

Jumlah Tingkat:

Perbandingan kenaikan temperatur = 0,7.

Tinggi tekan adiabatik overall = 13500 ft.

Tinggi tekan per tingkat = 6750 ft.

a: sebelum blower

b: diantara tingkat

c: pada sisi buang blower.

Dengan mengabaikan kerugian:

Tingkat pertama:

$$E_p^{0,283} - 1 = \frac{0,283 \cdot H}{R T_a} = \frac{0,283 \cdot 6750}{53,34 \cdot 520} = 0,0689 \rightarrow E_p = 1,2655$$

$$p_b = p_a \cdot E_p = 14,7 \cdot 1,2655 = 18,6 \text{ psia.}$$

$$p_b - p_a = 18,6 - 14,7 = 3,9 \text{ psi.}$$

$$T_b = T_a \cdot E_p^{0,283} = 520 \cdot 1,0689 = 555,8^\circ \text{F abs}$$

$$T_b - T_a = 555,8 - 520 = 35,8^\circ \text{F}$$

Tingkat kedua:

$$E_p^{0,283} - 1 = \frac{0,283 \cdot H}{R T_b} = \frac{0,283 \cdot 6750}{53,34 \cdot 555,8} = 0,0644 \rightarrow E_p = 1,247.$$

$$p_c = p_b \cdot E_p = 18,6 \cdot 1,247 = 23,2 \text{ psia}$$

$$p_c - p_b = 23,2 - 18,6 = 4,6 \text{ psi.}$$

$$T_c = T_b \cdot E_p^{0,283} = 555,8 \cdot 1,0644 = 591,4^\circ \text{F abs}$$

$$T_c - T_b = 591,6 - 555,8 = 35,8^\circ \text{F.}$$

Dengan memperhatikan kenaikan temperatur:

Tingkat pertama: (perbandingan kenaikan temperatur = 0,7)

$$E_p^{0,283} - 1 = \frac{0,283 \cdot H}{R \cdot T_a} = \frac{0,283 \cdot 6750}{53,34 \cdot 520} = 0,0689 \rightarrow E_p = 1,2655$$

$$p_b = p_a \cdot E_p = 14,7 \cdot 1,2655 = 18,6 \text{ psia}$$

$$p_b - p_a = 18,6 - 14,7 = 3,9 \text{ psi}$$

$$T_b = T_a \cdot E_p^{0,283} = 520 \times 1,0689 = 555,8^\circ \text{F abs.}$$

$$(T_b - T_a)_{ad} = 555,8 - 520 = 35,8^\circ \text{F}$$

$$(T_b - T_a)_{act} = \frac{(T_b - T_a)_{ad}}{\psi} = \frac{35,8}{0,7} = 51,1^\circ \text{F.}$$

$$T_{baet.} = 520 + 51,1 = \underline{\underline{571,1^\circ \text{F abs}}}$$

Perhitungan kedua:

$$E_p^{0,283} - 1 = \frac{0,283 \cdot 6750}{53,34 \cdot 571,1} = 0,0627 \rightarrow E_p = 1,2397$$

$$p_c = p_b \cdot E_p = 18,6 \cdot 1,2397 = 23,04 \text{ psi}$$

$$p_c - p_b = 23,04 - 18,6 = 4,44 \text{ psi.}$$

$$T_c = T_b \cdot E_p^{0,283} = 571,1 \cdot 1,0627 = 606,9^\circ \text{F abs}$$

$$(T_c - T_b)_{ad} = 606,9 - 571,1 = 35,8^\circ \text{F}$$

$$(T_c - T_b)_{act} = \frac{35,8}{0,7} = 51,1^\circ \text{F}$$

$$T_{caet} = 571,1 + 51,1 = 622,2^\circ \text{F abs}$$

$$\psi = \frac{T_a (E_p^{0,283} - 1)}{\Delta T_{act.}} = \frac{520 \left[\left(\frac{18,55}{14,7} \right)^{0,283} - 1 \right]}{570 - 520} = 0,708.$$