Fig:2.9 Intercooler

Working: Cold water enters the bottom of the intercooler through water inlet (1) and flows into the bottom tubes. Then they pass through the top tubes and leaves through the water outlet (2) at the top. Air from LP compressor enters through the air inlet (3) of the intercooler and passes over the tubes. While passing over the tubes, the air is cooled (by the cold water circulated through the tubes). This cold air leaves the intercooler through the air outlet (4). Baffle plates are provided in the intercooler to change the direction of air. This provides a better heat transfer from air to the circulating water.

2.15 Work input required in multistage compressor:

The following assumptions are made for calculating the work input in multistage compression.
1. Pressure during suction and delivery remains constant in each stage.
2. Intercooling takes place at constant pressure in each stage.
3. The compression process is same for each stage.
4. The mass of air handled by LP cylinder and HP cylinder is same.
5. There is no clearance volume in each cylinder.
6 There is no pressure drop between the two stages, i.e., exhaust pressure of one stage is equal to the suction pressure of the next stage.
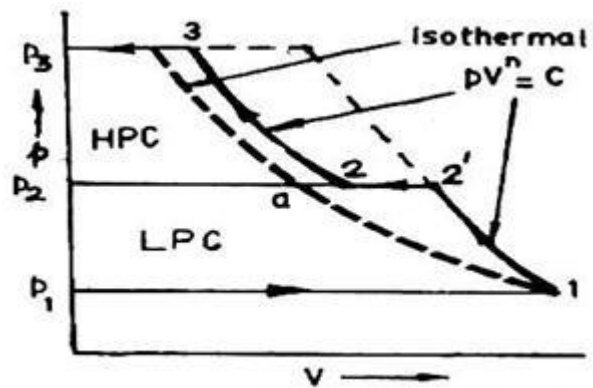

Fig:2.10 Two Stage compression

Work required to drive the multi-stage compressor can be calculated from the area of the p - V diagram .
Let, p_1, V_1 and T_1 be the condition of air entering the LP cylinder.
P_2, V_2 and T_2 be the condition of air entering the HP cylinder.
p_3 be the final delivery pressure of air.

Then,
Total work input = Work input for LP compressor + Work input for HP compressor.