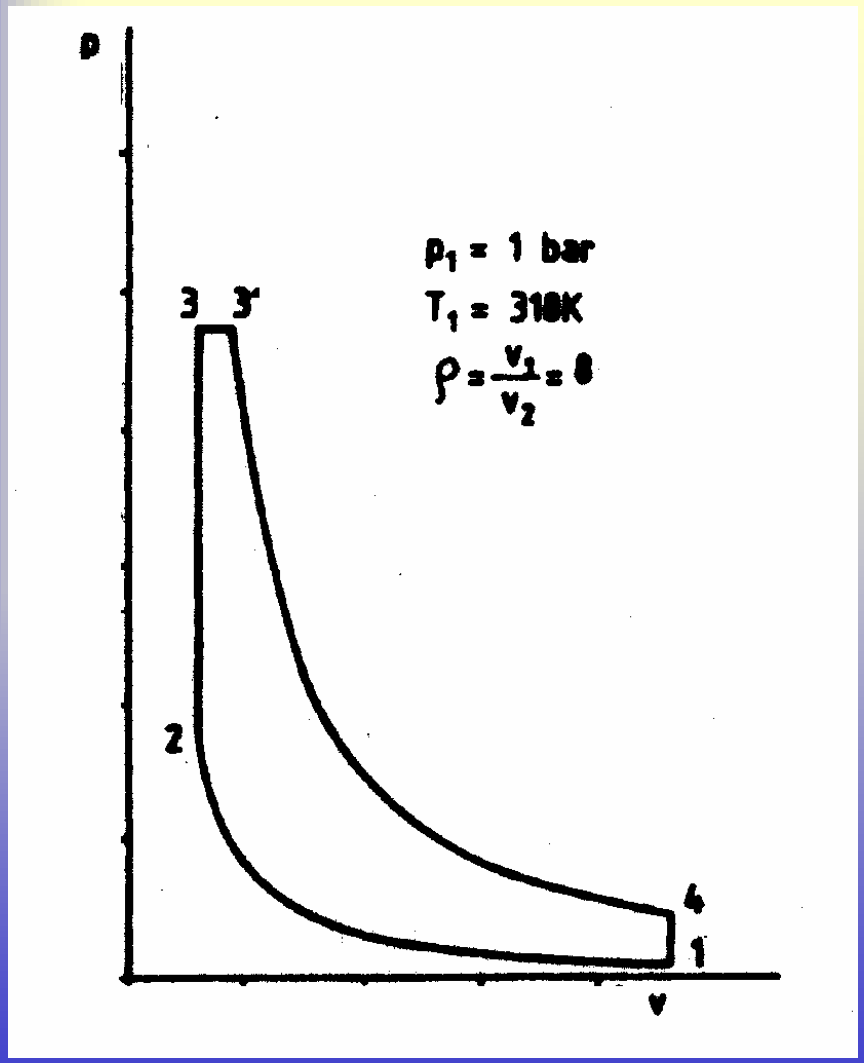
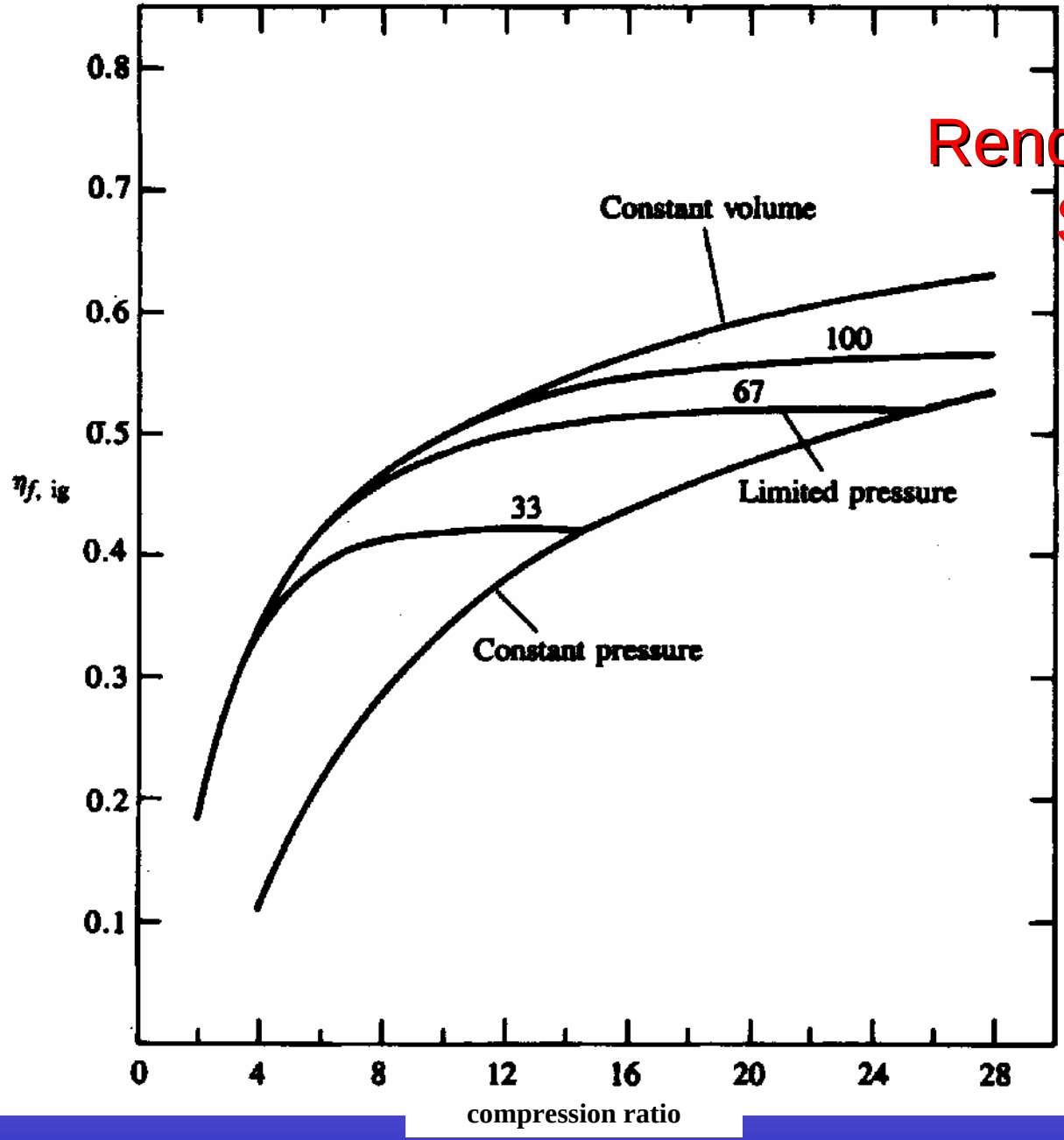
Lezione 16

Pseudo-ciclo limite MCI

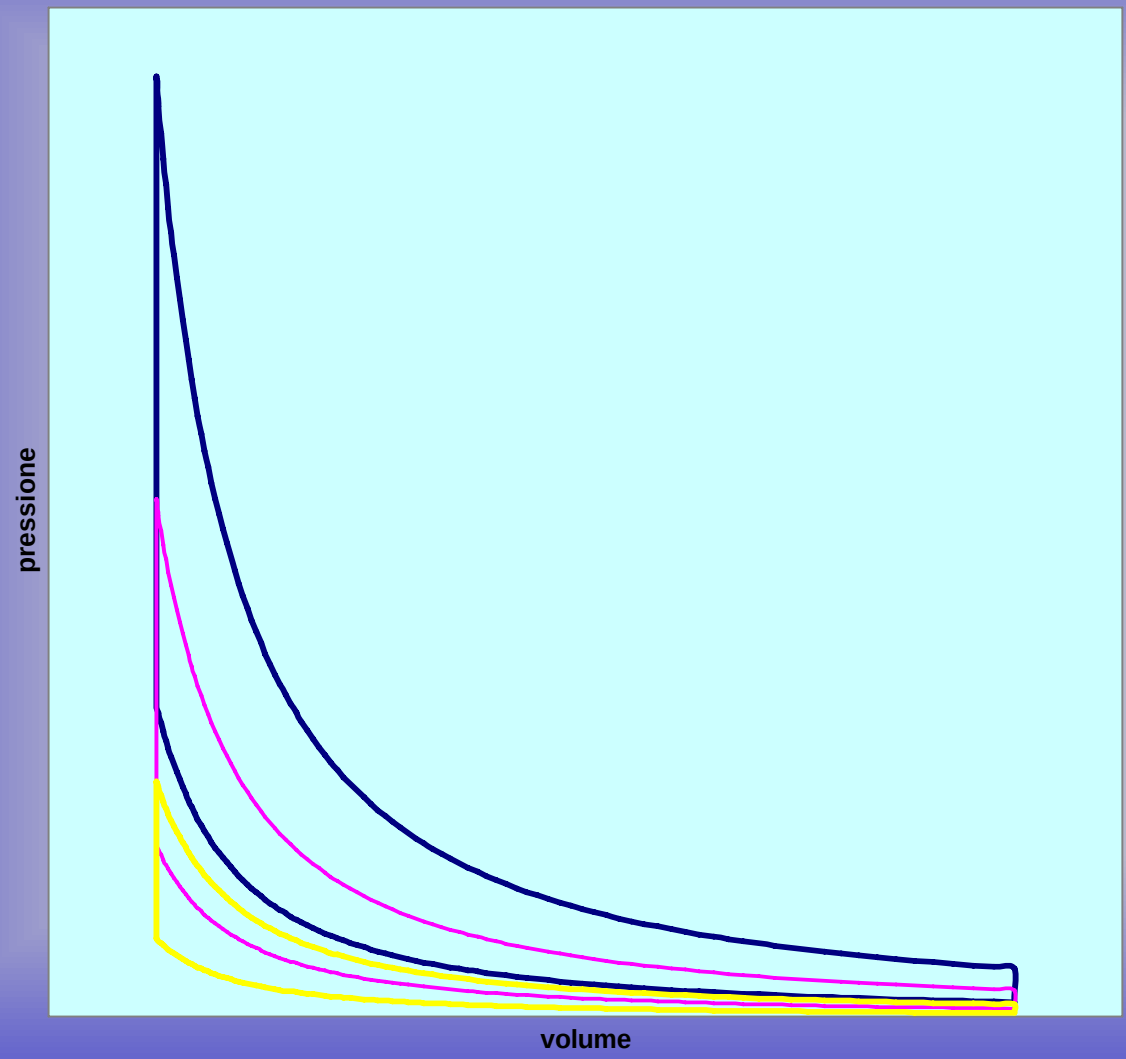
Ciclo Sabathé



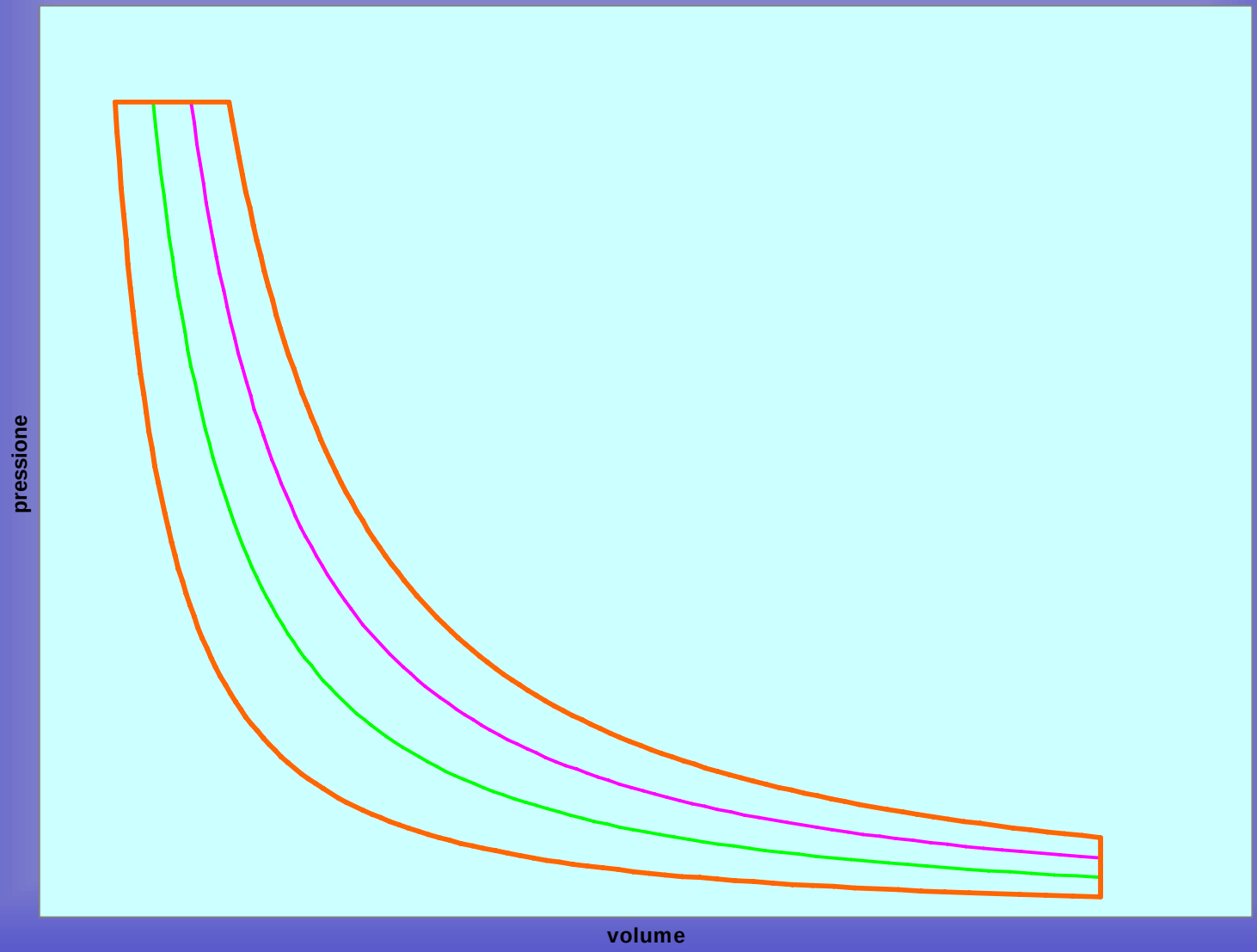
Rendimento ciclo Sabathé

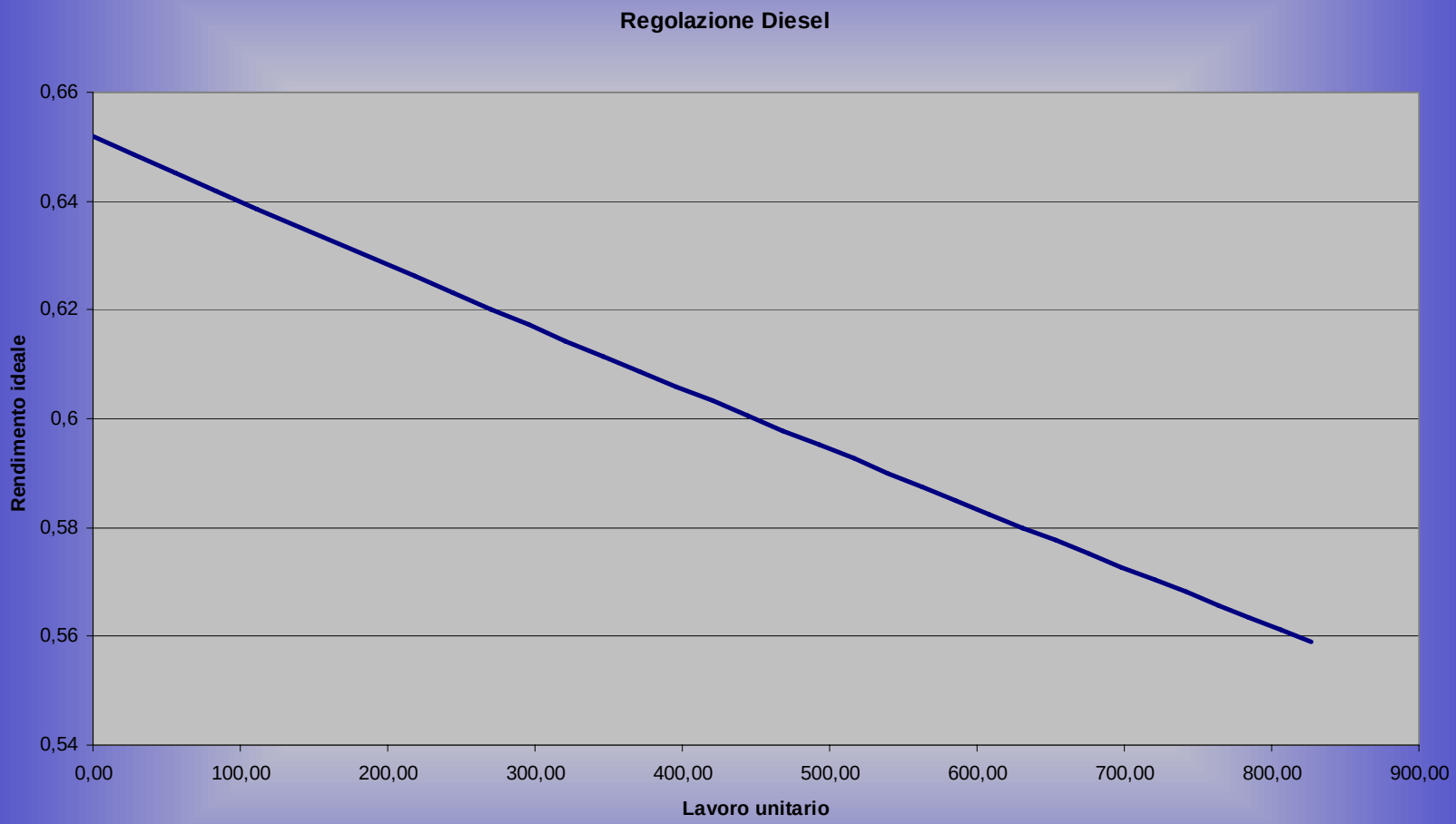


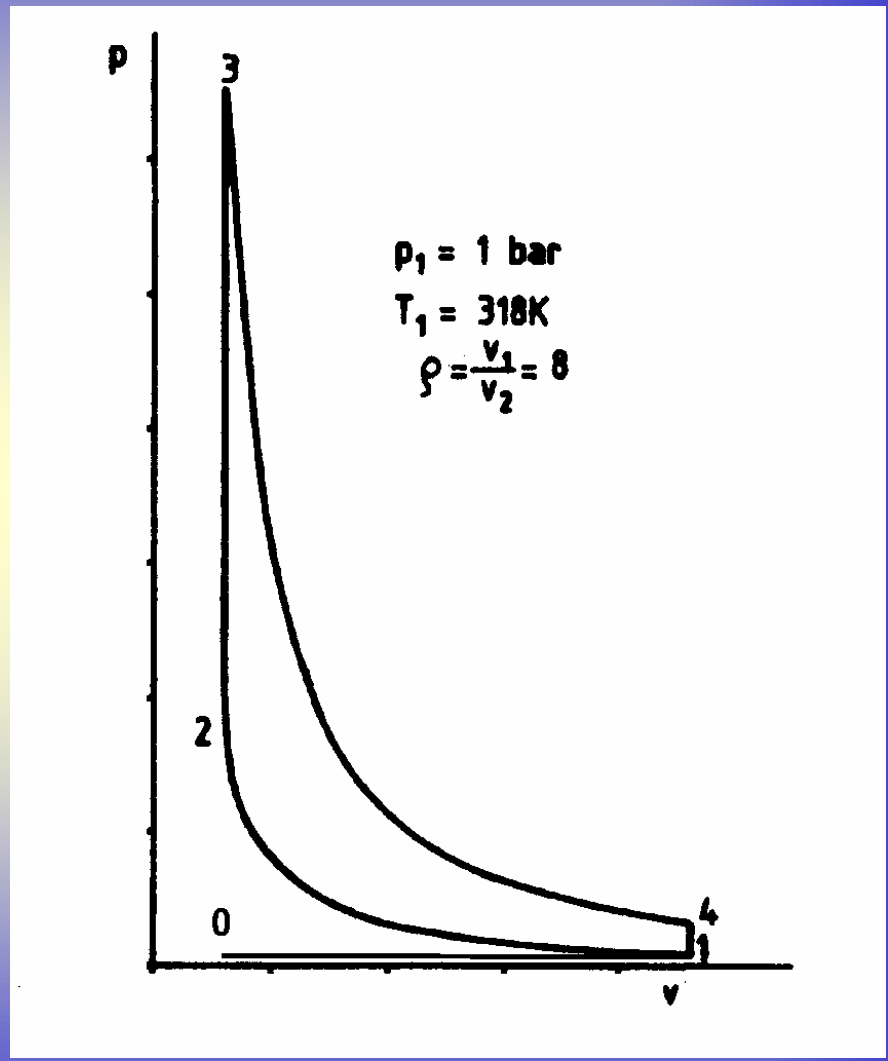
Regolazione ciclo ideale BdR

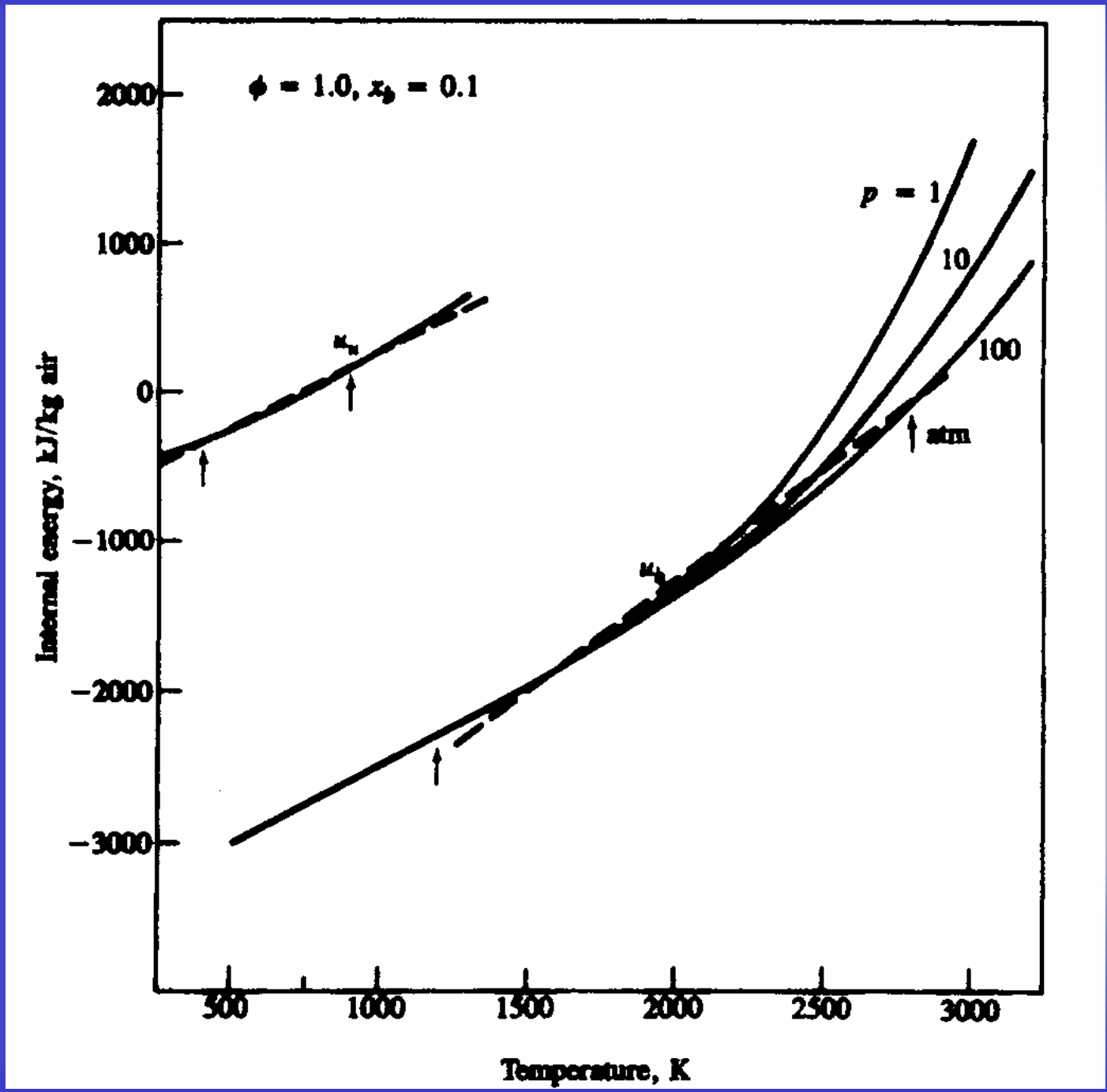


Regolazione ciclo ideale Diesel

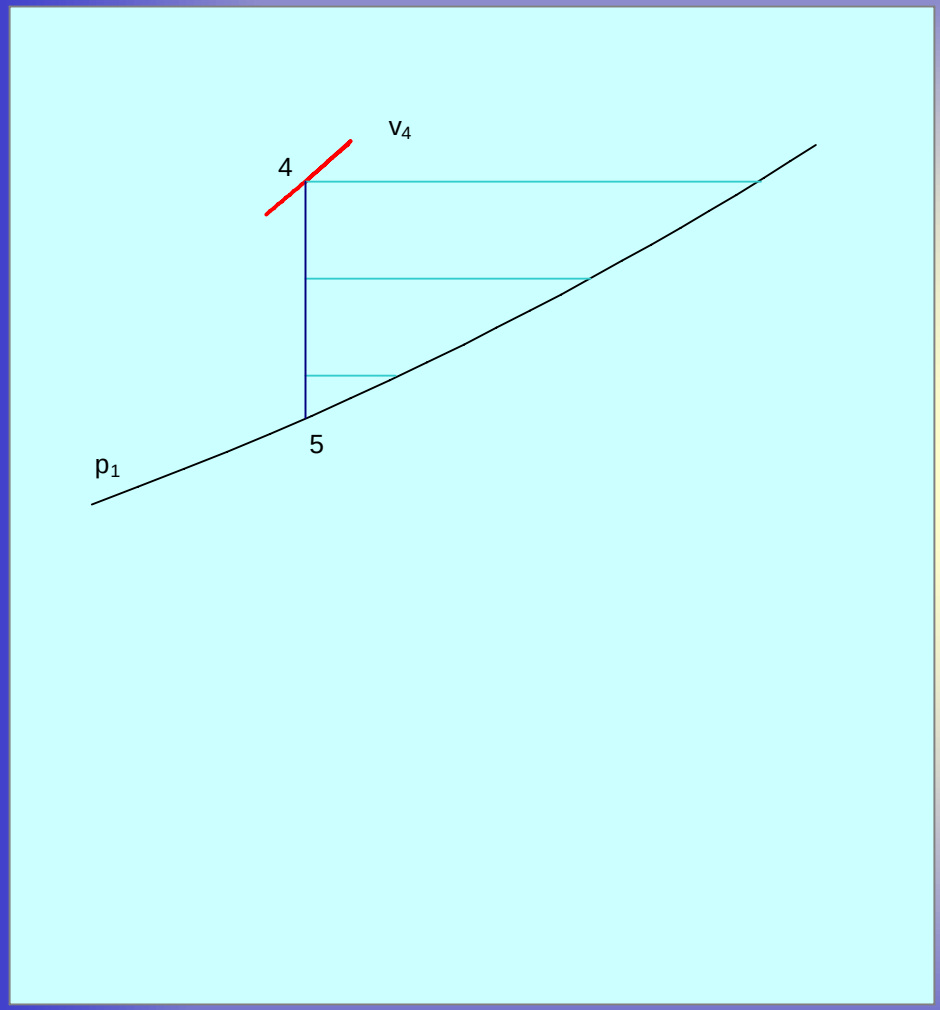


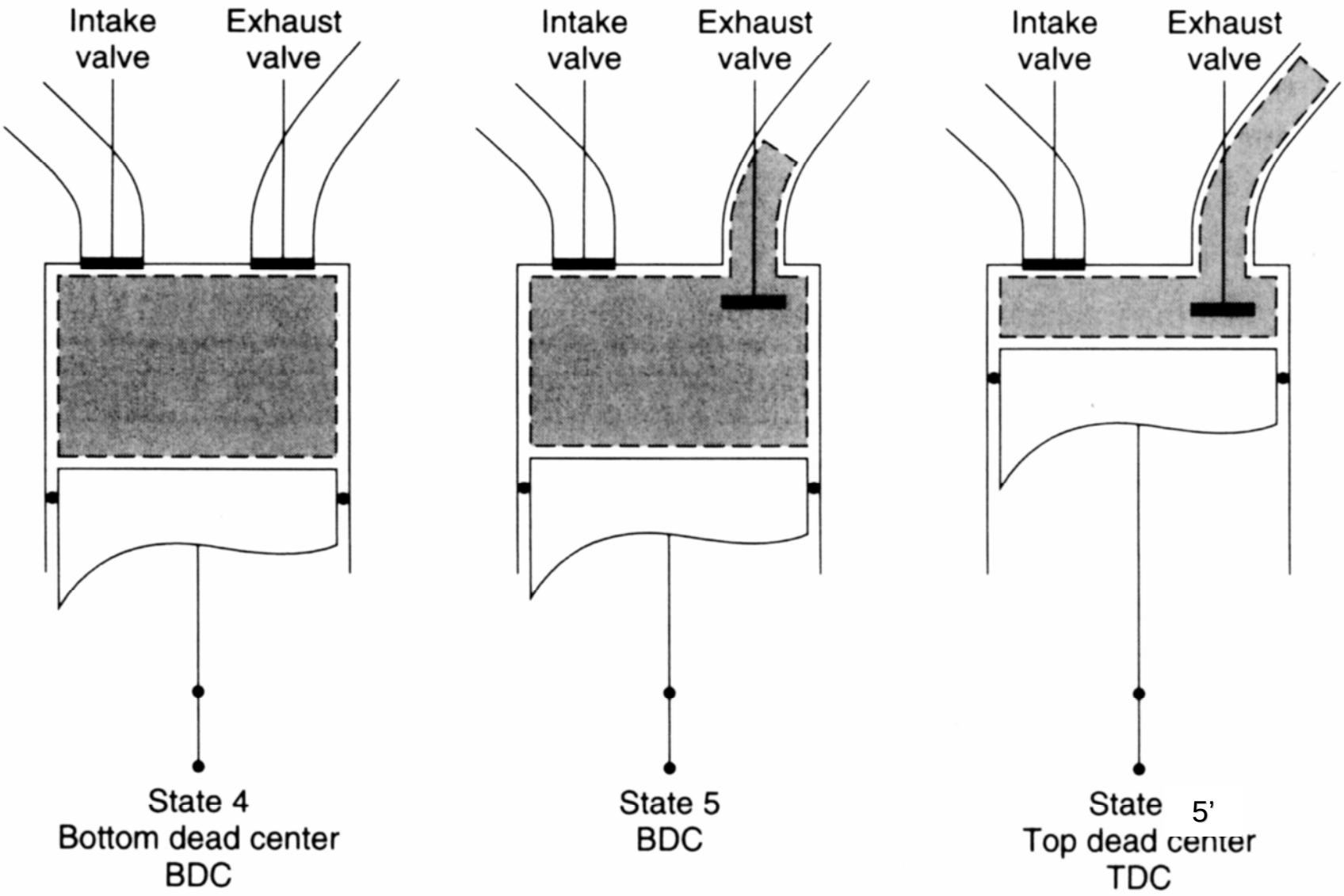

Regolazione Diesel
Rendimento ideale
0,66
0,64
0,62
0,6
0,58
0,56
0,54
0,00
100,00
200,00
300,00
400,00
500,00
600,00
700,00
800,00
900,00
Lavoro unitario


p
3
p_1 = 1 bar
T_1 = 318K
$\rho = \frac{v_1}{v_2} = 8$
2
0
4
1
v


$\phi = 1.0, x_b = 0.1$
2000
1000
0
−1000
−2000
−3000
Internal energy, kJ/kg air
$p = 1$
10
100
atm
u_u
u_b
500
1000
1500
2000
2500
3000
Temperature, K

Blow-down




Intake valve
Exhaust valve
State 4
Bottom dead center
BDC
Intake valve
Exhaust valve
State 5
BDC
Intake valve
Exhaust valve
State
Top dead center
TDC

5'

$$dU = dQ_e - dL$$

$$U_4 - U_{5'} = p_s(V_{5'} - V_4)$$

$$U_4 + p_s V_4 = p_5 V_{5'} + U_{5'}$$

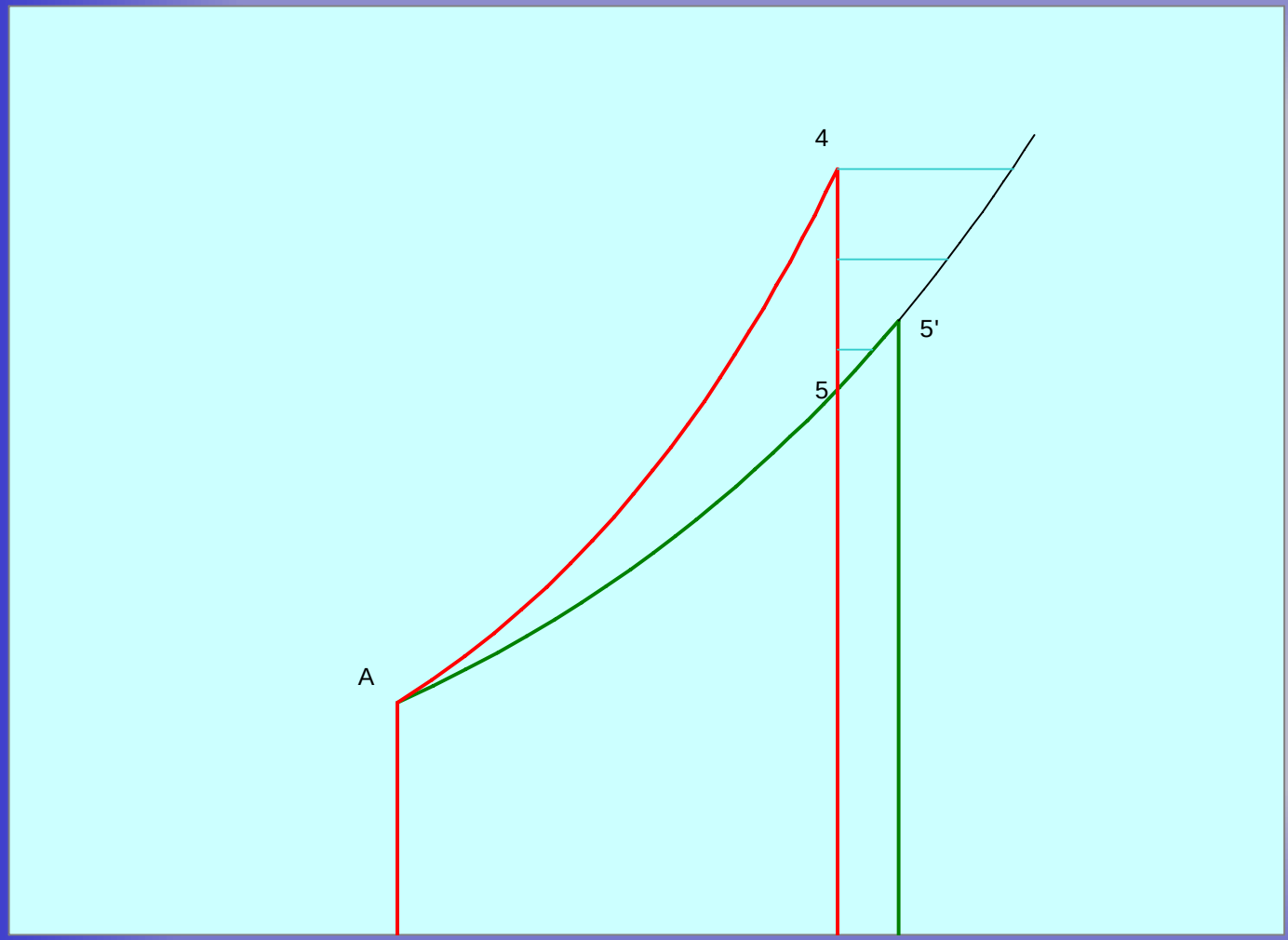
$$U_4 + p_s V_4 + U_A - U_A = H_{5'}$$

$$U_4 - U_A = H_{5'} - \left(p_s V_4 + U_A\right)$$

$$U_4 - U_A = H_{5'} - \left(p_A V_4 + U_A\right)$$

$$U_4 - U_A = H_{5'} - H_A$$

Blow-down



$$dU = dQ_e - dL$$

$$U_4 - U_{5'} = p_s(V_{5'} - V_4)$$

$$U_4 + p_s V_4 = p_5 V_{5'} + U_{5'}$$

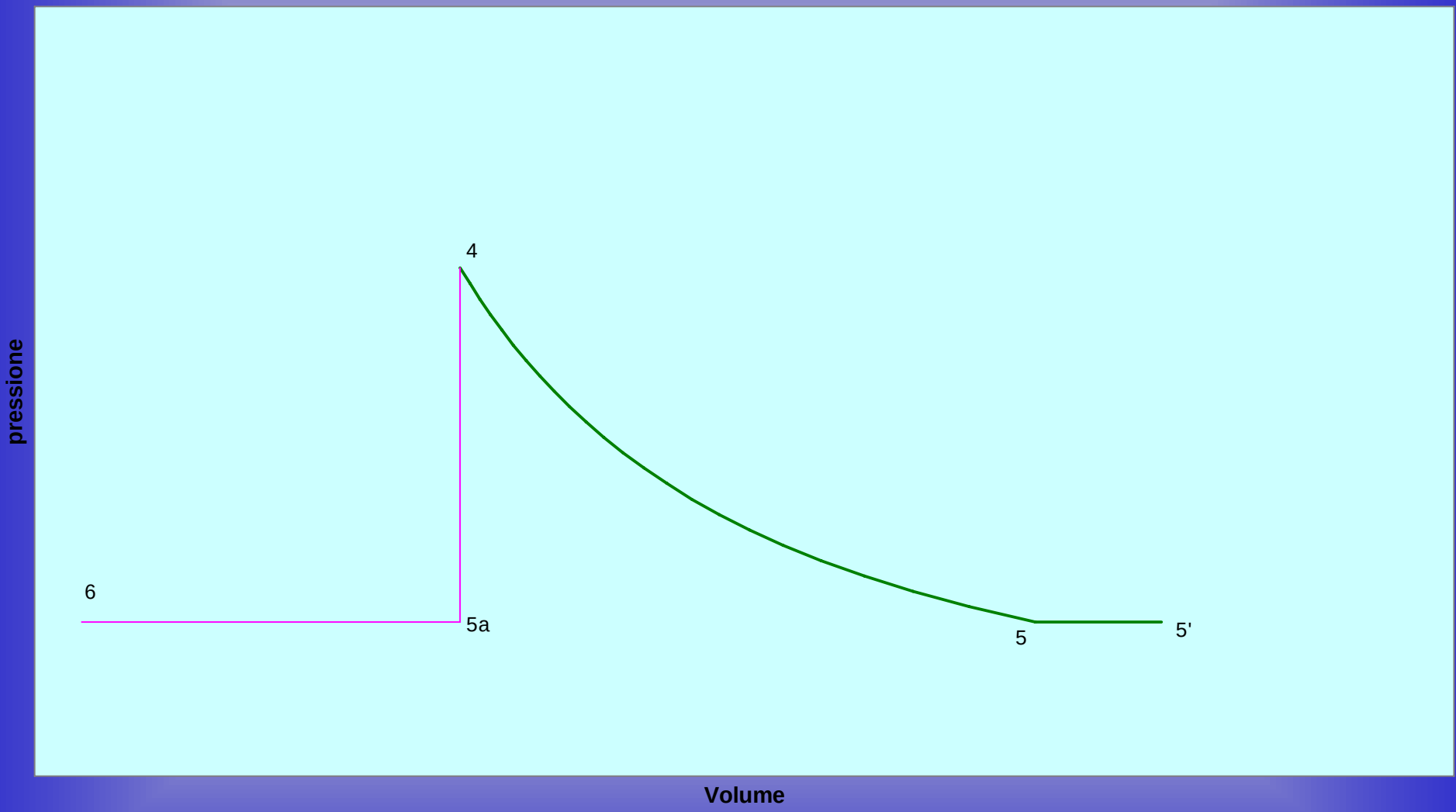
$$U_4 + p_s V_4 + U_A - U_A = H_{5'}$$

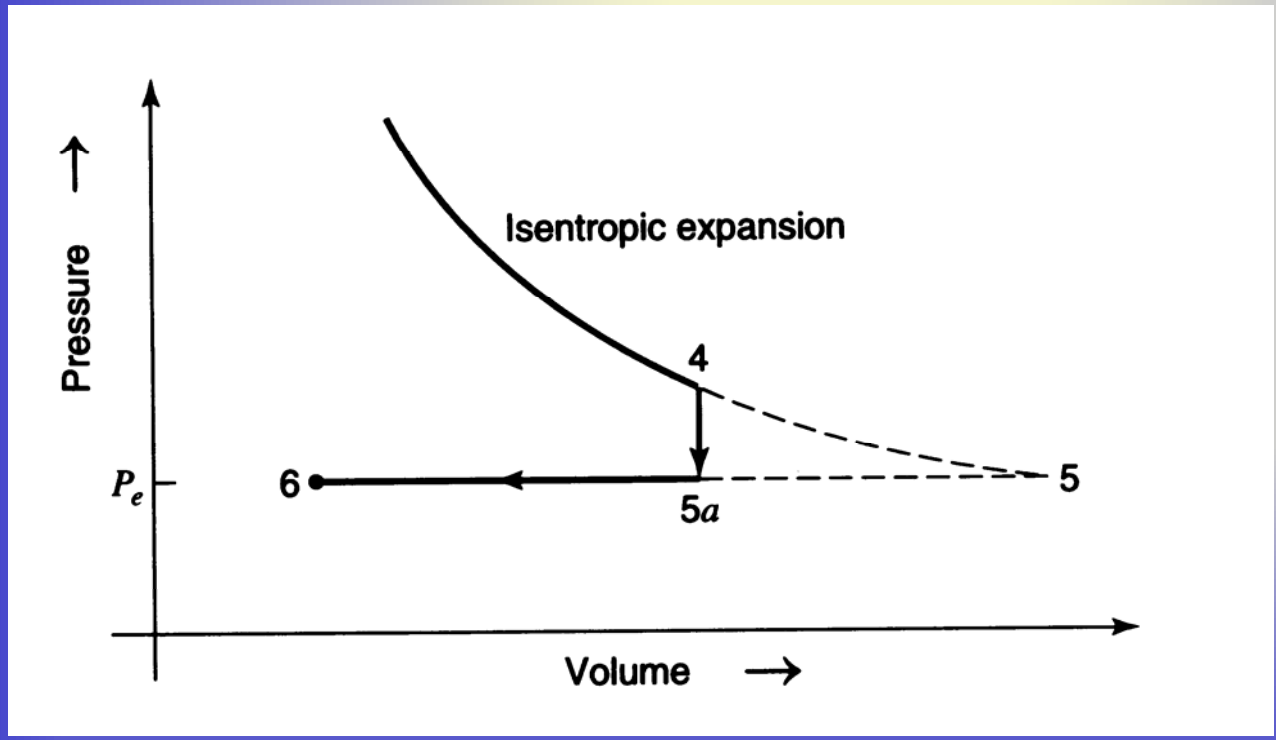
$$U_4 - U_A = H_{5'} - \left(p_s V_4 + U_A\right)$$

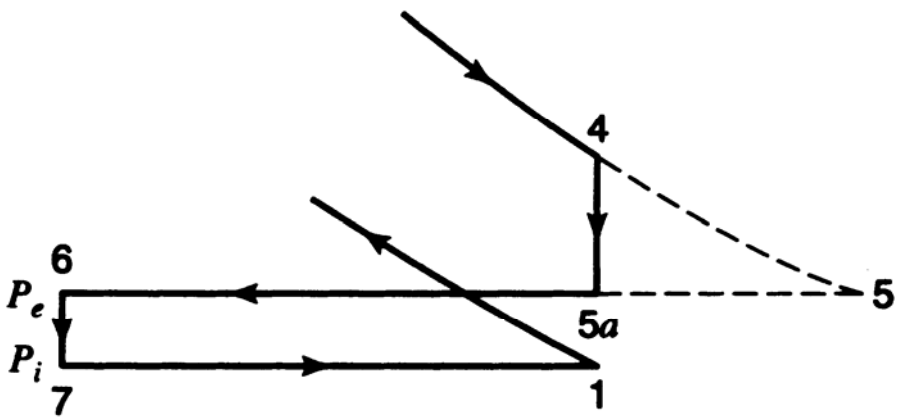
$$U_4 - U_A = H_{5'} - \left(p_A V_4 + U_A\right)$$

$$U_4 - U_A = H_{5'} - H_A$$

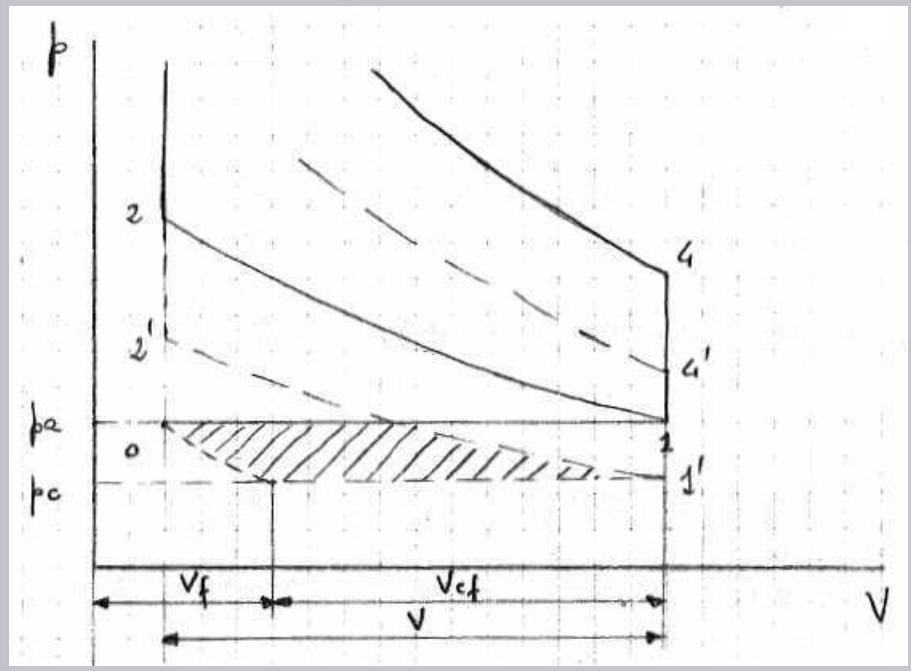
Blow-down

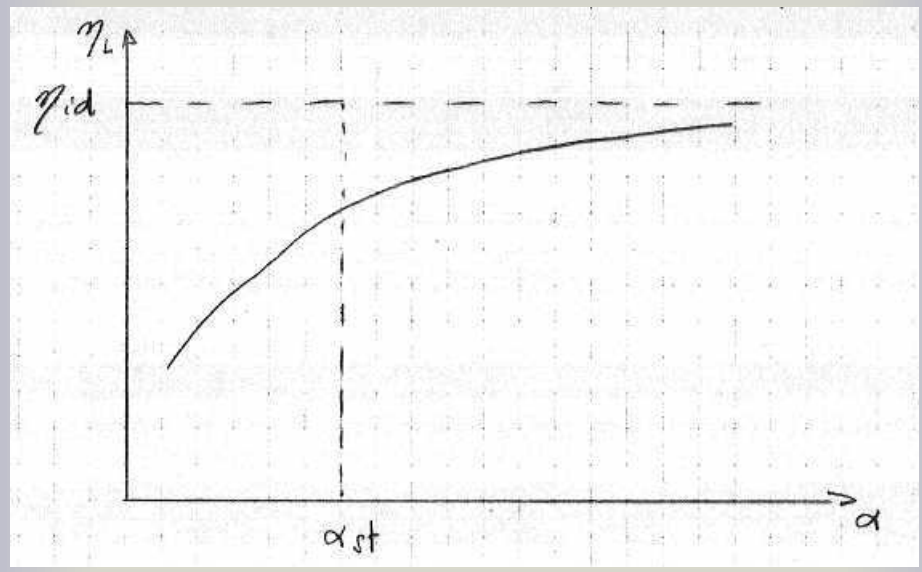


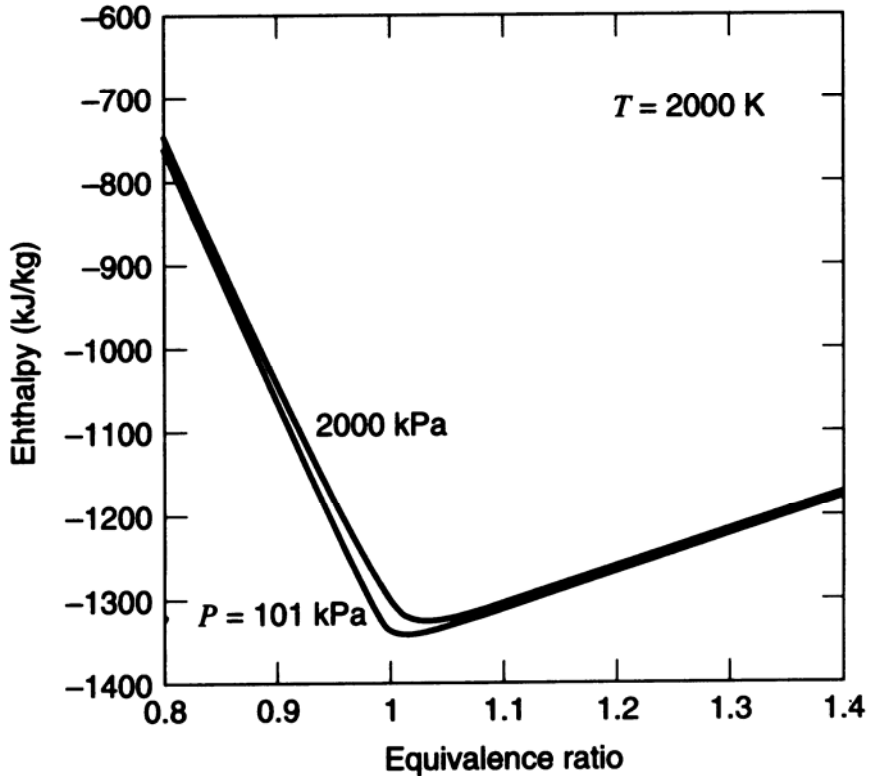

Pressure
Isentropic expansion
4
P_e
6
5
5a
Volume



Throttled cycle


p
2
2'
4
4'
pa
0
1
1'
pc
Vf
Vcf
V
V


η_L
η_{id}
α_{st}
α


−600
−700
−800
−900
−1000
−1100
−1200
−1300
−1400
Ehthalpy (kJ/kg)
T = 2000 K
2000 kPa
P = 101 kPa
0.8
0.9
1
1.1
1.2
1.3
1.4
Equivalence ratio