ARCHITECTURAL SCIENCE
(HVAC)

VENTILATION

The process of supplying air to any space within a building without noticeable odor and without objectionable levels of contaminants, such as dusts and harmful gases, and of removing stale, polluted air from the space. Outside air is generally used as an acceptable source of ventilation air.

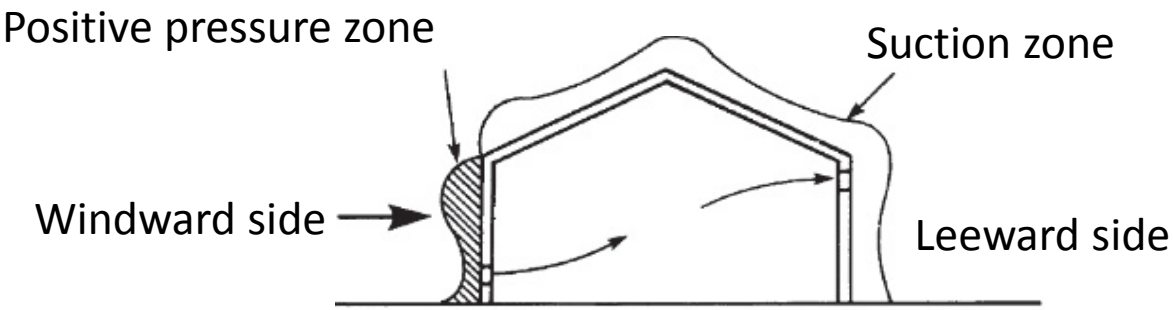
• Purpose of Ventilation

- Provide fresh air for respiration.
- Preserve the correct level of oxygen in the air.
- Control carbon dioxide content to no more than 0.1%.
  Concentrations above 2% are unacceptable as carbon dioxide is poisonous to humans and can be fatal.
- Control moisture relative humidity of 30% to 70% is acceptable.
- Remove excess heat from machinery, people, lighting, etc.
- Dispose of odours, smoke, dust and other atmospheric contaminants.
- Relieve stagnation and provide a sense of freshness.

- **Natural/Passive Ventilation** - is the ventilation of a building without the use of a fan or other mechanical system. It is an economic means of providing air changes in a building. It uses components integral with construction such as air bricks and louvers, or open able windows. Natural ventilation in buildings is caused by the temperature difference between the air in the building and the outside air and by openings in the outside walls or by a combination of both. The sources for natural ventilation are wind effect/pressure and stack effect/pressure.

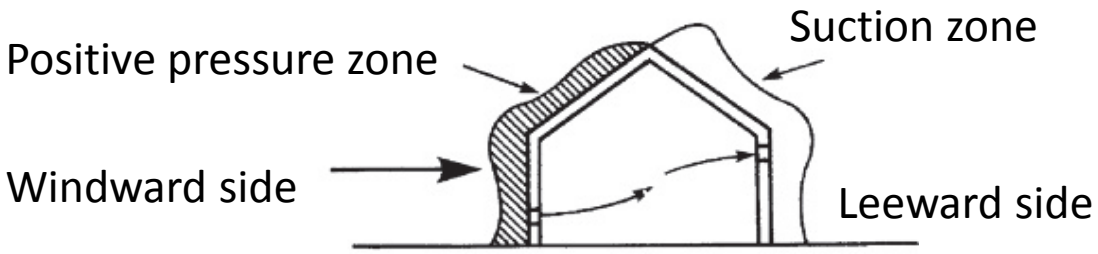
4 Basic Components of Natural Ventilation System

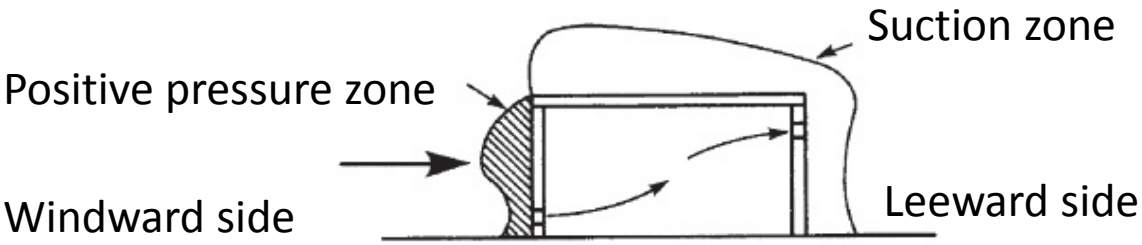
1. An air source of acceptable temperature, moisture content, and cleanliness
2. A force to move the air through the inhabited space of the building
3. A means of controlling the volume, velocity, and direction of the airflow
4. A means of recycling or disposing of contaminated air



Wind diagram for roofs with pitches up to 30 deg.

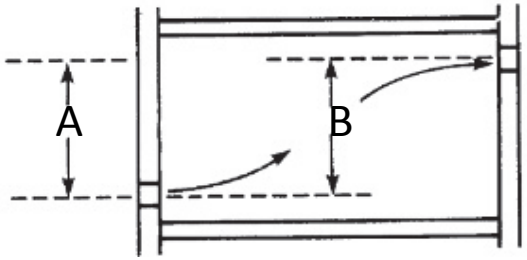
Wind diagram for roofs with pitches above 30 deg.



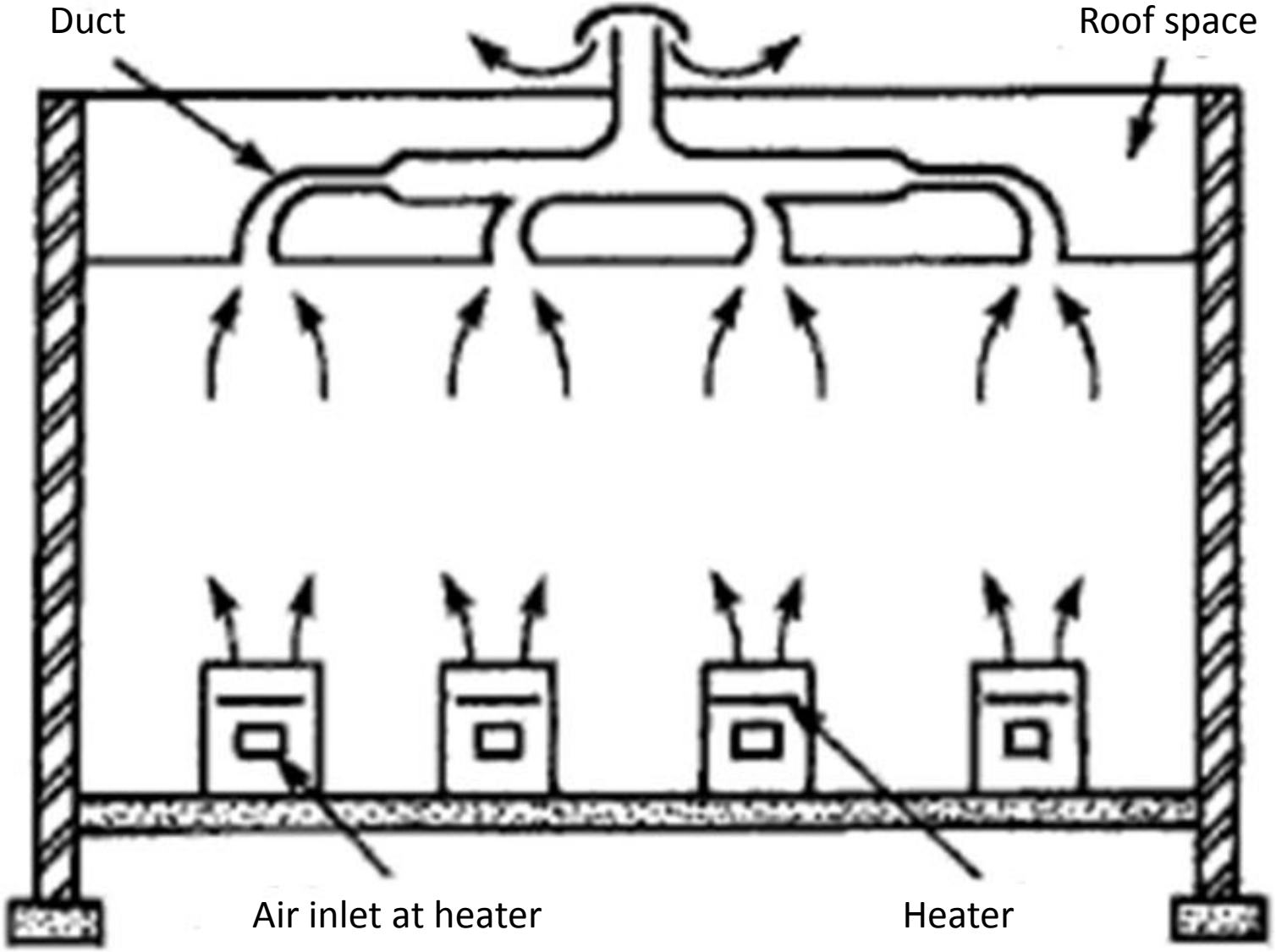


Wind pressure diagram for flat roofs

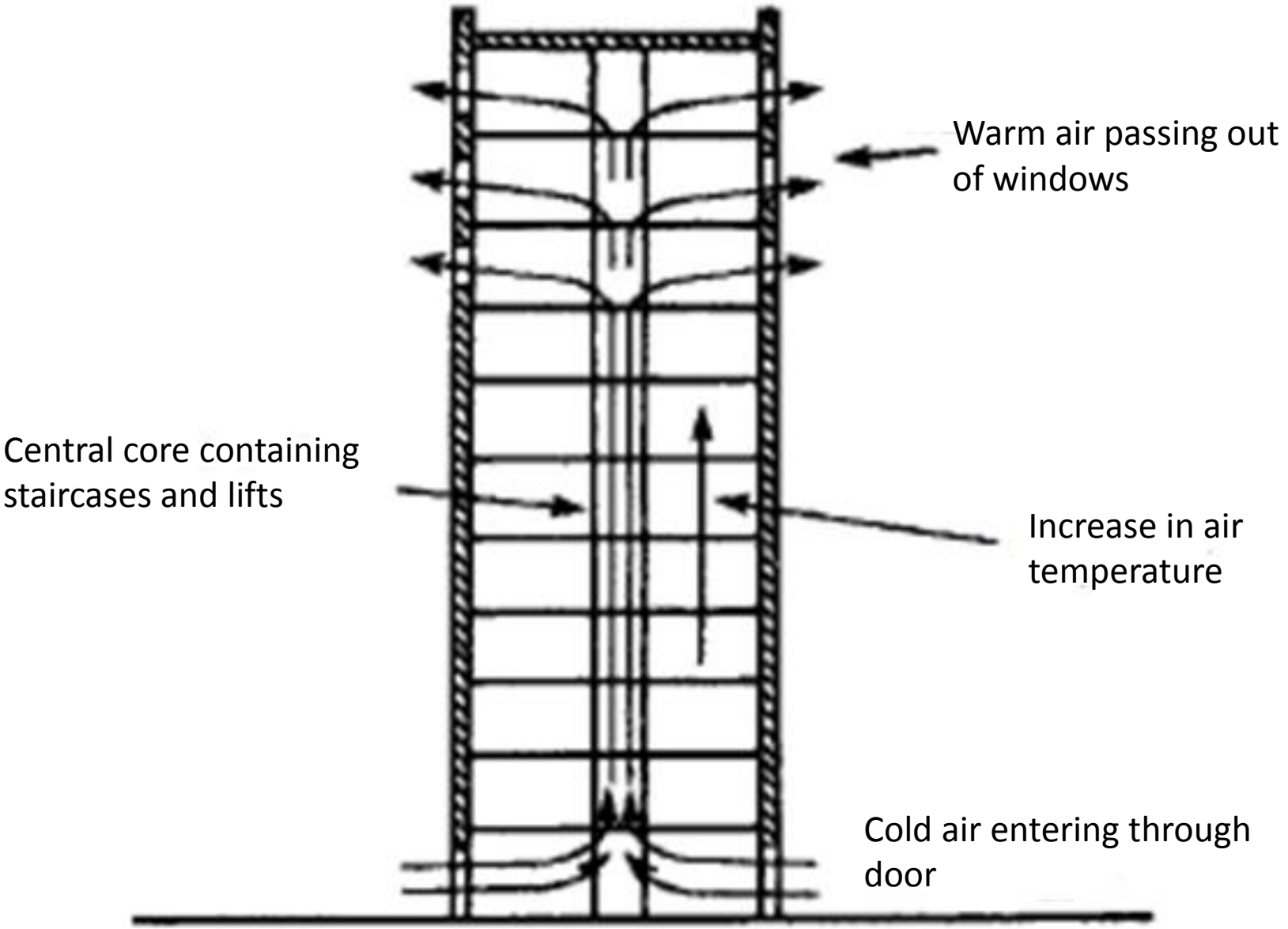
A and B are the heights of the cool and warm air stacks respectively



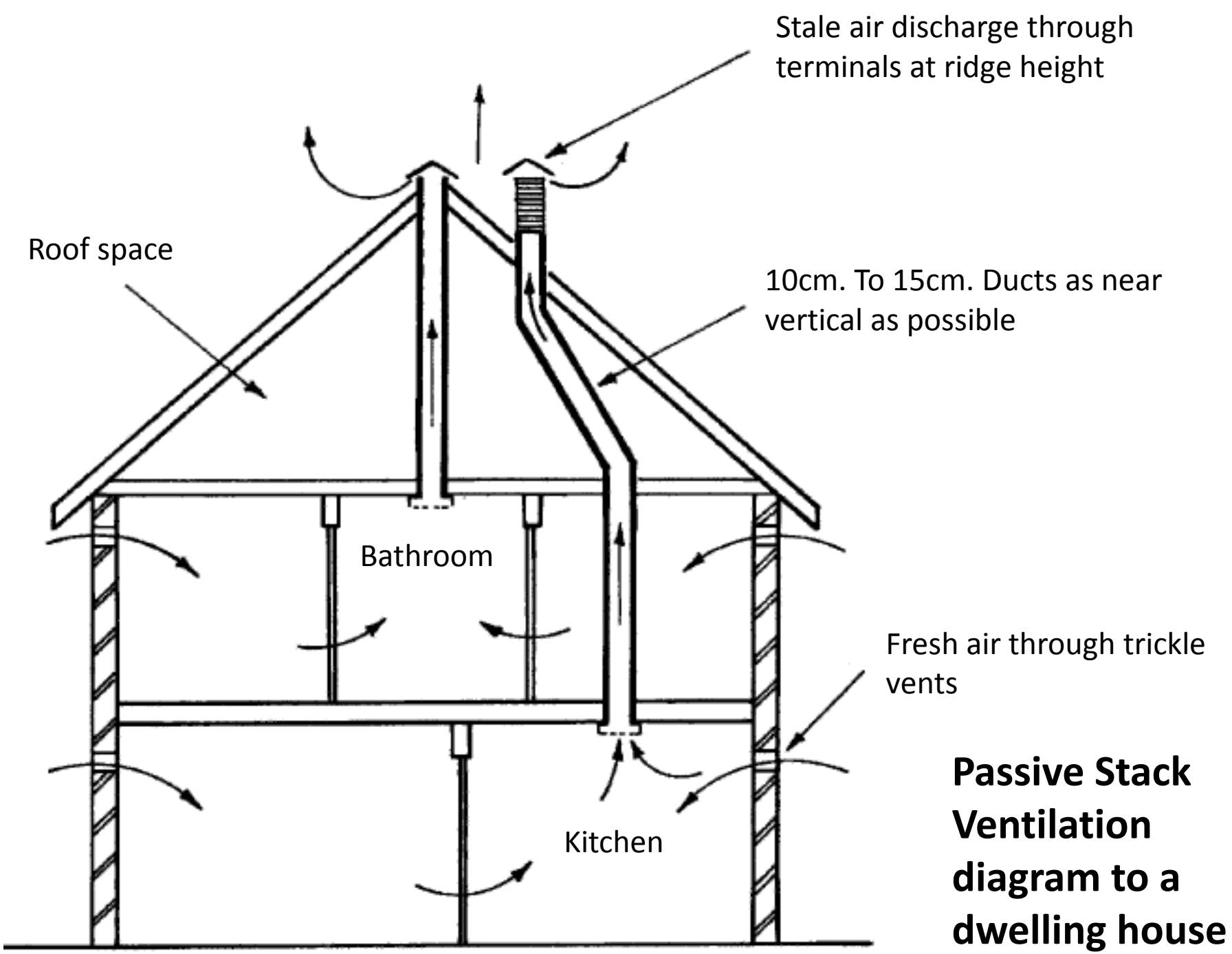
Stack pressure causing cross ventilation



Ventilation for an assembly hall by passing fresh air through heat emitters



Stack pressure in a tall building



Passive Stack Ventilation diagram to a dwelling house


Non-power ventilator


Shanghai TR Steel Building Products Co.,Ltd
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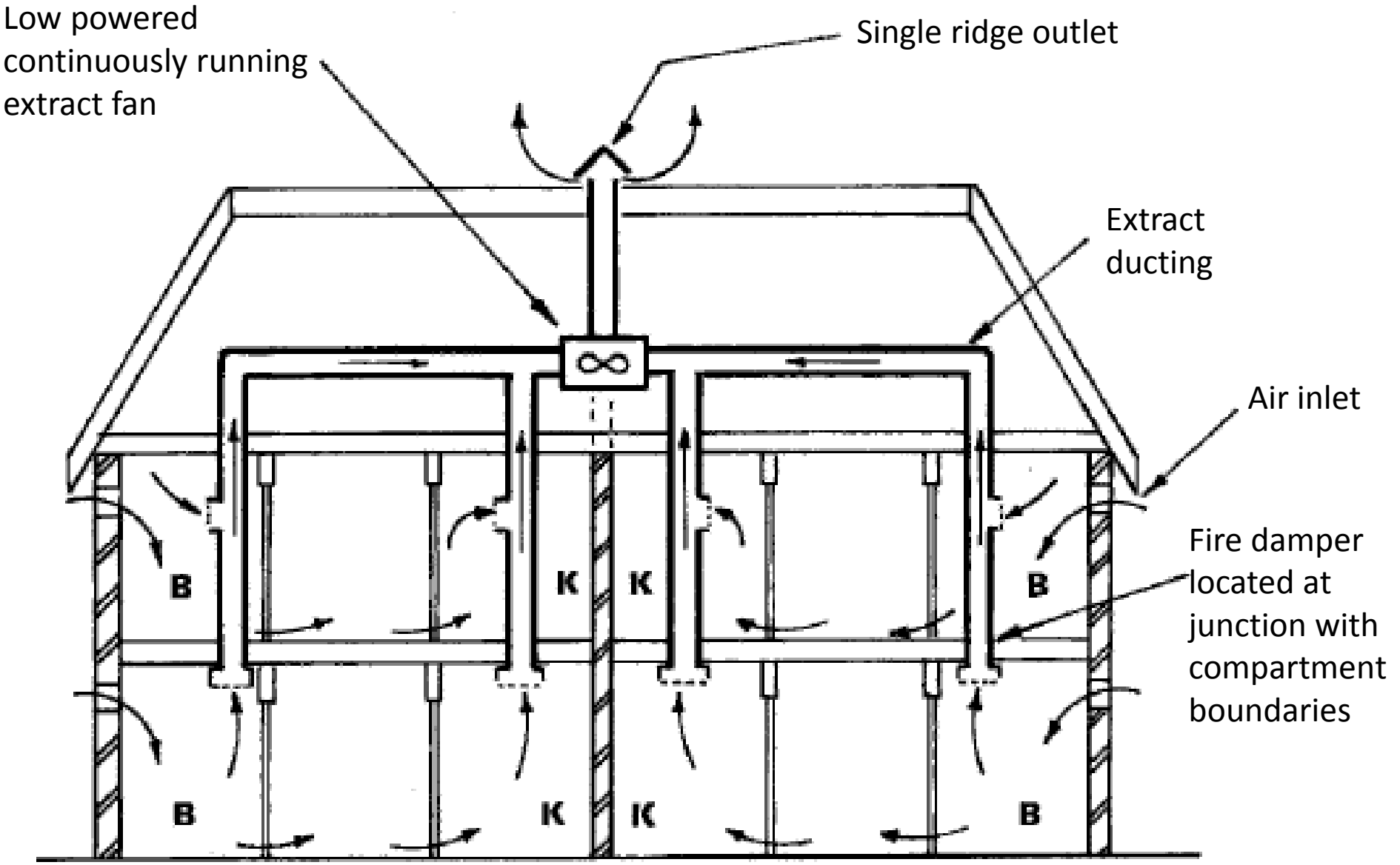
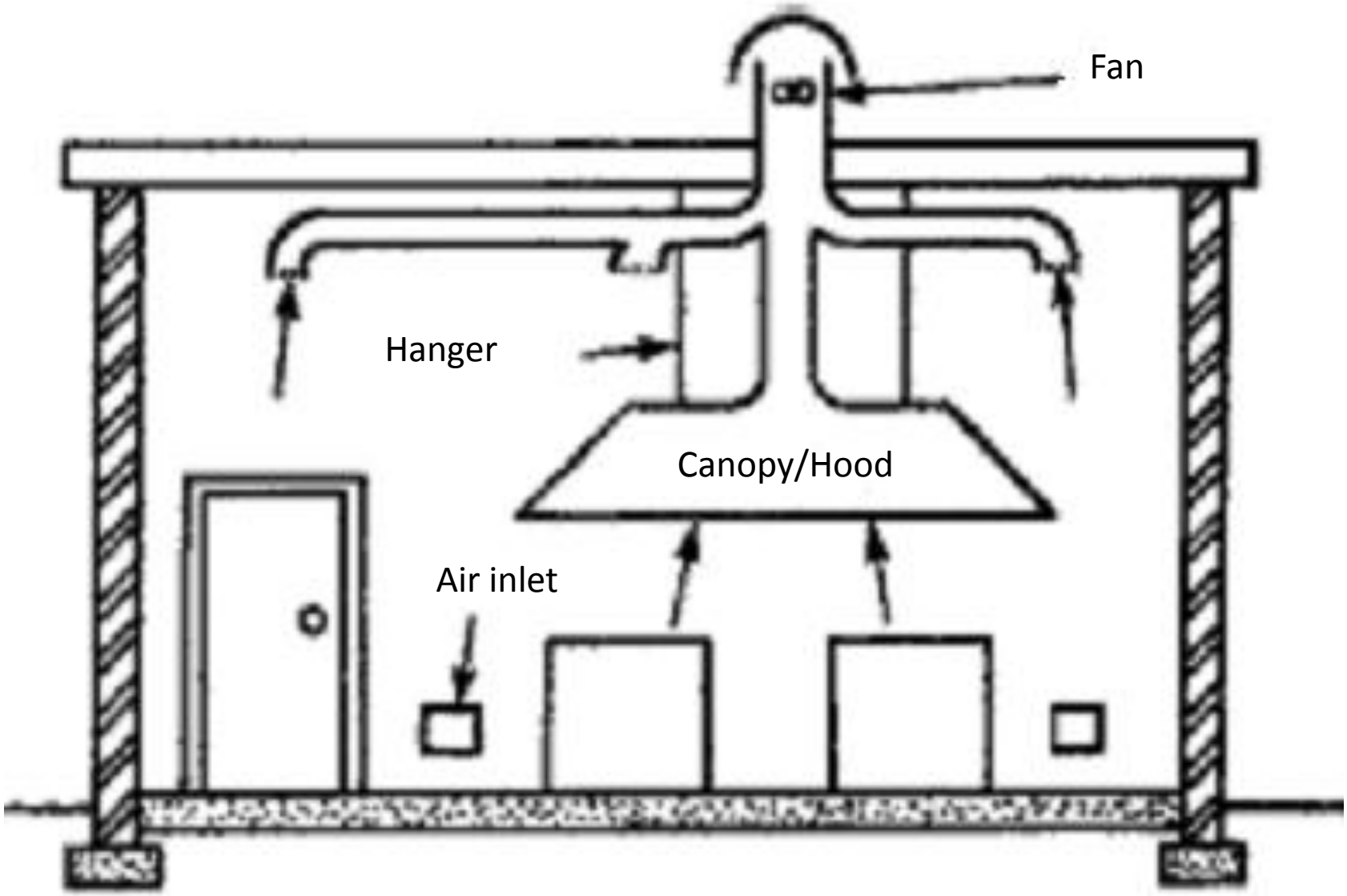
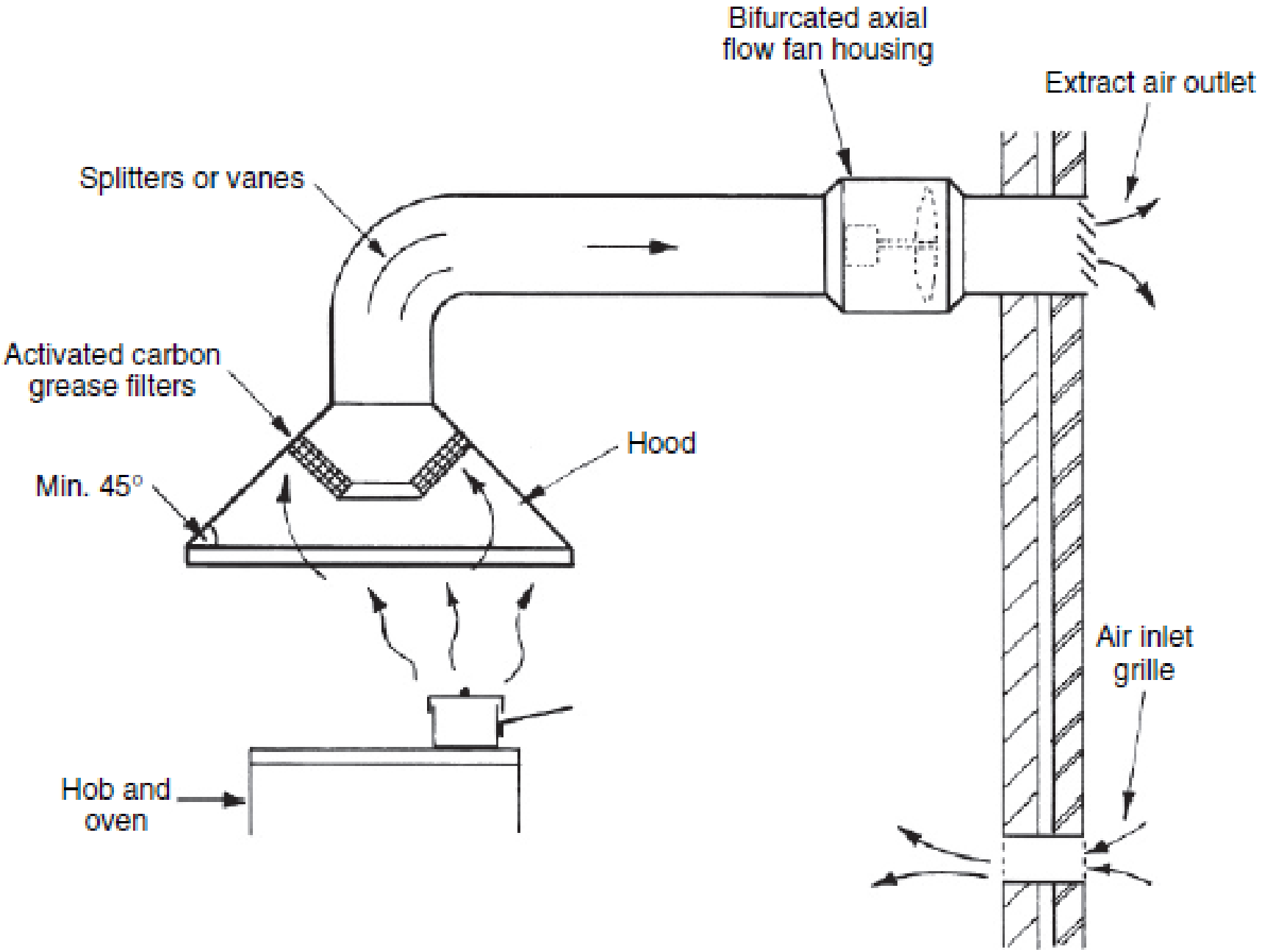
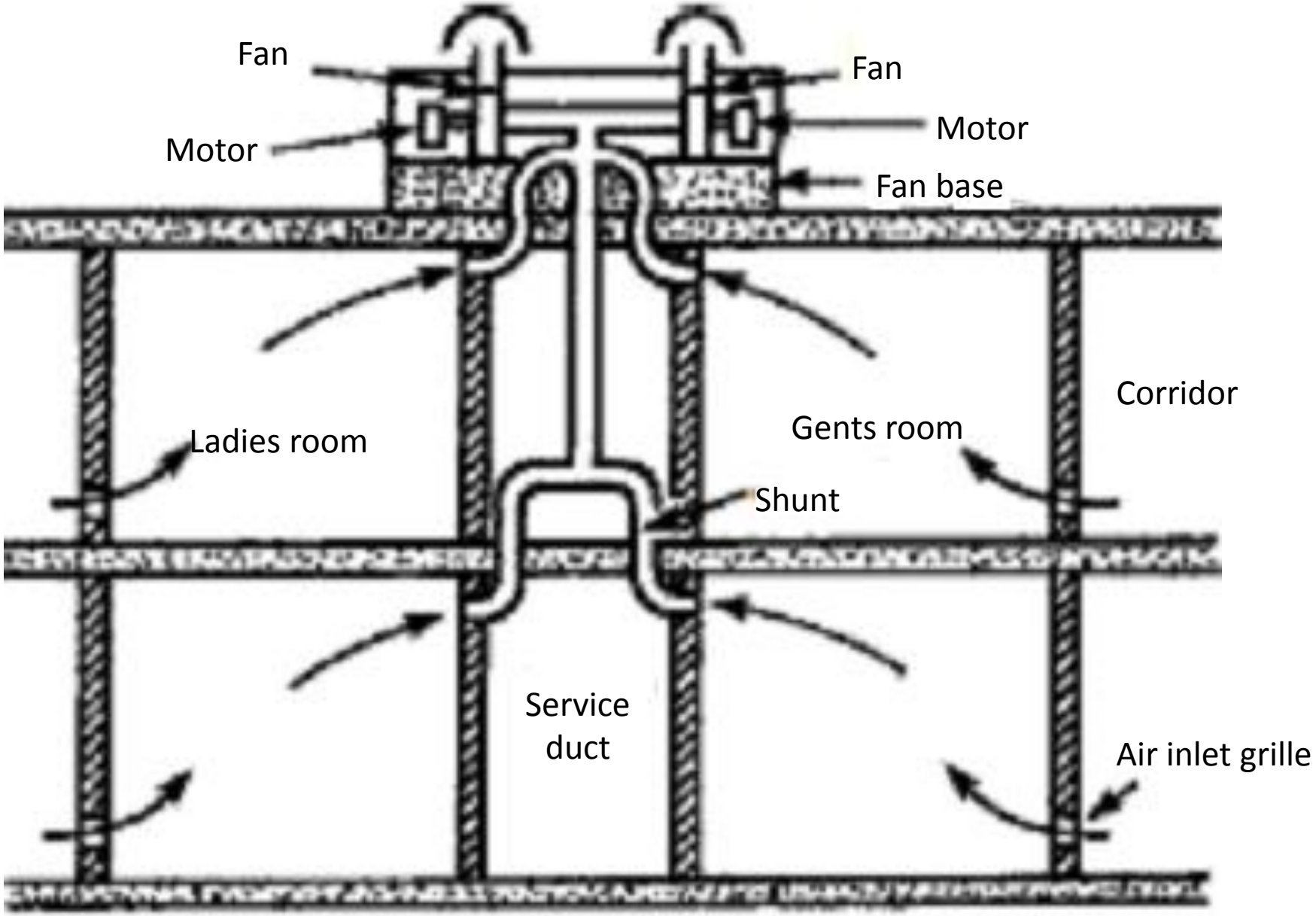
- **Mechanical Ventilation – is a ventilation of a building** through an **air handling unit** or direct injection to a space by a fan. A local exhaust fan can enhance infiltration or natural ventilation, thus increasing the ventilation air flow rate.


Low powered continuously running extract fan
Single ridge outlet
Extract ducting
Air inlet
Fire damper located at junction with compartment boundaries
B
K
K
B
B
K
K
B

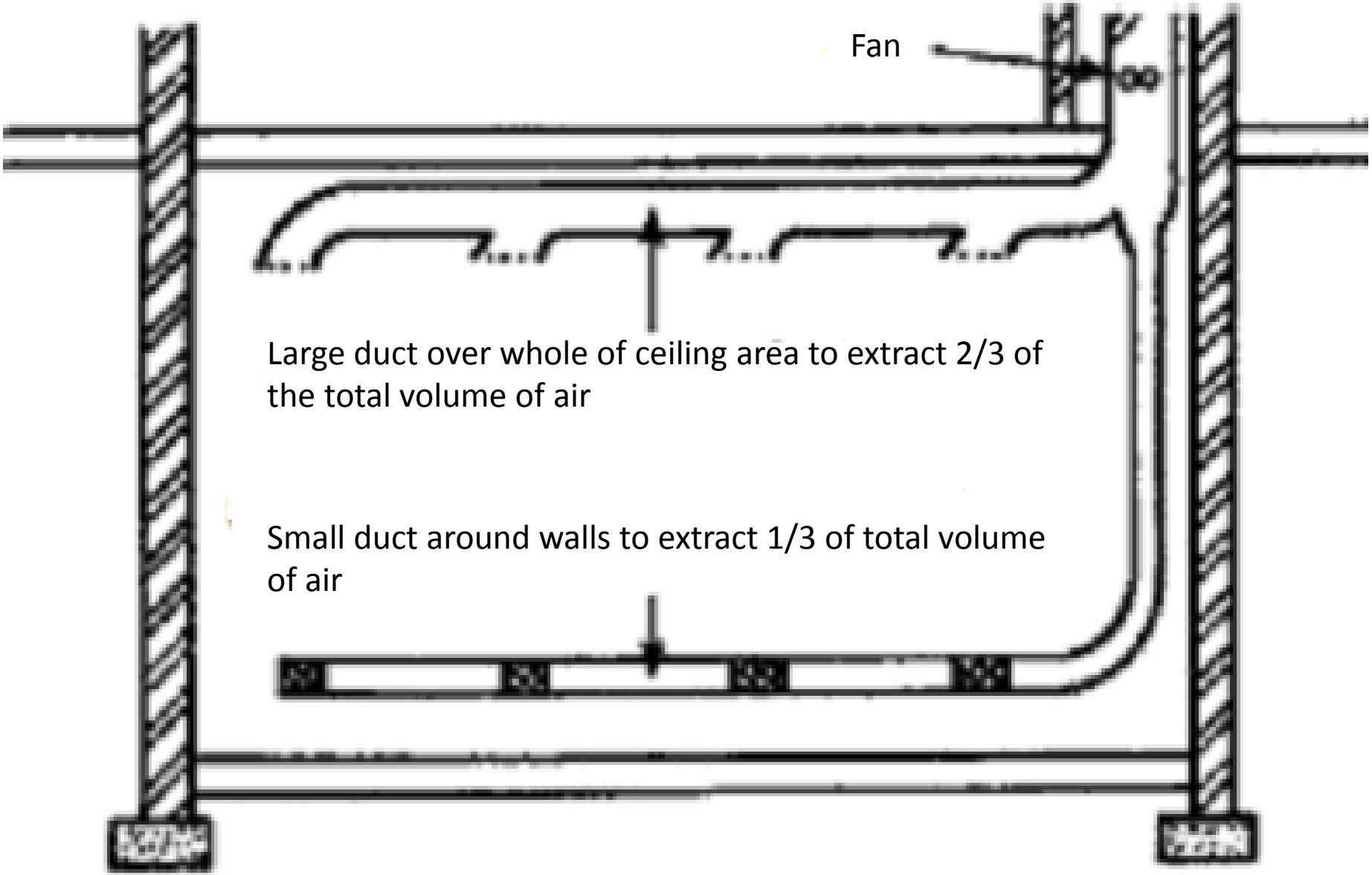


Kitchen

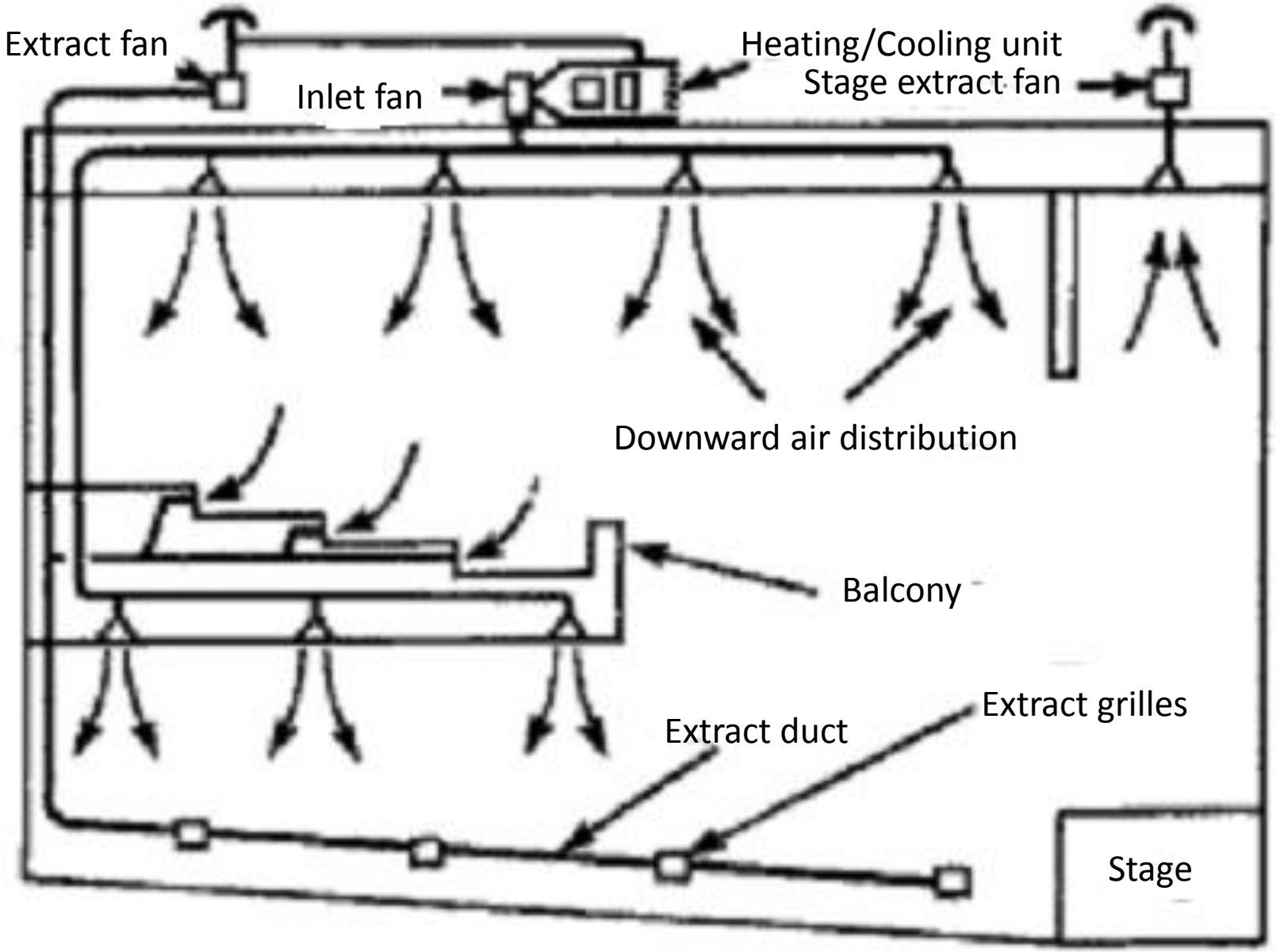

Bifurcated axial
flow fan housing
Extract air outlet
Splitters or vanes
Activated carbon
grease filters
Hood
Min. 45°
Air inlet
grille
Hob and
oven



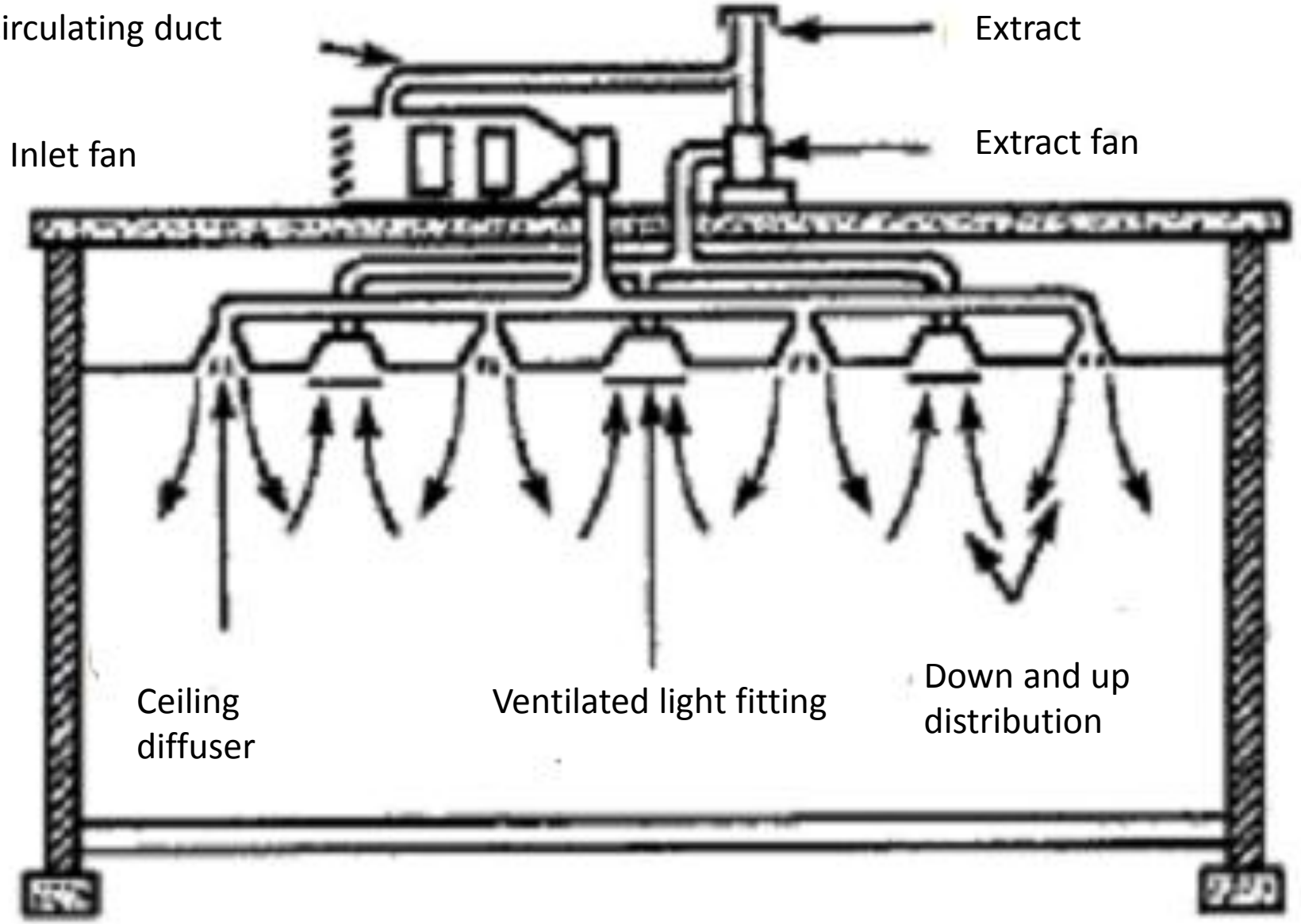
Internal sanitary accommodation



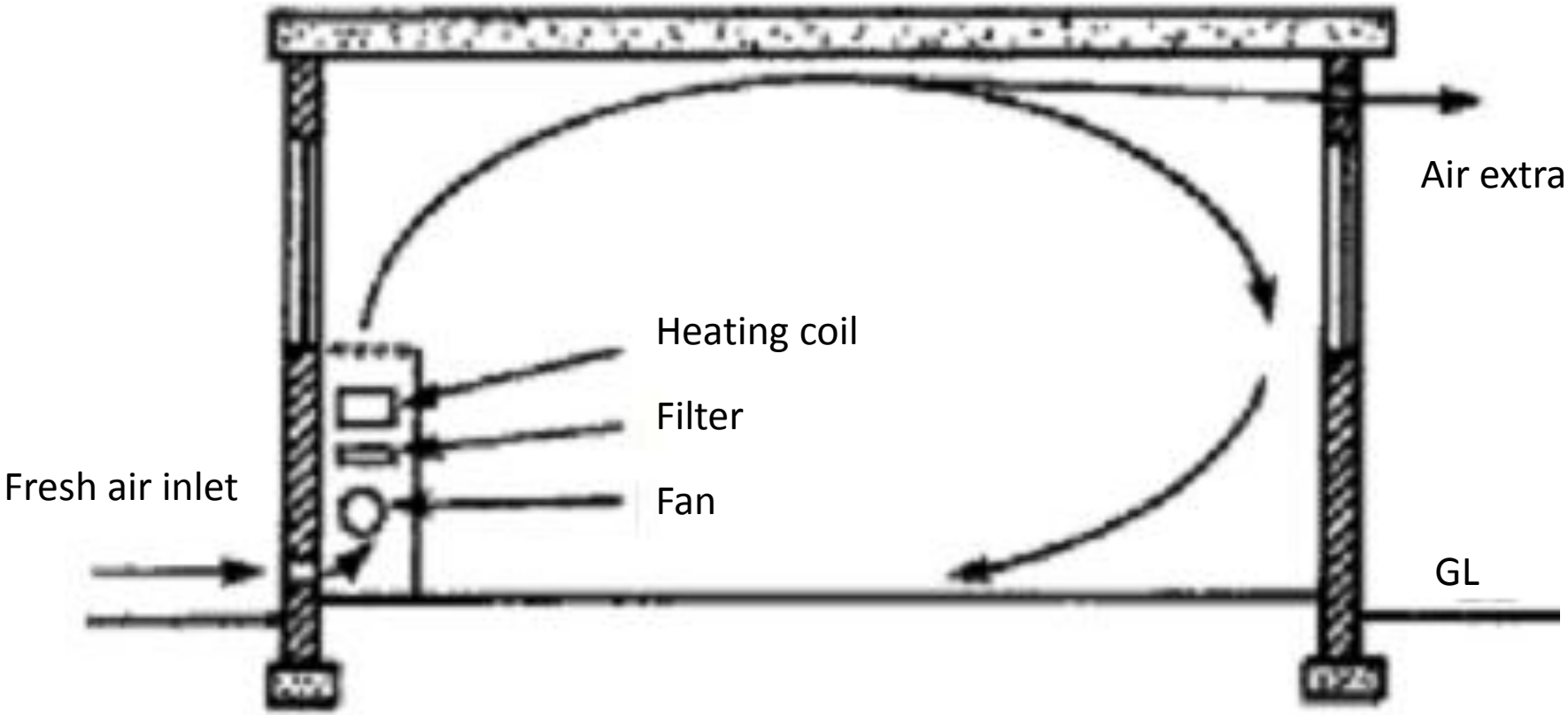
Car parking (Basement)



Mechanical inlet and mechanical extract for theatre



Mechanical inlet and mechanical extract for an open plan space



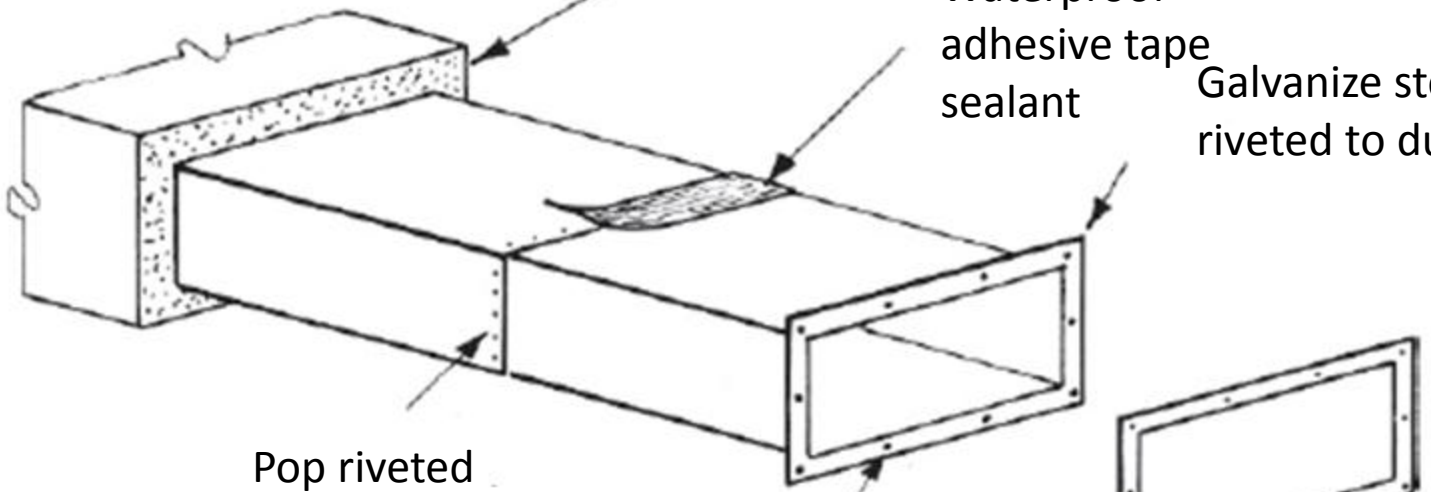
Mechanical inlet and natural extract

Square/Rectangular steel duct

Resin bonded glass fiber or other insulation

Waterproof adhesive tape sealant

Galvanize steel angle riveted to duct



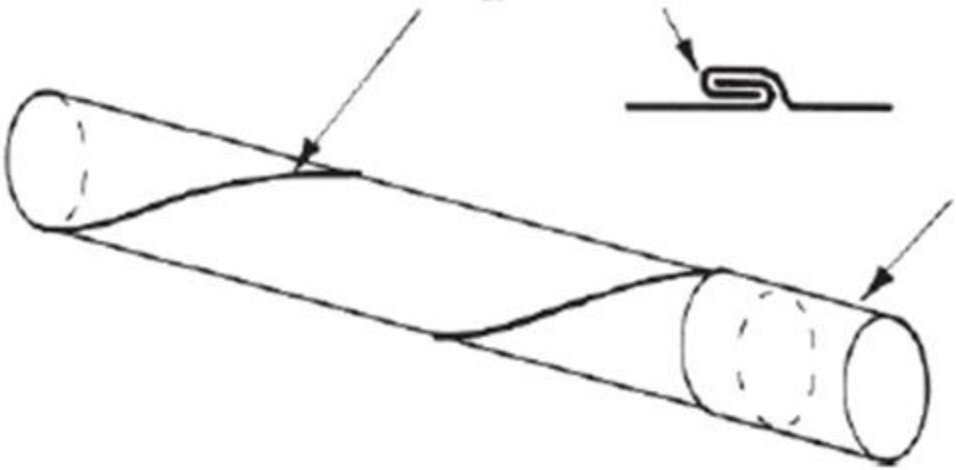
Pop riveted sleeve joint

Bolt holes

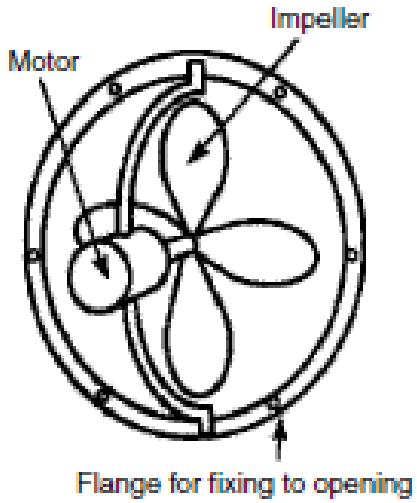
Rubber gasket between steel flanges

Circular spirally bounded steel duct

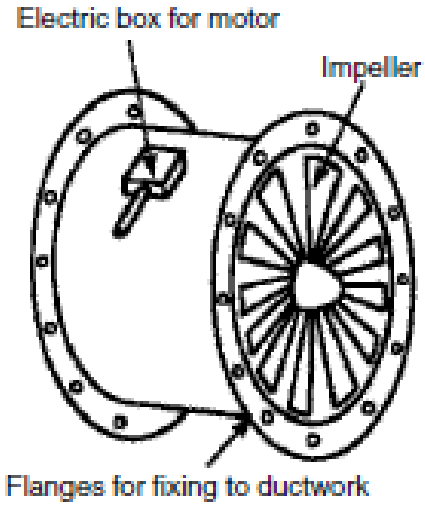
Continuous welt



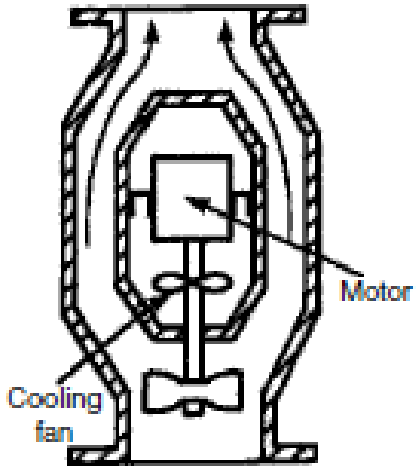
Taped sleeve socket joint or push fit self sealing joint



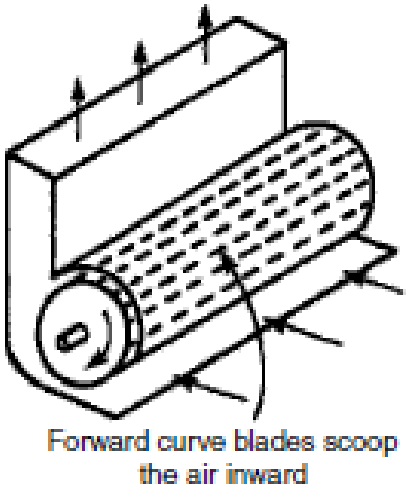
Propeller fan



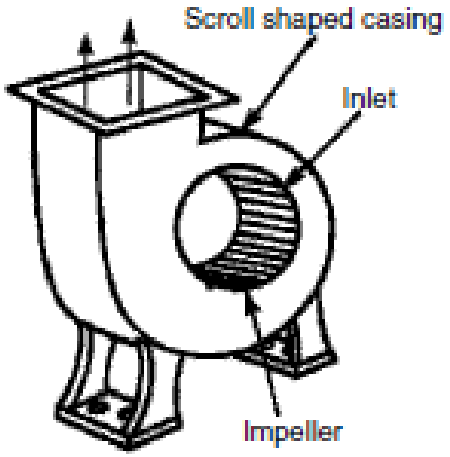
Axial flow fan



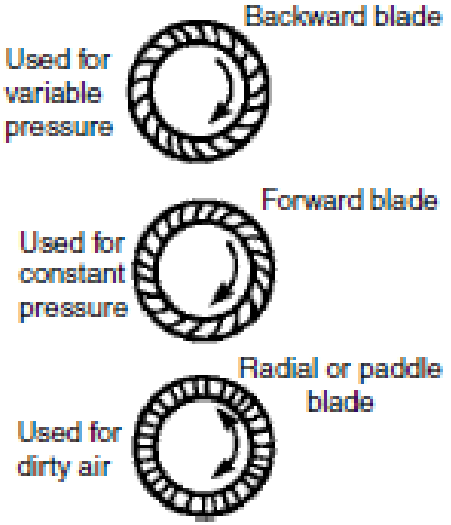
Bifurcated axial flow fan



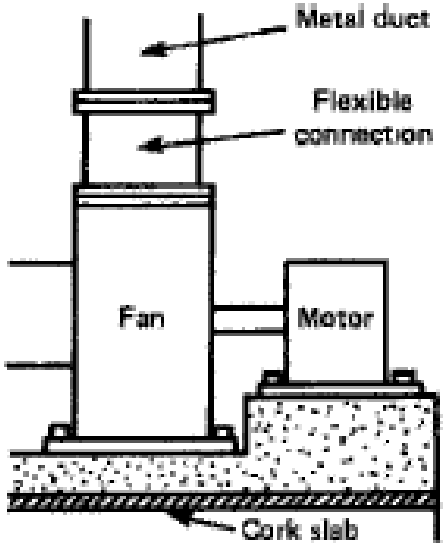
Cross-flow fan



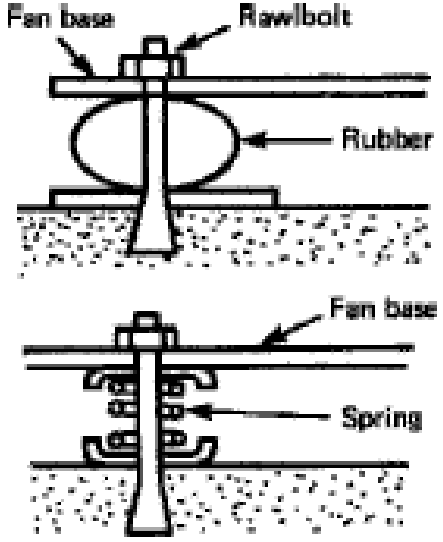
Centrifugal fan



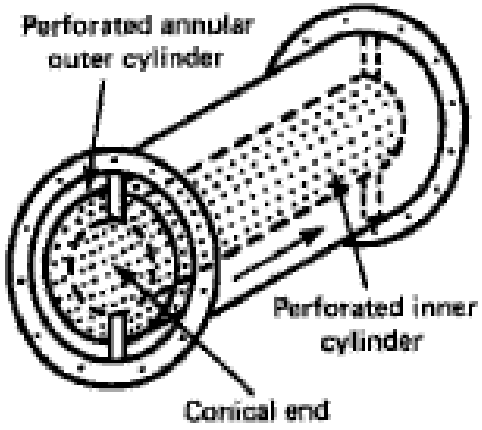
Types of impeller used with centrifugal fans



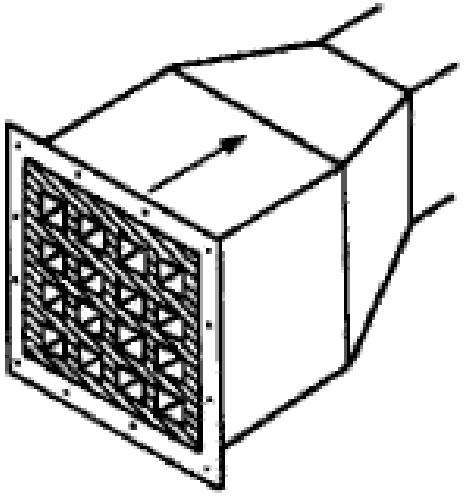
Use of cork slab and flexible connection



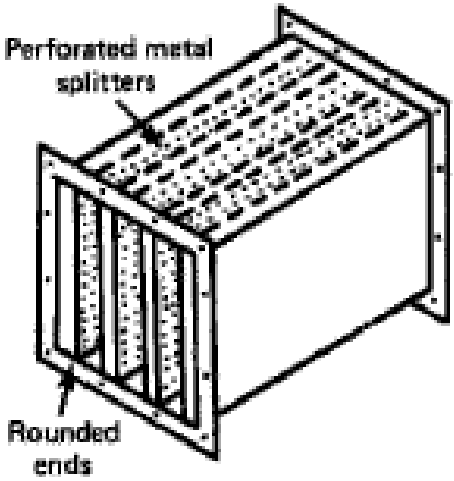
Use of rubber or spring mountings



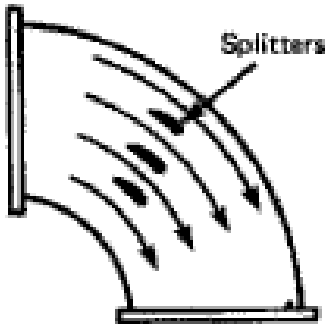
Use of perforated metal cylinder



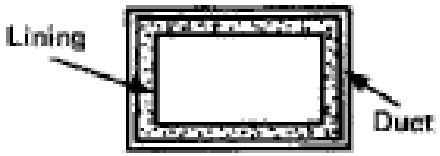
Use of acoustically absorbent honeycomb



Use of perforated metal splitters



Use of splitters to give streamline flow



Use of acoustically absorbent lining of mineral wool