

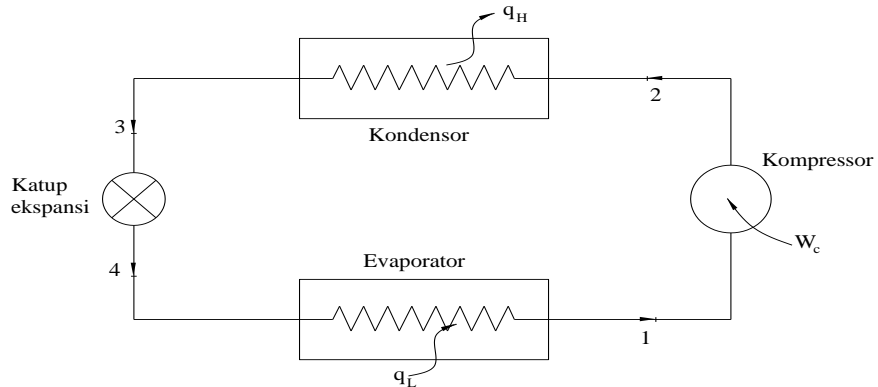
Jawab: (soal 6.15)

Dik. $T_1 = T_4 = -15 \text{ }^\circ\text{C}$ $T_a = 40 \text{ }^\circ\text{C}$ Freon 12
 $T_3 = 40, 45, 50, 55, 60, 65, 70, 75, 80, 85 \text{ dan } 90 \text{ }^\circ\text{C}$

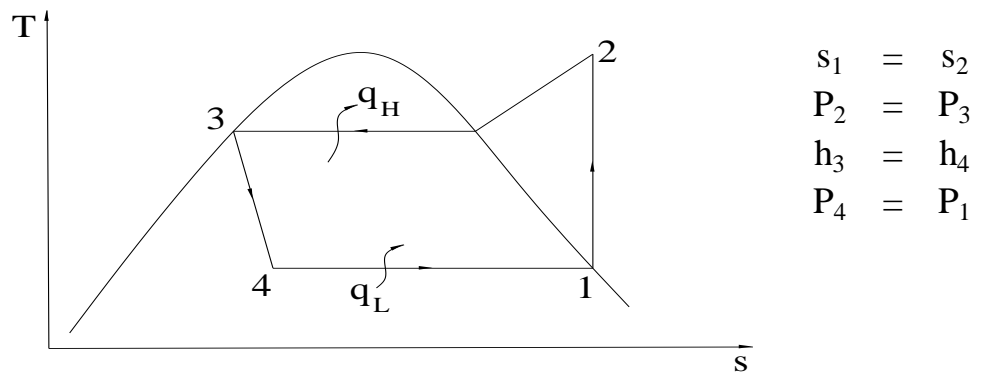
Diminta: Grafik Daya input Vs beda temperatur lingkungan dan kondensor

Penyelesaian

* Gambar skema instalasi



* Diagram T - s



Entalpi (h) pada setiap titik

* Titik 1 (uap jenuh)

$$T_1 = -15 \text{ }^\circ\text{C} \xrightarrow{\text{A.3.1}} h_1 = h_{g1} = \boxed{180.8460} \text{ kJ/kg}$$

$$s_1 = s_{g1} = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

* Titik 2 (UDL)

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{ pada } T_3 = 40 \text{ }^\circ\text{C}$$

$$P_2 = P_3 = 0.9607 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
1		0.9607	0.9	
h	s	h	h	s
210.162	0.7021		204.17	0.6982
210.9826	0.7046	h_2	207.4323	0.7046
217.81	0.7254		211.765	0.7131

$$h_2 = \boxed{209.5873} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{ pada } T_3 = 45 \text{ }^\circ\text{C}$$

$$P_2 = P_3 = 1.0843 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
1		1.0843	1.2	
h	s	h	h	s
210.162	0.7021		206.661	0.6812
210.9826	0.7046	h_2	214.3453	0.7046
217.81	0.7254		214.805	0.706

$$h_2 = \boxed{212.4000} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{ pada } T_3 = 50 \text{ }^\circ\text{C}$$

$$P_2 = P_3 = 1.2193 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
1.4		1.2193	1.2	
h	s	h	h	s
211.457	0.6876		206.661	0.6812
215.219	0.7046	h_2	214.3453	0.7046
219.822	0.7254		214.805	0.706

$$h_2 = \boxed{214.4296} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{ pada } T_3 = 55 \text{ } ^\circ\text{C}$$

$$P_2 = P_3 = 1.3663 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
1.4		1.3663	1.2	
h	s	h	h	s
211.457	0.6876		206.661	0.6812
215.219	0.7046	h_2	214.3453	0.7046
219.822	0.7254		214.805	0.706

$$h_2 = \boxed{215.0718} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{ pada } T_3 = 60 \text{ } ^\circ\text{C}$$

$$P_2 = P_3 = 1.5259 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
1.4		1.5259	1.6	
h	s	h	h	s
211.457	0.6876		216.65	0.6959
215.219	0.7046	h_2	219.678	0.7046
219.822	0.7254		225.177	0.7204

$$h_2 = \boxed{218.0259} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{ pada } T_3 = 65 \text{ } ^\circ\text{C}$$

$$P_2 = P_3 = 1.6988 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
1.6		1.6988	1.8	
h	s	h	h	s
216.65	0.6959		213.049	0.6794
219.678	0.7046	h_2	221.8153	0.7046
225.177	0.7204		222.198	0.7057

$$h_2 = \boxed{220.7338} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{pada } T_3 = 70 \text{ }^\circ\text{C}$$

$$P_2 = P_3 = 1.8858 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
2		1.8858	1.8	
h	s	h	h	s
218.859	0.6909		213.049	0.6794
223.7617	0.7046	h_2	221.8153	0.7046
228.056	0.7166		222.198	0.7057

$$h_2 = \boxed{222.6503} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{pada } T_3 = 75 \text{ }^\circ\text{C}$$

$$P_2 = P_3 = 2.0874 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
2		2.0874	2.5	
h	s	h	h	s
218.859	0.6909		219.562	0.6823
223.7617	0.7046	h_2	227.7573	0.7046
228.056	0.7166		229.852	0.7103

$$h_2 = \boxed{224.4601} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{pada } T_3 = 80 \text{ }^\circ\text{C}$$

$$P_2 = P_3 = 2.3046 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
2		2.3046	2.5	
h	s	h	h	s
218.859	0.6909		219.562	0.6823
223.7617	0.7046	h_2	227.7573	0.7046
228.056	0.7166		229.852	0.7103

$$h_2 = \boxed{226.1958} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{pada } T_3 = 85 \text{ } ^\circ\text{C}$$

$$P_2 = P_3 = 2.538 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
3		2.538	2.5	
h	s	h	h	s
220.529	0.677		219.562	0.6823
230.9708	0.7046	h_2	227.7573	0.7046
232.068	0.7075		229.852	0.7103

$$h_2 = \boxed{228.0015} \text{ kJ/kg}$$

$$P_2 = P_3 = P_j \xrightarrow{\text{A.3.1}} \text{pada } T_3 = 90 \text{ } ^\circ\text{C}$$

$$P_2 = P_3 = 2.7885 \text{ MPa}$$

$$s_2 = s_1 = 0.7046 \text{ kJ/kg} \cdot \text{K}$$

Interpolasi Tabel A.3.2

P (MPa)				
3		2.7885	2.5	
h	s	h	h	s
220.529	0.677		219.562	0.6823
230.9708	0.7046	h_2	227.7573	0.7046
232.068	0.7075		229.852	0.7103

$$h_2 = \boxed{229.6115} \text{ kJ/kg}$$

$T_a = 40$

ΔT	T3	h1	h2	Wc
0	40	180.8460	209.5873	28.7413
5	45	180.8460	212.4000	31.5540
10	50	180.8460	214.4296	33.5836
15	55	180.8460	215.0718	34.2258
20	60	180.8460	218.0259	37.1799
25	65	180.8460	220.7338	39.8878
30	70	180.8460	222.6503	41.8043
35	75	180.8460	224.4601	43.6141
40	80	180.8460	226.1958	45.3498
45	85	180.8460	228.0015	47.1555
50	90	180.8460	229.6115	48.7655

