4.3 Ericsson Cycle:

The Ericsson cycle consists of two isothermal and two constant pressure processes. The processes are:

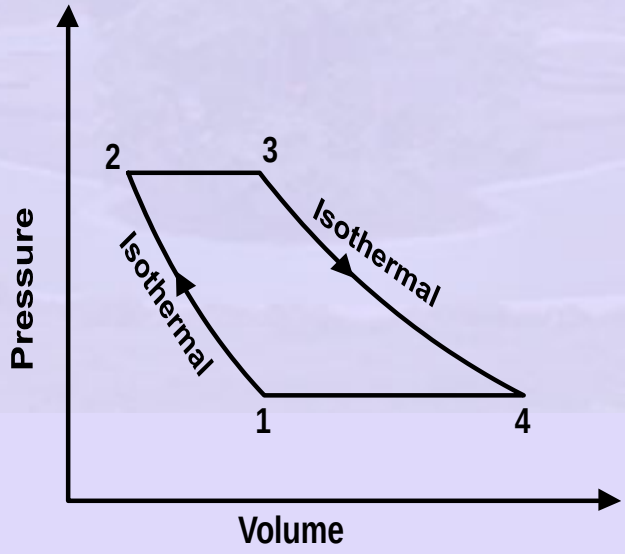
Process 1-2: Reversible isothermal compression.

Process 2-3: Constant pressure heat addition.

Process 3-4: Reversible isothermal expansion.

Process 4-1: Constant pressure heat rejection.

The heat addition and rejection take place at constant pressure as well as isothermal processes. Since the process 2-3 and 3-4 are parallel to each other on the T-s diagram, the net effect is that the heat need to be added only at constant temperature $T_3=T_4$ and rejected at the constant temperature $T_1=T_2$. The cycle is shown on p-v and T-s diagrams in Fig.4.3. The advantage of the Ericsson cycle over the Carnot and Stirling cycles is its smaller pressure ratio for a given ratio of maximum to minimum specific volume with higher mean effective pressure.



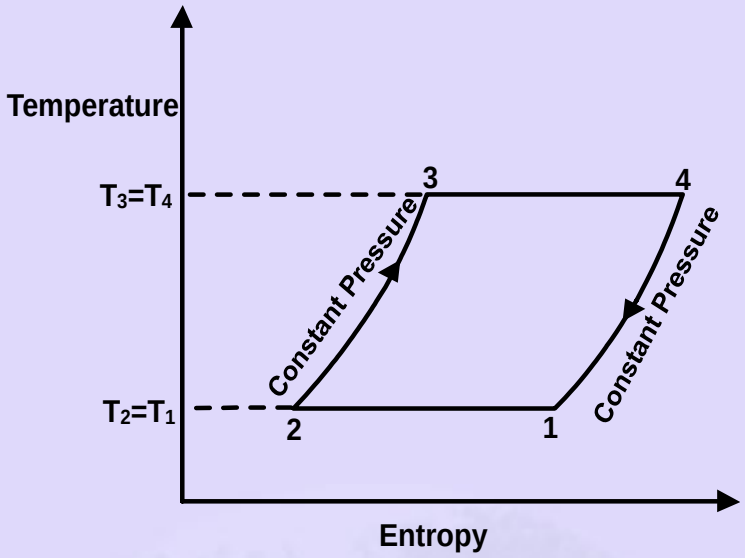


Fig.4.3. Ericsson cycle on p-v and T-s diagrams

The thermal efficiency of Ericsson cycle is given by, (derivation is same as that of Stirling cycle),

$$\eta_{th} = \frac{T_H - T_L}{T_H} = \left[1 - \frac{T_L}{T_H}\right]$$

The Ericsson cycle does not find practical application in piston engines but is approached by a gas turbine employing a large number of stages with heat exchangers, insulators and reheaters.