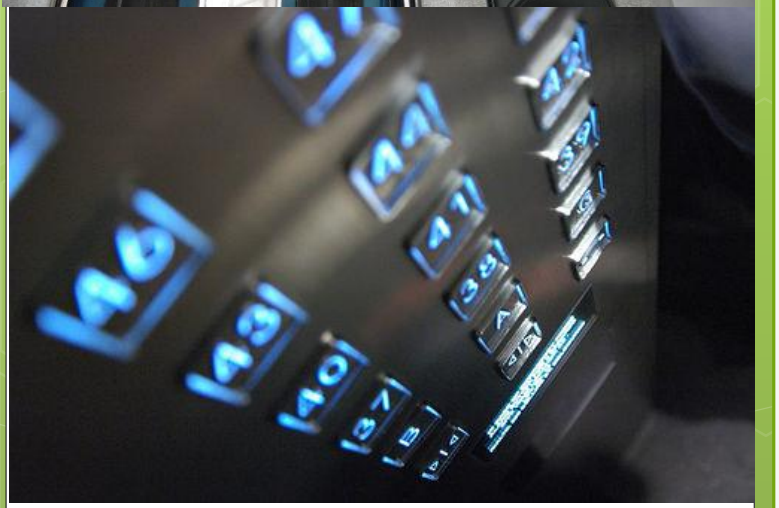
Module 6

Building Services



LIFTS OR ELEVATORS

Introduction

- A hoisting and lowering mechanism equipped with a car or platform that moves along guides in a shaft, in a substantially vertical direction and that transports passengers or goods, or both, between two or more floors of a building.

ELEVATORS OR LIFT

- Passenger lift : Lift designed for the transport of passengers
- Hospital lift : are also passenger elevators but employ special cars, suitable in size and shape for transportation of patients in stretchers or standard hospital beds and of attendants accompanying them
- Goods lift : for the transport of goods, but which may carry a lift attendant or other persons necessary for loading and unloading of goods

Components of an elevator

- Car : The load-carrying element of an elevator, including platform, car frame, enclosure, and car door or gate.
- Buffer : A device for stopping a descending car beyond its bottom terminal by absorbing and dissipating the kinetic energy of the car
  - oil buffer
  - spring buffer.

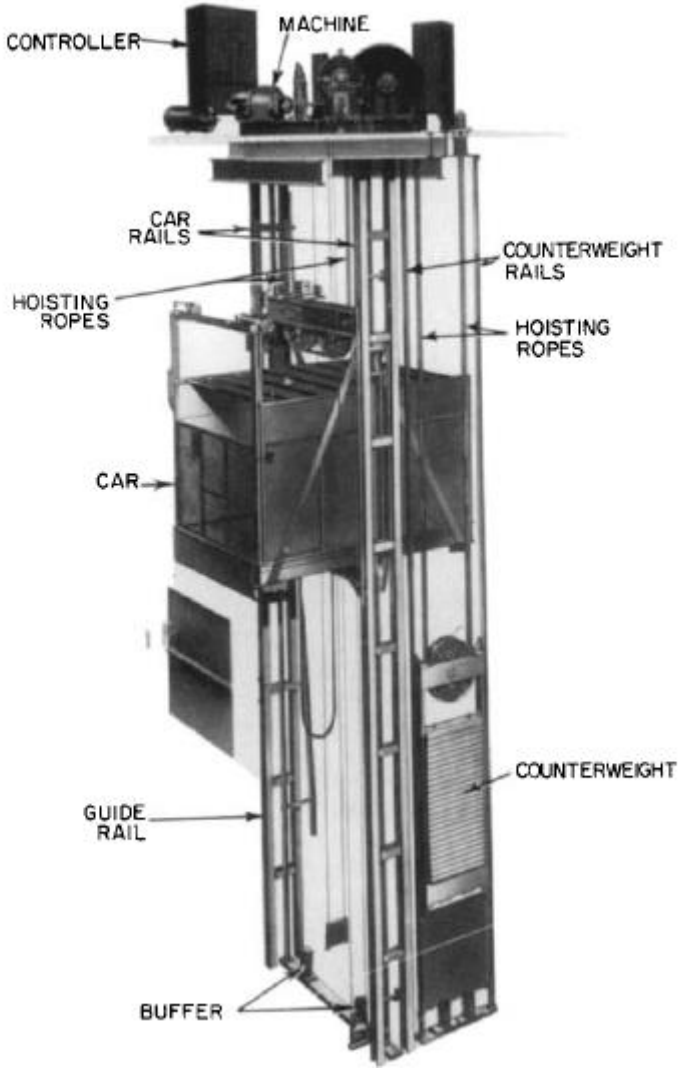
Components of an elevator

- Bumper : A device other than a buffer for stopping a descending car beyond its bottom terminal by absorbing the impact
- Hoist way : A shaft for travel of one or more elevators. It extends from the bottom of the pit to the underside of the overhead machine room or the roof.

Components of an elevator

- Counterweights- Power requirements of the driving machine for moving the car are reduced by hanging a counterweight on the hoisting ropes.
- The weight of the counterweight usually is made equal to the weight of the unloaded car and the ropes plus about 40% of the rated load capacity of the car

Components of an elevator

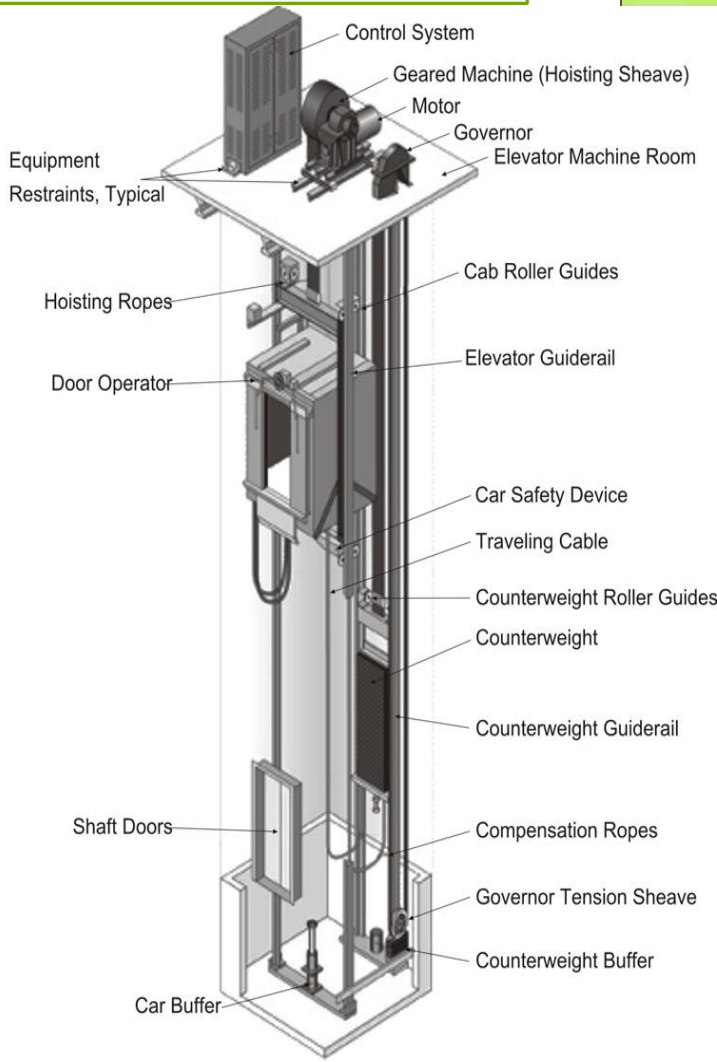


Classification

- **Traction**
- **Hydraulic**
- **Climbing**

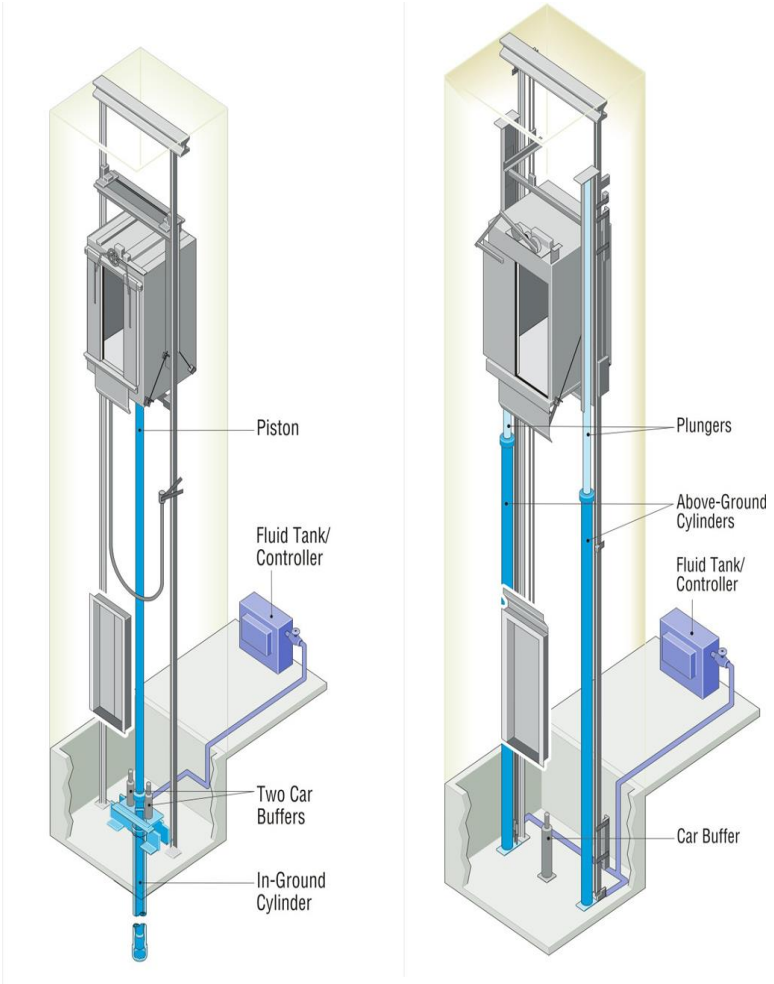
Traction

- Car is pulled up by means of rolling steel ropes over deeply grooved pulley
- Weight of car balanced with counterweight
- Friction b/w ropes & pulley gives traction as pulley rotates
- Types:
  - Geared
    - Pulley connected to motor with gears
  - Gearless
    - Pulley connected directly to high torque AC motor



Hydraulic

- Use principle of hydraulics
- Hydraulic pressure to push
- Slower than traction
- Not for > 8 storey
- Can accommodate more weight than traction
- Types
  - Conventional: Hydraulic piston push the car upward
  - Roped: Use combination of rope & hydraulics



Climbing Elevator

- Self ascending with its own propulsion
- Propulsion by electric motor
- Used for maintenance of building
- Less capacity

Design Considerations of Passenger Elevator

(NBC 2005 Part 8)

Two basic considerations

- Quantity of service
  - Passenger handling capacity during peak hours
- Quality of service
  - Waiting time of passengers at various floors

Number of Lifts and Capacity
Quantity of service

- Depend on the characteristics
  - Number of floors to be served by the lift;
  - Floor to floor distance;
  - Population of each floor to be served; and
  - Maximum peak demand

Number of Lifts and Capacity

Quality of service

- *Quality of Service or Acceptable Interval*
  - 20 to 25 seconds Excellent
  - 30 to 35 seconds Good
  - 36 to 40 seconds Fair
  - 45 seconds Poor
  - Over 45 seconds Unsatisfactory

Speed of lifts in different occupancies

- **Passenger lifts -**
  - Low and medium class flats -0.5 m/s
  - Office buildings, hotels -0.5-0.75 m/s
  - Large flats -0.75-1 m/s
  - Hospitals -above 1.5 m/s
  - Departmental stores - 2-2.5 m/s
- **Goods lifts**
  - Normal case - 0.25-0.5m/s
  - Serving main floors -1 m/s
- **Hospital bed lift**
  - Short travel in small hospital -0.25 m/s
  - Normal -0.5 m/s
  - Long Travel lift in large hospital -1 m/s

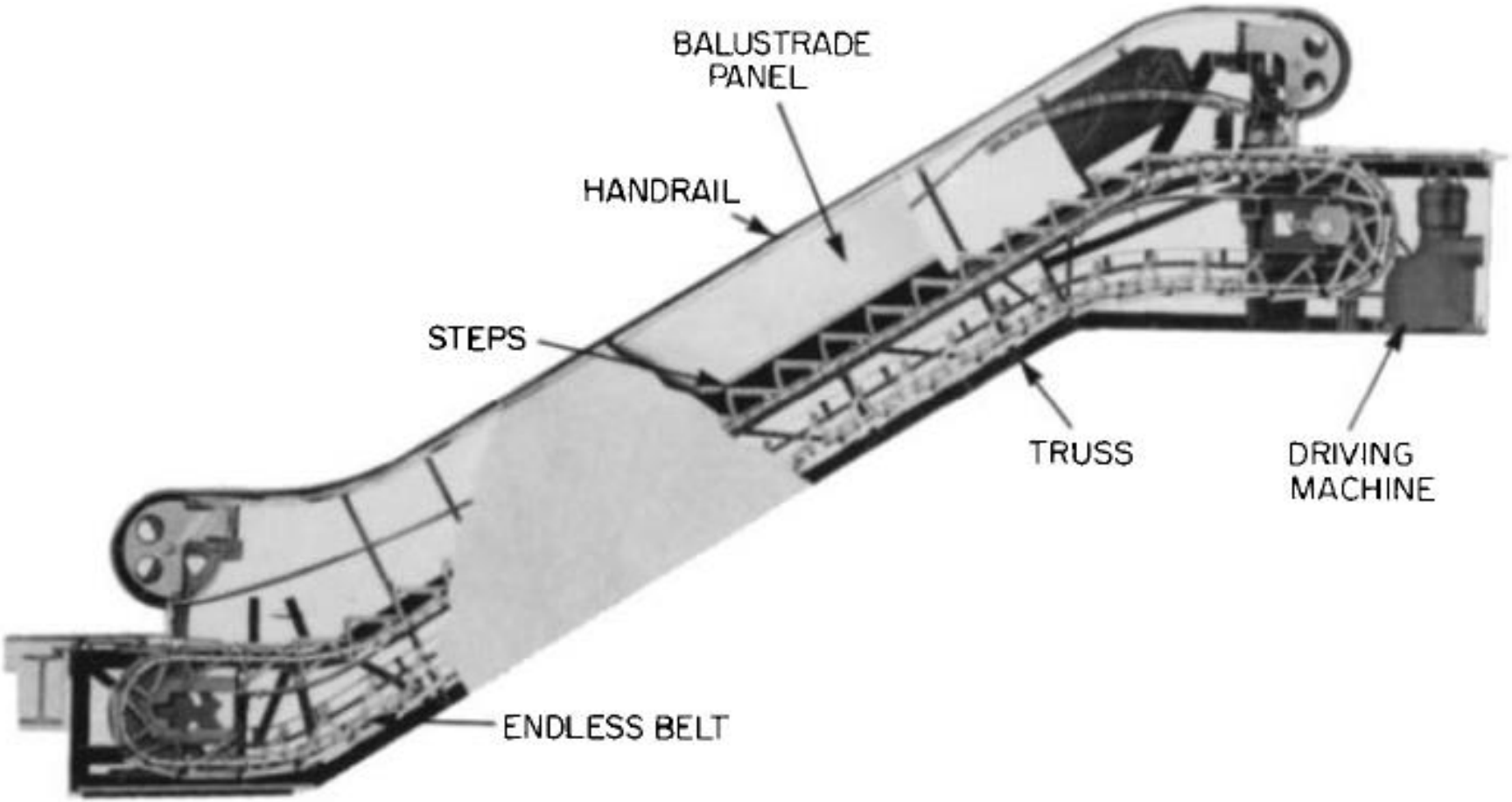
Positioning of Lifts

- Easily accessible from all entrances
- Not all lifts should be in straight line (not >3)
- Corridor should be wide enough to allow space for waiting passengers
- If no. >3, “alcove” arrangement

ESCALATORS

Escalators (IS: 4591: 1968)

- Power driven, inclined and continuous stairway
- To move large no. of people
- No need of operators
- Large capacity and low power consumption
- Reversible in direction
- Normally positioned where traffic heavy
- Normally installed in pairs


BALUSTRADE
PANEL
HANDRAIL
STEPS
TRUSS
DRIVING
MACHINE
ENDLESS BELT

Features

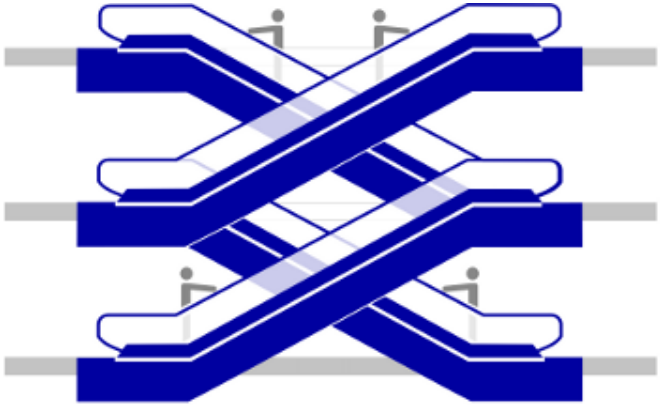
- Essential Parts: steel trussed frame work, handrails, endless belt with steps
- Speed and slope
  - Speed- 30- 40 m/ min or 450 mm/sec
  - Slope 30 degree normally
  - For rise<6m & speed< 0.5m/s, slope can be increased to 35 degree
- Location
  - Type of building
  - Peak traffic times
  - Population factor
  - Travel comfort

Components of an Escalator

- An escalator consists of grooved treads and risers attached to a continuous chain moved by a driving machine and supported by a steel truss framework .The installation also includes a handrail on each side of the steps that moves at the same speed as the steps guards, that enclose the steps on each side and support the handrails; brakes; control devices; and threshold plates at the entrance to and the exit from the tread way.

Escalator arrangement

Criss Cross

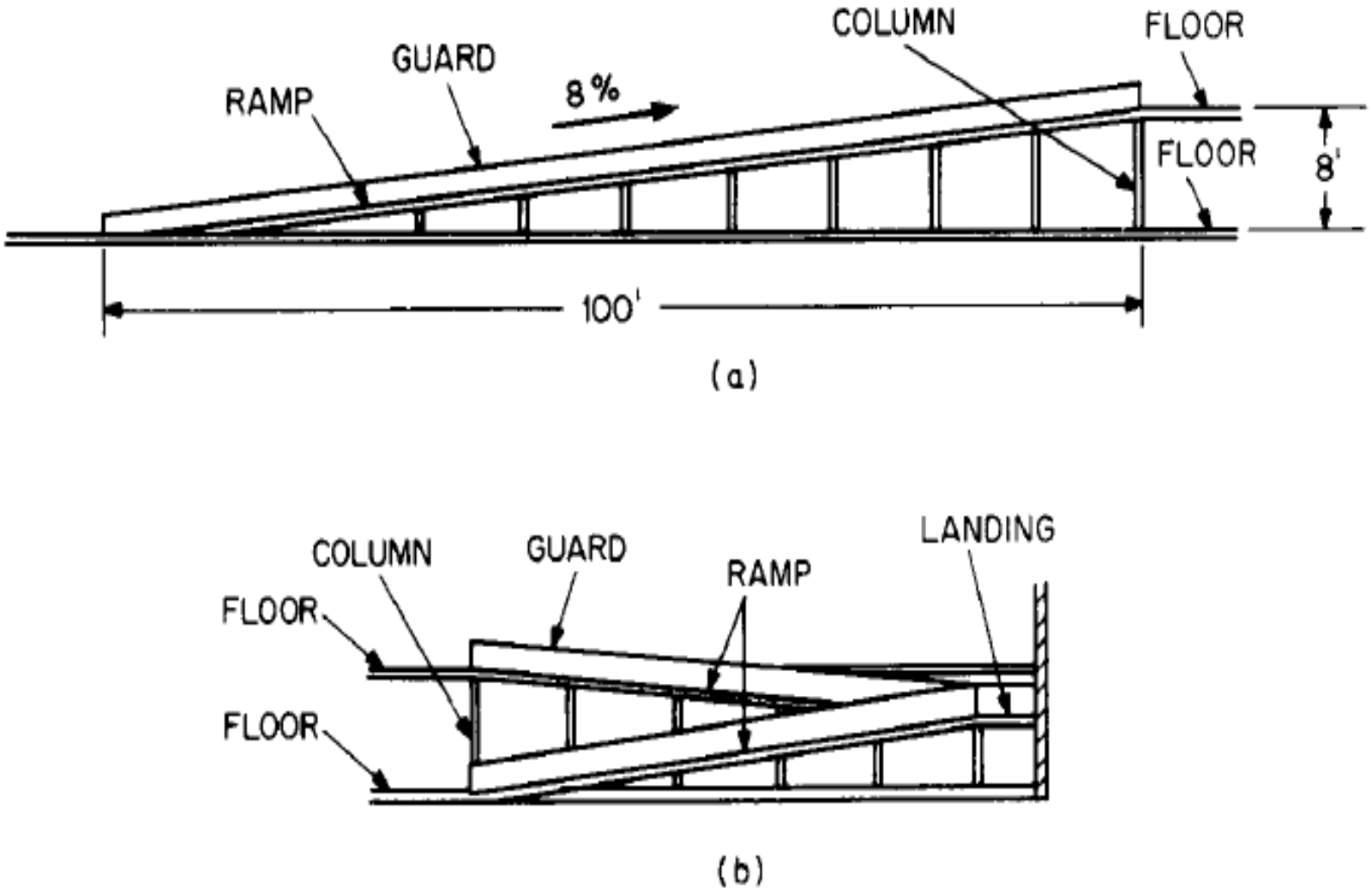


Parallel

RAMPS

Ramps (IS 4963: 1987)

- Ramp is an inclined plane joining two floors and is mainly used for carrying machinery, equipments, trolleys, cars, etc. to upper floors in multi-storeyed building and public buildings
- Adopted for buildings such as stadiums, railroad stations, hospitals etc.



Types of ramps: (*a*) straight ramp; (*b*) zigzag ramp.

Design Considerations

- Shall have handrails on at least one side
- It can be curved, zigzagged, u-shaped, or spiraled
- Should be constructed with a non-slip surface
- Ramps have been built with slopes up to 15% (15 ft in 100 ft), but 8% is a preferred maximum.
- Exterior location is preferred for ramps
- Should be provided with landings for resting & to avoid excessive speed
- Length of ramp should be 9 m
- Landing- min width 1.5m, handrails- 0.8 m high
- Landing at every change in direction are provided with width equals to that of the ramp

Air Conditioning

Ventilation

- System of supplying or removing air by natural or mechanical means to or from any enclosed space to create & maintain comfortable conditions

- Orientation of building & location of windows help in providing proper ventilation

Air Conditioning

- The process of treating air supply to control simultaneously its humidity, temperature, purity, distribution, air movement to meet specific criteria for a space.
- Air conditioning may either increase or decrease the space temperature

Air Condition - Purpose

- To preserve and maintain the health, comfort and convenience of the occupants in **residential** building
- To preserve the quality of products and to maintain the working of **industrial** processes such as artificial silk and cotton clothes etc

Air Condition - Purpose

- In the **commercial buildings** like theatres, offices, shops, banks, stores, restaurants etc. air conditioning is required to improve the working atmosphere and maintain comfort within these concerns
- In **travel** by air, railway, road and water, air conditioning imparts facility and comfort by conditioning the quality of air in aeroplanes, railway coaches, road cars, buses, ships etc

Air Conditioning

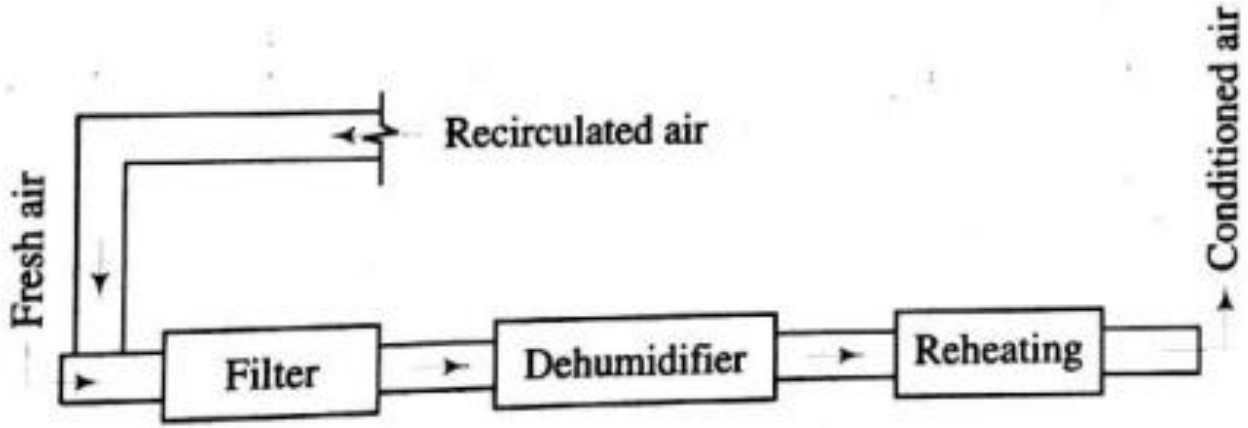
- Functional Classification:

Comfort Air Conditioning: Use of air conditioning mainly for human comfort, as compared with conditioning for industrial processes or manufacturing.

Industrial Air Conditioning: Use of air conditioning in industrial plants where the prime objective is enhancement of a manufacturing process rather than human comfort

Air Conditioning- based on season

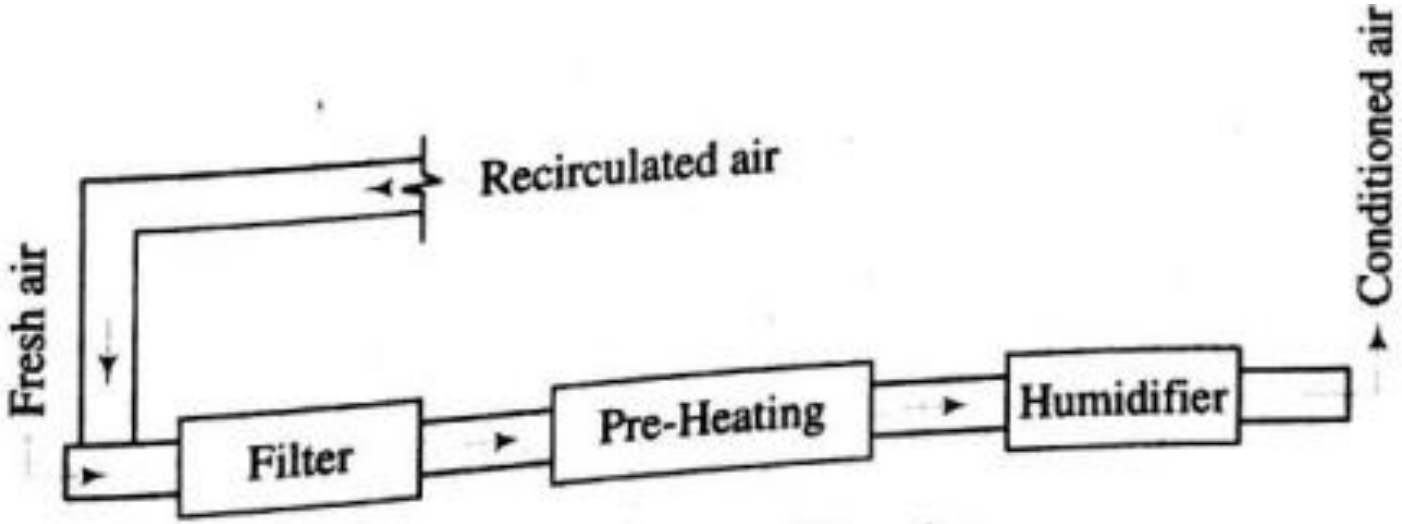
- Summer air conditioning: Main aim is to cool the air inside the room. Consists of air cleaning, air cooling, dehumidification and air circulation



Summer air-conditioning

Air Conditioning- based on season

- Winter air conditioning: Main aim is to heat the air inside the room. Consists of following actions: air cleaning, air heating, humidification, air circulation.



Winter air-conditioning

Air conditioning

- **Window A/C-** implements a complete air conditioning in a small space. the units are made small enough to fit into a standard window frame. Built into wall or window with the warm part outside and the cooling part inside
- **Split A/C-** In case of larger air conditioning application. this splits the hot side from cold side of the system

Sound Proofing

Sound Absorbing Materials

- Qualities:
  - It should be economical in construction and maintenance
  - It should be waterproof, fire proof and strong
  - It should be good in appearance
- If sound wave strikes porous surface, considerable energy will be dissipated as heat and passing through pores which are interconnected through a series of small channels, the resultant absorption is relatively very high

Classification

- Soft materials like **hair felt**
- Semi Hard materials in the form of **porous fibre boards**-sound absorbents and building panels
- **Porous tiles** of masonry which are installed on the walls. Acoustic tiles can fix easily, but costly. Suitable for rooms having small area. This group may include curtains also.
- **Acoustical plasters** Also known as fibre plasters and includes granulated insulation material mixed with cement
- **Quilts and mats**: prepared from mineral and glass wool an fixed in form of acoustical blankets
- **Cork Tiles** made by blending phenolic or other thermosetting resin with cork granules and baking under high temperature and pressure to reduce a strong tile of low porosity.

Sound Absorbing Materials

No	Material	Coefficient of absorption
1	Wood Wool board of 25mm thickness	0.02
2	Glass sheet of 6 mm thickness	0.02
3	Acoustical plaster of 20 mm thickness	0.3
4	Quilts and mats	0.9
5	Hair felt of 25mm thickness	0.6
6	Porous fibre of 12mm thickness	0.3
7	Porous tiles	0.5