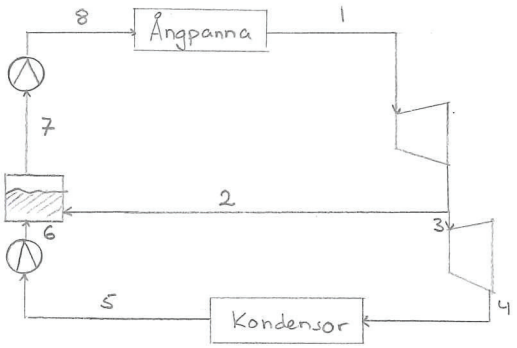
BE-4 a) UTAN AVTAPPNING



	P[bar]	T[°C]	H[kJ/kg]	S[kJ/kg·K]
1	50	500	3432	6,974
4'				
4	0,1		2455,3	7,7458
5	0,1	45,83	191,877	
8	50		191,877	

$\eta_{m+g} = 0,96$, $\eta_p = 0,90$ $\quad \eta_{el} = ?$

$$\therefore \eta_{el} = \frac{\text{Elproduktion}}{\text{Tillförd bränsleenergi}} = \frac{W_t \cdot \eta_{m+g}}{\frac{Q_p}{\eta_p}} = \frac{(3432-2455,3)\cdot 0,96}{\frac{1}{0,90}\cdot(3432-191,877)} = \underline{\underline{0,261}}$$

b) AVTAPPNING ALT 1

	P[bar]	T[°C]	H[kJ/kg]	S[kJ/kg·K]
1	50	500	3432	6,974
2	4		2952,9	7,3558
4	0,1		2455,3	7,7458
5	0,1		191,877	
8	50		604,72	

$\dot{m}_1 = \dot{m}_2 + \dot{m}_3$

$W_{T,1} = \eta_{m+g} \cdot \dot{m}_1 (H_1 - H_2)$

$W_{T,2} = \eta_{m+g} \cdot \dot{m}_3 (H_3 - H_4)$

$\dot{m}_2 \cdot H_2 + \dot{m}_3 \cdot H_5 = \dot{m}_1 \cdot H_8$ (EB över kärlet)

$\Rightarrow \dot{m}_2 H_2 + (\dot{m}_1 - \dot{m}_2) H_5 = \dot{m}_1 H_8 \quad \Rightarrow \dot{m}_2 = \frac{\dot{m}_1 (H_8 - H_5)}{H_2 - H_5} = 0,15\,\dot{m}_1$

$$\therefore \eta_{el} = \frac{\eta_{m+g}\left(\dot{m}_1 (H_1 - H_2) + \dot{m}_3 (H_3 - H_4)\right)}{\frac{1}{\eta_p} Q_p} = \frac{0,96\left(\cancel{\dot{m}_1}(H_1 - H_2) + 0,85\cancel{\dot{m}_1}(H_3 - H_4)\right)}{\frac{1}{\eta_p}\cdot \cancel{\dot{m}_1}(H_1 - H_8)} = \underline{\underline{0,276}}$$

c) AVTAPPNING ALT 2

	P[bar]	T[°C]	H[kJ/kg]	S[kJ/kg·K]
1	50	500	3432	6,974
2	1		2739,4	7,5232
4	0,1		2455,3	7,7458
5	0,1		191,877	
8	50		417,55	

EB över kärlet:

$\dot{m}_2 H_2 + (\dot{m}_1 - \dot{m}_2) H_5 = \dot{m}_1 H_8$

$\Rightarrow \dot{m}_2 = \frac{\dot{m}_1 (H_8 - H_5)}{H_2 - H_5} = 0,089\,\dot{m}_1$

$$\therefore \eta_{el} = \frac{\eta_{m+g}\left(\dot{m}_1 (H_1 - H_2) + \dot{m}_3 (H_3 - H_4)\right)}{\frac{1}{\eta_p}\cdot Q_p} = \frac{0,96\left(\cancel{\dot{m}_1}(H_1 - H_2) + 0,91\cancel{\dot{m}_1}(H_3 - H_4)\right)}{\frac{1}{0,90}\cancel{\dot{m}_1}(H_1 - H_8)} = \underline{\underline{0,273}}$$

Svar:
- Utan avtappning – $\eta_{el} = 26,1\,\%$
- Avtappning alt. 1 – $\eta_{el} = 27,6\,\%$
- Avtappning alt. 2 – $\eta_{el} = 27,3\,\%$