

2.8 Isothermal efficiency: Isothermal efficiency is defined as the ratio of isothermal work input to the actual work input. This is used for comparing the compressors.

$$\text{Isothermal efficiency, } \eta_{\text{iso}} = \frac{\text{Isothermal work input}}{\text{Actual work output}}$$

2.9 Adiabatic efficiency: Adiabatic efficiency is defined as the ratio of adiabatic work input to the actual work input. This is used for comparing the compressors.

$$\text{Adiabatic efficiency, } \eta_{\text{adia}} = \frac{\text{Adiabatic work input}}{\text{Actual work output}}$$

2.10 Mechanical efficiency:

The compressor is driven by a prime mover. The power input to the compressor is the shaft power (brake power) of the prime mover. This is also known as brake power of the compressor.

Mechanical efficiency is defined as the ratio of indicated power of the compressor to the power input to the compressor.

$$\eta_m = \frac{\text{Indicated power of compressor}}{\text{Power input}}$$

$$\text{Indicated Power, IP} = \frac{p_m l a N k}{60},$$

where, p_m = mean effective pressure, kN/m²

l = length of stroke of piston, m

a = area of cross section of cylinder, m² N = crank speed in rpm, and

K = number of cylinders

11. Clearance and clearance volume:

When the piston reaches top dead centre (TDC) in the cylinder, there is a dead space between piston top and the cylinder head. This space is known as clearance space and the volume occupied by this space is known as clearance volume, V_c .

1. Effect of clearance volume:

The following are the effects of clearance space.

1. Suction volume (volume of air sucked) is reduced.
2. Mass of air is reduced.
3. If clearance volume increases, heavy compression is required.
4. Heavy compression increases mechanical losses