

Lecture-10

vacuum and DC circuit breakers

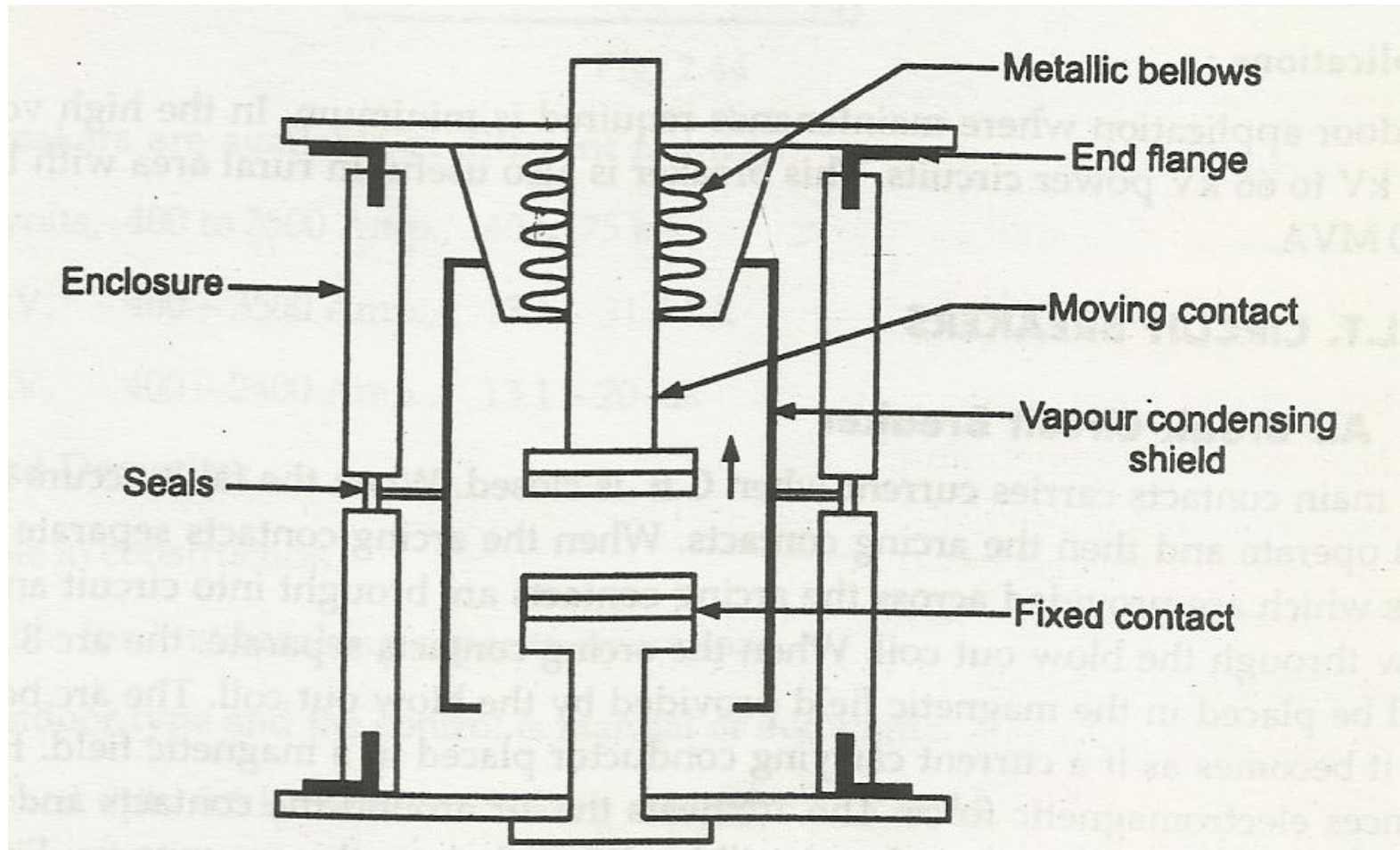
Topic Covered

- Vacuum Circuit Breakers
- Working
- Advantage and Disadvantage

Vacuum Circuit Breakers

When two contacts of this circuit breaker are separated in vacuum an arc is struck and hot spots are formed on the surface of the contacts. These hot spots produce metal vapor and plasma. The amount of vapor in plasma depends on how rapidly the vapor is emitted from contact surface which depends on the arc current. The current is of alternating nature, it passes through zero several times, so the rate of vapor emission also becomes zero, and the vapor already emitted gets condensed. During this process the dielectric strength builds up rapidly and the restriking of arc is prevented.

Vacuum Circuit Breaker



Vacuum Circuit Breakers

It consists of fixed contact, moving contact and arc shield mounted inside a vacuum chamber. The movable member is connected to the control mechanism by stainless steel bellows. This enables the permanent sealing of the vacuum chamber so as to eliminate the possibility of leakage,.

A glass vessel or ceramic vessel is used as outer insulating body. The arc shield prevents the deterioration of the internal dielectric strength by preventing the deterioration of the internal dielectric strength.

Applications –

Outdoor application where maintenance required is minimum. In the high voltage system from 22 KV to 66kV power Circuits.

Working of Vacuum Circuit Breaker

When two contacts of circuit breaker are separated in vacuum arc is struck and hot spots are formed on the surface of the contacts. These hot spots produce metal vapour and plasma.

At current zero the rate of vapour emission becomes zero.

The vapour already emitted gets condensed .

During this process the dielectric strength builds up and the restriking of arc is prevented.

Vacuum Circuit Breakers

Advantages

- Compact in size
- Reliable and long life
- Heavy fault can be interrupted effectively
- No gas is generated after arc extinction operation
- Operation is not noisy
- Arc energy is low
- No risk of fire

Disadvantages

- Vacuum has to be maintained at desired level always