

1.9 AIR CONDITIONING

It is defined as the process of simultaneously controlling and maintaining the properties of air like temperature, humidity, purity, direction of flow in a closed space.

Principle

An air-conditioner continuously draws an air from an indoor space to be cooled and cools it by the refrigeration principles and discharges it back into the same indoor space that needs to be cooled and recirculation of the cooled air keeps the indoor space at the required temperature.

Classification of air-conditioning system

Comfort air- conditioning

Summer air – conditioning

Winter air – conditioning

Year-round air -conditioning

Industrial air-conditioning

Unitary (Window) air-conditioning

Central air-conditioning

Comfort air- conditioning

It is to provide the environment with required temperature and humidity for comfort. It is used in houses, shops hospitals, hotels etc.

Summer air – conditioning

The temperature is high and hence the air conditioning system involves cooling & dehumidification.

Winter air – conditioning

Temperature is lower in the atmospheric hence air conditioning involves heating and dehumidification to provide comfort.

Year-round air –conditioning

System has both winter & summer air-conditioning. One part of the system works in summer and other in winter.

Industrial air-conditioning

It is to provide the environment with the required temperature and humidity according to applications.

Unitary (window) air-conditioning

The unitary or window type air-conditioner is of small capacity. (0.5 tonnes to 2 tonnes). It is used for air conditioning of rooms, small offices.

Central air-conditioning

The central air-conditioning is of large capacity.(around 50 to 100 tonnes). It is used for large commercial buildings.

WINDOW AIR-CONDITIONER (ROOM AIR-CONDITIONER)

It is designed to condition the air in a single room and usually installed in a window.

Construction

Main components are

- ❖ Compressor
- ❖ Condenser
- ❖ Air filter
- ❖ Evaporator
- ❖ Motor
- ❖ Fans
- ❖ Thermostat
- ❖ Capillary tube

The whole unit is divided into two units as

- ❖ Indoor unit (an evaporator, air filter, motor driven fan, control panel, trays)
- ❖ Outdoor unit (compressor,condenser,trays,motar driven fan)
- ❖ Basic refrigeration components are enclosed in a single unit.

Working

The evaporator fan sucks the air from the room to be conditioned through air filter and it passes the air over the cooling coil. It delivers cool and dehumidified air back to the room.

In the evaporator, the liquid refrigerant picks up heat from the room air. This cool air brings down the temperature and humidity levels in the room.

Compressor compresses the low-pressure vapour refrigerant coming from the evaporator or cooling coil and converts into high pressure vapour refrigerant. It is passed into the condenser where it is cooled.

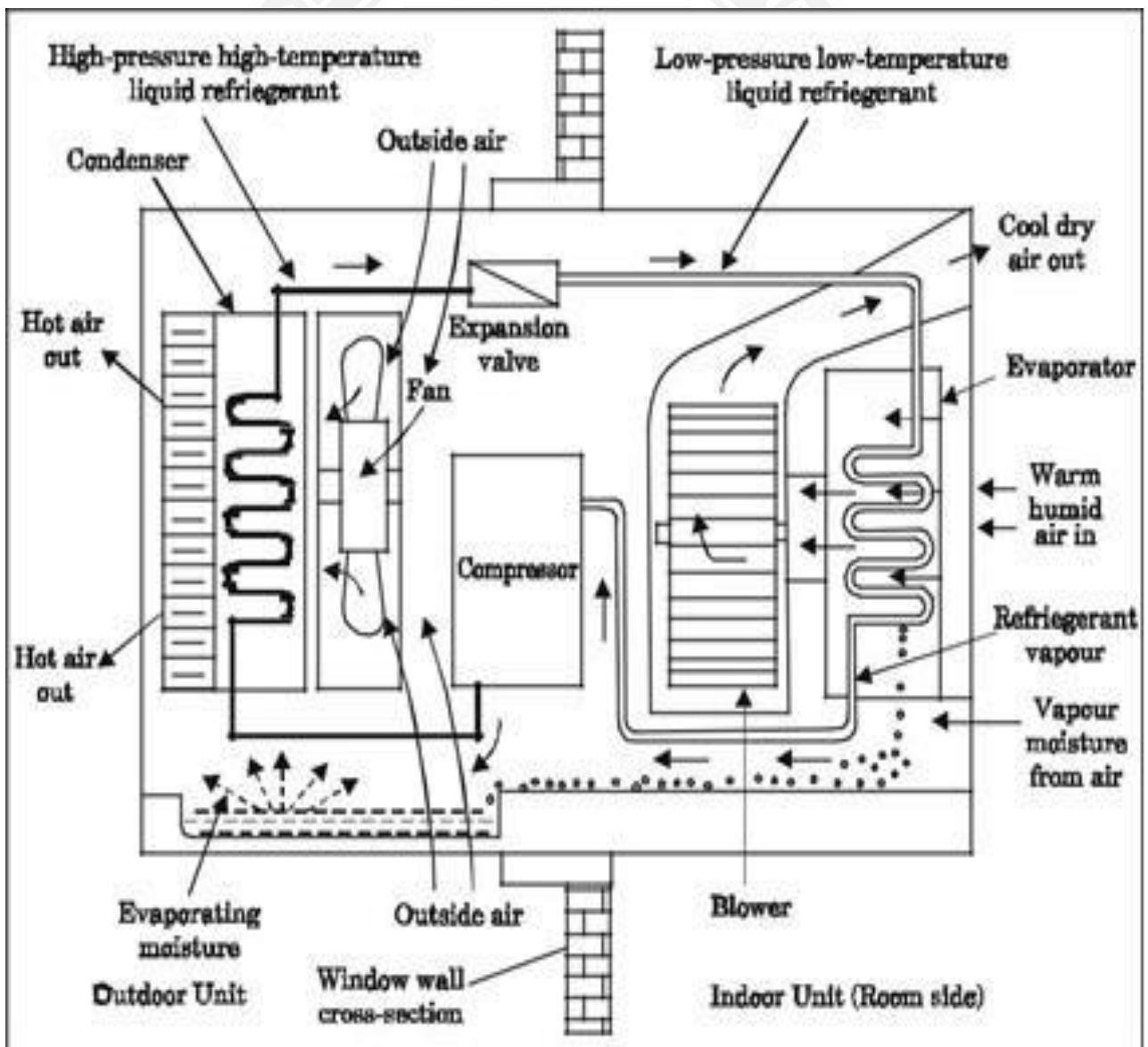


Fig 1.9.1- Window A.C.

Outside air is drawn in by the another fan (which also driven by same motor) and it cools the refrigerant then becomes liquid. The high-pressure low-temperature liquid refrigerant from the condenser enters the capillary tube. It is passes to the evaporator coil.

In the evaporator, the liquid refrigerant picks up heat and gets vapourised. This cycle repeats again & again until required temperature is reached.

Advantages

- ❖ Individual temperature control device is provided
- ❖ For air distribution, ducts are not required.

Disadvantages

- Unit is installed outside the wall.
- Unit has a fixed air quantity

