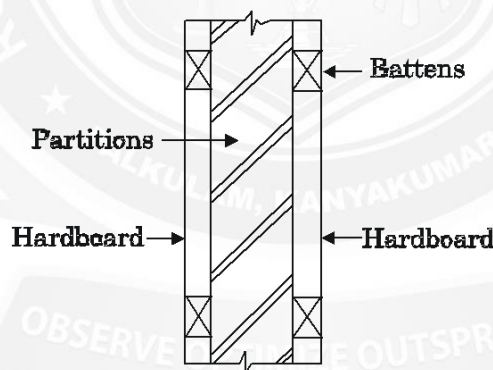


Fig 1.1.2- Insulation of walls

THERMAL INSULATION IN DOORS & WINDOWS

Heat transmittance through doors & windows may be reduced by

- Providing sunshades

- Using louvered shutters
- Using insulating glass or double glass with air space between them.

BENEFITS OF THERMAL INSULATION

- Due to thermal insulation, the room remains cooler in summer & warmer in winter than outside. It gives thermal comfort.
- Due to thermal insulation transfer of heat between inside & outside of the room is restricted. This result in less quantity of energy required for maintaining the desired temperature in the room.
- Due to thermal stress roof decks tend to crack, these would be reduced to a great extent.
- Non-toxic, environmental friendly solutions.
- No heat absorption & subsequent dissipation.
- Expansion joints, can be avoided.
- Temperature drops of 5°C to 10°C depending on outside temperature.