

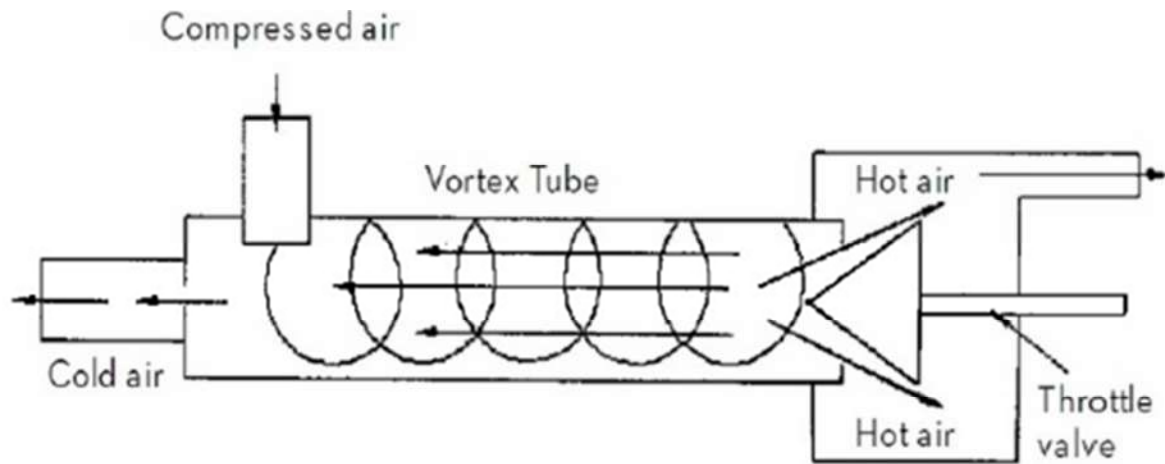
VORTEX

TUBE

Vortex Tube

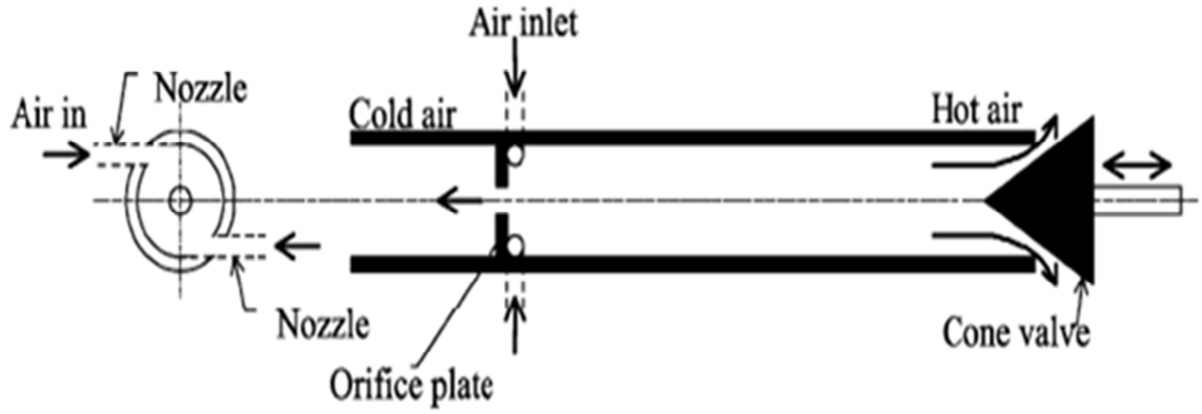
In 1931, the French engineer Georges Ranque discovered an interesting phenomenon, which is called “Ranque effect” or “vortex effect”. The tangential injection of air into a cylindrical tube induces to quote his words “a gyratory expansion with simultaneous production of an escape of hot air and an escape of cold air”. However, the discovery was neglected until after the Second World War, when in 1945, Rudolph Hilsch, a German physicist, studied this effect and published a widely read scientific paper on this device. Thus, the vortex tube has also been known as the “*Ranque-Hilsch Tube*”.

The vortex tube also known as Hilsch-Ranque tube is a simple device having no moving parts, which produces hot and cold air streams simultaneously at its two ends from a source of compressed air. It consists of a long tube having a tangential nozzle near one end and a conical valve at the other end, as shown schematically in Figure below

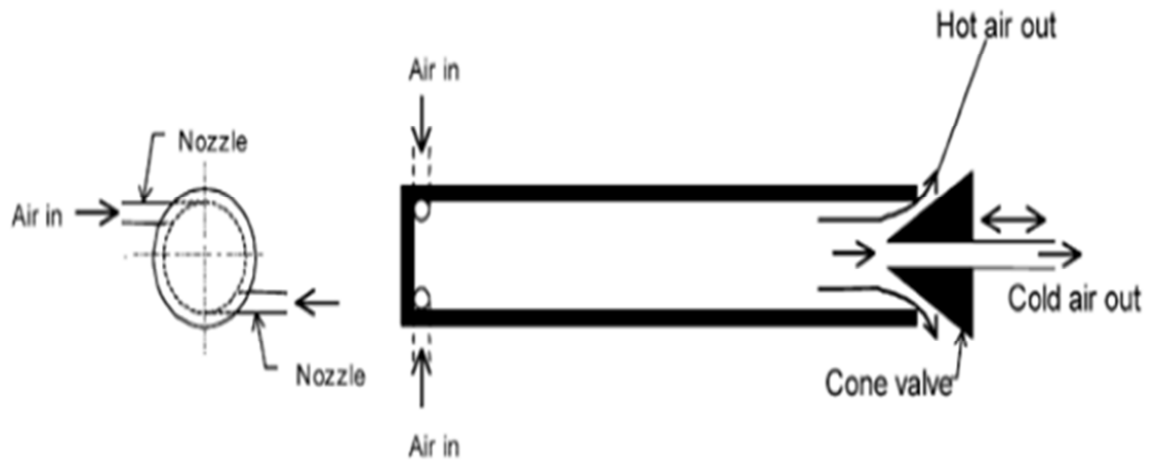


Types of Vortex Tubes

1- counter-flow vortex tube



2- parallel flow vortex tube



Advantages of vortex tube

- 1) It uses air as refrigerant, so there is no leakage problem.
- 2) Simple in design
- 3) No moving parts in vortex tube
- 4) It is light in weight and requires less space.
- 5) Initial cost is low
- 6) Maintenance is simple.

Disadvantages of vortex tube

- 1- low COP,
- 2- Limited refrigeration capacity

Applications of vortex tube

- 1) Cooling of rotor blade
- 2) Cold air suits
- 3) Laboratory cooler
- 4) Cooling of cutting tools
- 5) Simultaneous heating and cooling