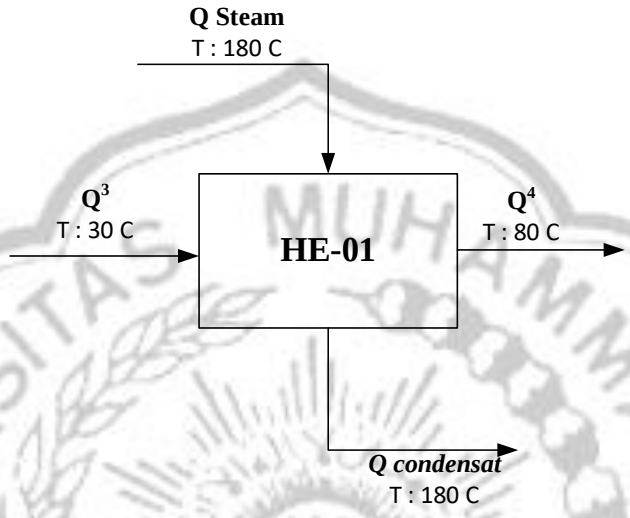
BAB VI
NERACA PANAS

6.1. Neraca Panas Tiap Alat

Heat Exchanger – 01



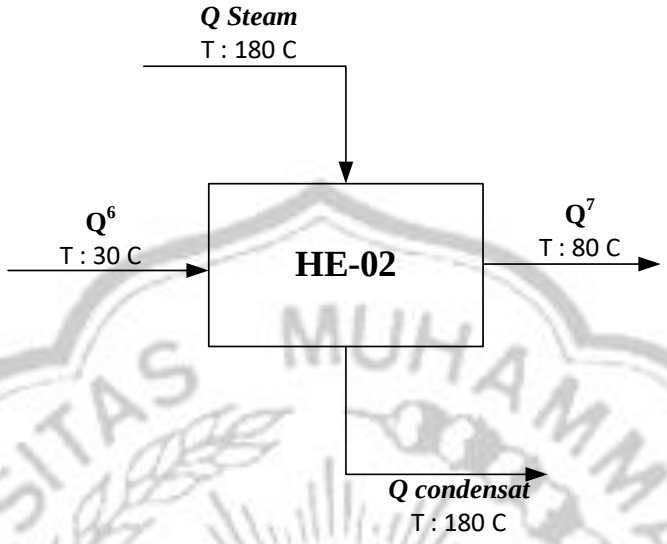
Gambar 6. 1 Diagram Blok Neraca Energi *Heat Exchanger* (HE-01)

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.1

Tabel 6. 1 Neraca Energi *Heat Exchanger* (HE-01)

Senyawa	Masuk (Kj/hr)		Keluar (Kj/hr)	
	Q^3	Q *Steam* (Sat.Vapor)	Q^4	Q *Condensat* (Sat. Liquid)
$C_4H_6O_2$	24.067,1616		264.738,7777	
$C_4H_{10}O$	21.746,5105		239.211,6150	
H_2O	1.375,6930		15.132,6225	
Steam		650.764,1272		178.870,4771
Total	**697.953,4922**		**697.953,4922**	

***Heat Exchanger* – 02**



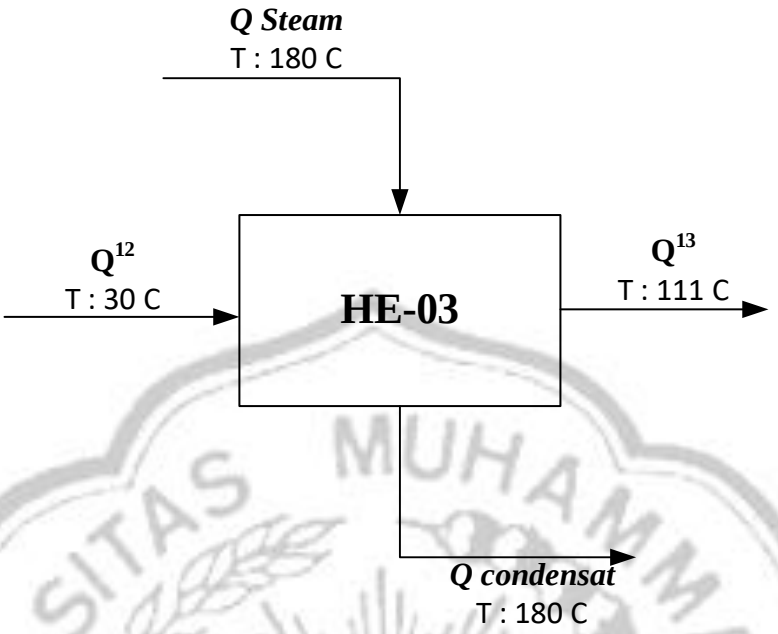
Gambar 6. 2 Diagram Blok Neraca Energi *Heat Exchanger* (HE-02)

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.2

Tabel 6. 2 Neraca Energi *Heat Exchanger* (HE-02)

Senyawa	Masuk (Kj/jam)		Keluar (Kj/jam)	
	Q^6	Q *Steam* (Sat.Vapor)	Q^7	Q *Condensat* (Sat. Liquid)
H_2SO_4	631,0936		6.942,0300	
H_2O	37,8541		416,3950	
Steam		9.225,1122		2.535,6349
Total	**9.894,0600**		**9.894,0600**	

***Heat Exchanger* – 03**



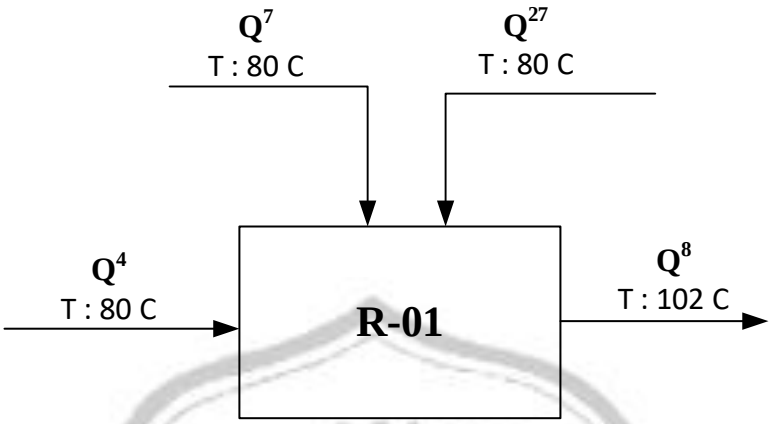
Gambar 6. 3 Diagram Blok Neraca Energi Heat Exchanger (HE-03)

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.3

Tabel 6. 3 Neraca Energi Heat Exchanger (HE-03)

Senyawa	Masuk (Kj/jam)		Keluar (Kj/jam)	
	Q^{12}	Q *Steam* (Sat.Vapor)	Q^{13}	Q *Condensat* (Sat. Liquid)
NaOH	619,0287		10.647,2943	
H_2O	1.707,3894		29.367,0969	
Steam		51.973,5346		14.285,5614
Total	**54.299,9527**		**54.299,9527**	

Reaktor – 01



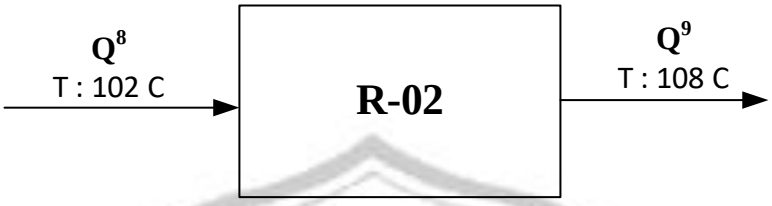
Gambar 6. 4 Diagram Blok Neraca Energi Reaktor (R-01)

Besar energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.4

Tabel 6. 4 Neraca Energi Reaktor

Senyawa	Masuk (Kj/jam)			Keluar (Kj/jam)
	Q^4	Q^7	Q^{27}	Q^8
$C_4H_60_2$	161.731,3260		772,3801	48.465,5644
$C_4H_{10}O$	146.136,5502		2.182,0060	42.807,8175
H_20	9.244,6566	272,1771		163.684,7384
H_2SO_4		4.240,9493		9,809,4671
$C_8H_{14}O_2$			2.599,6413	546.316,7357
Panas reaksi	483.904,6364			
Total	**811.084,3231**			**811.084,3231**

Reaktor – 02



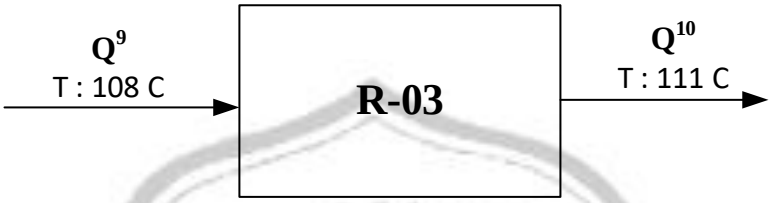
Gambar 6. 5 Diagram Blok Neraca Energi Reaktor (R-02)

Besar energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.5

Tabel 6. 5 Neraca Energi Reaktor

Senyawa	Masuk (Kj/jam)	Keluar (Kj/jam)
	Q^8	Q^9
$C_4H_60_2$	48.465,5644	16.573,9558
$C_4H_{10}O$	42.807,8175	13.435,9956
H_20	163.684,7384	191.579,5717
H_2SO_4	9.809,4671	10.558,2471
$C_8H_{14}O_2$	546.316,7357	646.751,8626
Panas reaksi	67.815,3097	
Total	**878.899,6328**	**878.899,6328**

Reaktor – 03



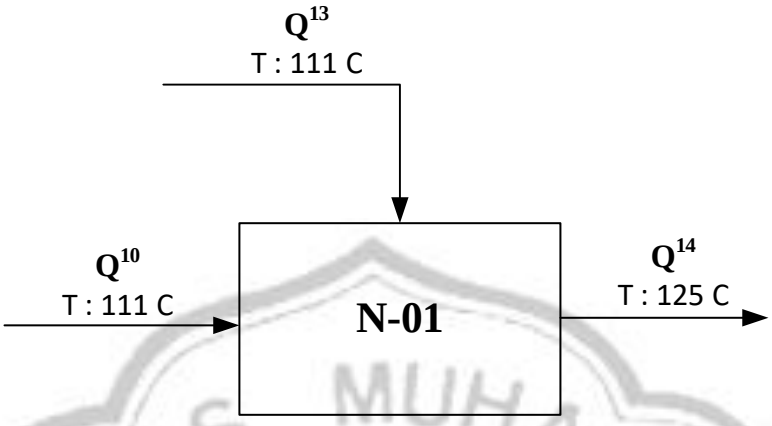
Gambar 6. 6 Diagram Blok Neraca Energi Reaktor (R-03)

Besar energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.6

Tabel 6. 6 Neraca Energi Reaktor

Senyawa	Masuk (Kj/jam)	Keluar (Kj/jam)
	Q^9	Q^{10}
$C_4H_60_2$	16.573,9558	8.333,3158
$C_4H_{10}O$	13.435,9956	5.826,0417
H_20	191.579,5717	201.088,3478
H_2SO_4	10.558,2471	10.873,9580
$C_8H_{14}O_2$	646.751,8626	680.507,7101
Panas reaksi	27.729,7406	
Total	**906.629,3733**	**906.629,3734**

Netralizer-01



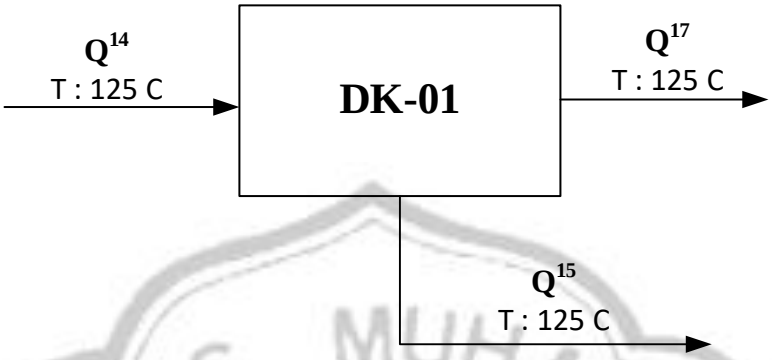
Gambar 6. 7 Diagram Blok Neraca Energi *Netralizer* (N-01)

Besar energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.7

Tabel 6. 7 Neraca Energi Pada *Netralizer* (N-01)

Senyawa	Masuk (Kj/jam)		Keluar (Kj/jam)
	Q^{10}	Q^{13}	Q^{14}
$C_4H_60_2$	8.333,1514		9.678,0922
$C_4H_{10}O$	5.825,9267		6.766,2105
H_20	201.038,7471	29.418,3185	282.623,2643
H_2SO_4	10.873,7434		
$C_8H_{14}O_2$	687.159,7313		798.064,8552
NaOH		10.665,8652	
Na_2SO_4			11.568,4371
$C_4H_5O_2Na$			4.085,0814
Panas reaksi	159.522,9508		
Total	**1.112.838,4344**		**1.112.838,4344**

Dekanter-01



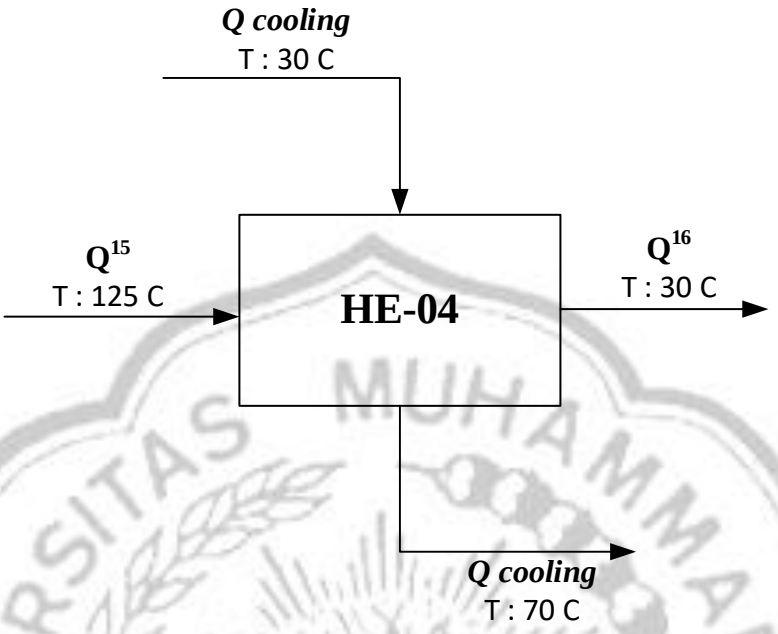
Gambar 6. 8 Diagram Blok Neraca Energi Dekanter (DK-01)

Besar energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.8

Tabel 6. 8 Neraca Energi Dekanter (DK-01)

Senyawa	Masuk (Kj/jam)	Keluar (Kj/jam)	
	Q^{14}	Q^{15}	Q^{17}
Na_2SO_4	20.564,2949	20.564,2949	
$C_4H_6O_2$	4.847,4998	145,4250	4.702,0748
$C_4H_{10}O$	6.761,6336	202,8490	6.558,7846
$C_8H_{14}O_2$	797.551,6807	23.926,5504	773.625,1303
H_20	282.494,2394	282.494,2394	
$C_4H_5O_2Na$	4.082,8643	4.082,8643	
Total	**1.116.302,2127**	**1.116.302,2127**	

***Heat Exchanger* – 04**



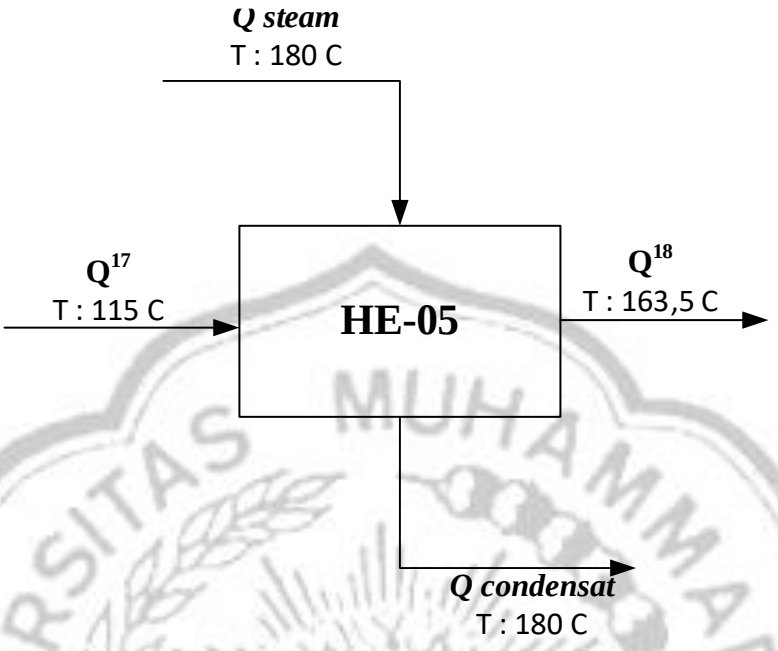
Gambar 6. 9 Diagram Blok Neraca Energi *Heat Exchanger* (HE-04)

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.9

Tabel 6. 9 Neraca Energi *Heat Exchanger* (HE-04)

Senyawa	Masuk (Kj/hr)		Keluar (Kj/hr)	
	Q^{15}	Q *Cooling*	Q^{16}	Q *Cooling*
Na_2SO_4	20.564,2949		1.028,2147	
$C_4H_6O_2$	145,4250		7,2712	
$C_4H_{10}O$	202,8490		10,1425	
$C_8H_{14}O_2$	23.926,5504		1.196,3275	
H_20	282.494,2394		14.124,7120	
$C_4H_5O_2Na$	4.082,8643		204,1432	
Cooling		39.336,8503		354.182,2622
Total	**370.753,0734**		**370.753,0734**	

***Heat Exchanger* – 05**



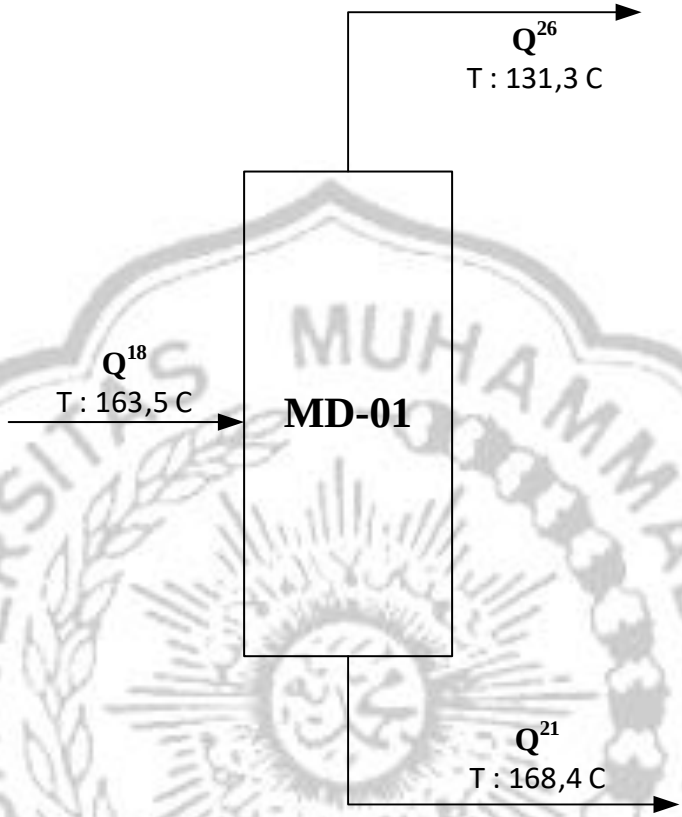
Gambar 6. 10 Diagram Blok Neraca Energi *Heat Exchanger* (HE-05)

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.10

Tabel 6. 10 Neraca Energi *Heat Exchanger* (HE-05)

Senyawa	Masuk (Kj/hr)		Keluar (Kj/hr)	
	Q^{17}	Q *Steam* (Sat.Vapor)	Q^{18}	Q *Steam* (Sat.Liquid)
$C_4H_{10}O$	6.559,6621		9.085,1320	
$C_8H_{14}O_2$	773.622,2158		1.071.466,7689	
$C_4H_6O_2$	4.691,3272		6.497,4882	
Steam		414.224,7640		113.854,7410
Total	**1.194.406,6494**		**1.194.406,6494**	

MENARA DISTILASI-01



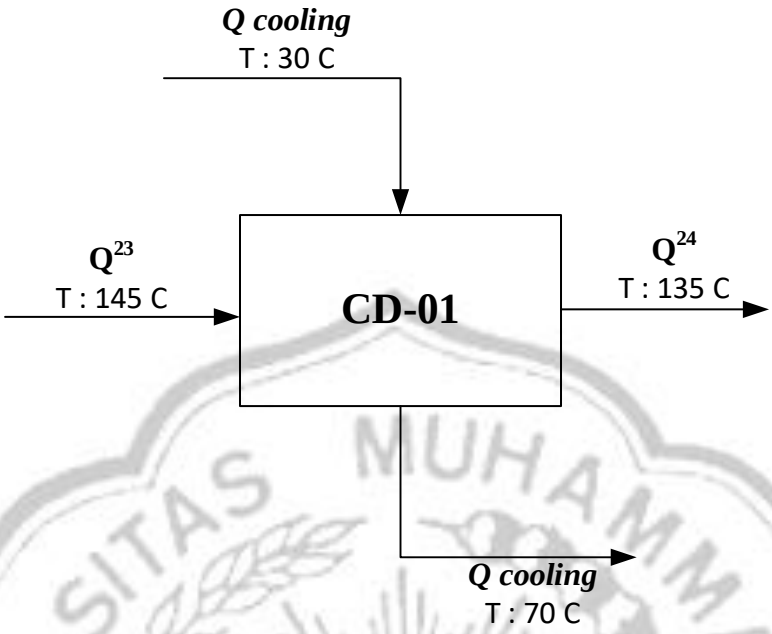
Gambar 6. 11 Diagram Blok Neraca Energi Menara Distilasi (MD-01)

Besar laju massa (Kg/jam) di arus sekitar alat ditunjukkan pada tabel 6.11

Tabel 6. 11 Neraca Energi Menara Distilasi (MD-01)

Senyawa	Masuk (Kj/hr)	Keluar (Kj/hr)	
	Q^{18}	Q^{21}	Q^{26}
$C_4H_{10}O$	9.089,3325	94,1282	7.826,7523
$C_8H_{14}O_2$	1.072.073,7834	1.064.214,2080	9.324,7904
$C_4H_6O_2$	6.500,4923	3.433,2384	2.770,4909
Total	**1.087.663,6082**	**1.087.663,6082**	

Condenser – 01



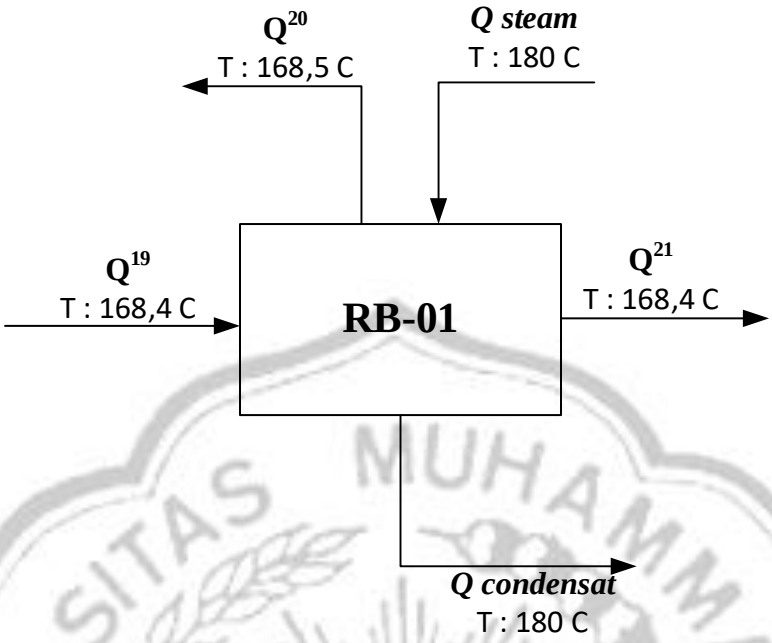
Gambar 6. 12 Diagram Blok Neraca Energi *Condenser* (CD-01)

Besar energi (Kj/jam) diarus sekitar alat ditunjukkan pada tabel 6.12

Tabel 6. 12 Neraca Energi *Condenser* (COND-01)

Senyawa	Masuk (Kj/hr)		Keluar (Kj/hr)	
	Q^{23}	Q *Cooling*	Q^{24}	Q *Cooling*
$C_4H_{10}O$	21.042,9828		8.062,2967	
$C_8H_{14}O_2$	71.301,4434		22.776,3242	
$C_4H_6O_2$	39.277,5657		7.115,2000	
Cooler		11.708,5214		105.376,6923
Total	**143.330,5133**		**143.330,5133**	

Reboiler – 01



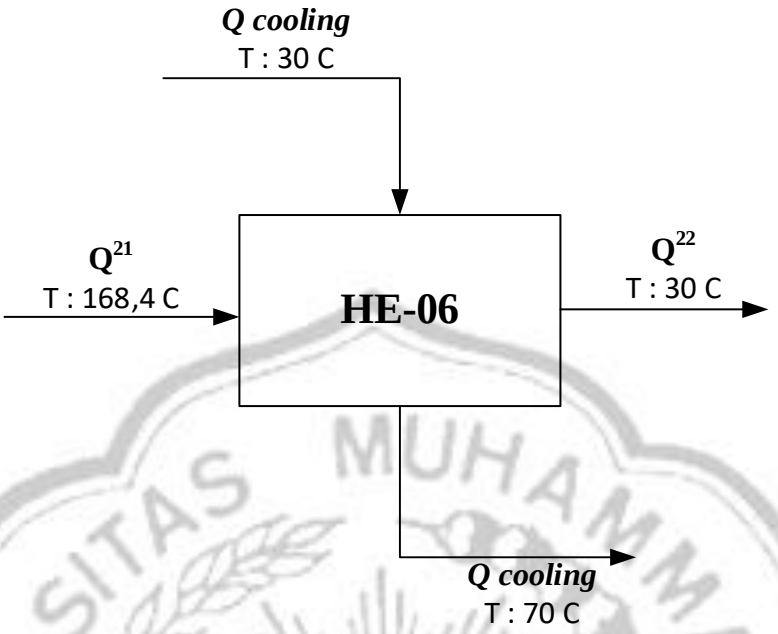
Gambar 6. 13 Diagram Blok Neraca Energi *Reboiler* (RB-01)

Besar energi (Kj/jam) diarus sekitar alat ditunjukkan pada tabel 6.13

Tabel 6. 13 Neraca Energi *Reboiler* (RB-01)

Senyawa	Masuk (Kj/hr)		Keluar (Kj/hr)		
	Q^{19}	Q *Steam* (Sat.Vapor)	Q^{20}	Q^{21}	Q *Steam* (Sat.Liquid)
$C_4H_{10}O$	94,2821		1,3031	93,8032	
$C_8H_{14}O_2$	1.095.976,3516		1.527,2277	1.095.331,0164	
$C_4H_6O_2$	6.854,1607		10.225,5641	3.421,3849	
Steam		10.585,4176			2.909,9128
Total	**1.113.510,2123**		**1.113.510,2123**		

***Heat Exchanger* – 06**



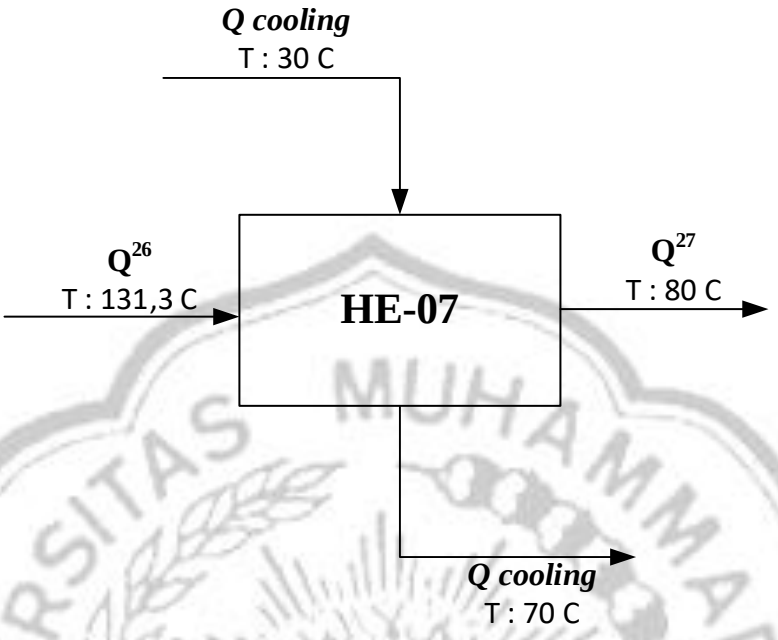
Gambar 6. 14 Diagram Blok Neraca Energi *Heat Exchanger* (HE-06)

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.14

Tabel 6. 14 Neraca Energi *Heat Exchanger* (HE-06)

Senyawa	Masuk (Kj/hr)		Keluar (Kj/hr)	
	Q^{21}	Q *Cooling*	Q^{22}	Q *Cooling*
$C_4H_{10}O$	94,1282		3,2798	
$C_8H_{14}O_2$	1.099.125,8183		38.298,2873	
$C_4H_6O_2$	3.433,2384		119,6288	
Cooler		132.937,2700		1.197.164,2589
Total	**1.235.585,4549**		**1.234.857,1702**	

***Heat Exchanger* – 07**



Gambar 6. 15 Diagram Blok Neraca Energi *Heat Exchanger* (HE-07)

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.15

Tabel 6. 15 Neraca Energi *Heat Exchanger* (HE-07)

Senyawa	Masuk (Kj/hr)		Keluar (Kj/hr)	
	Q^{26}	Q *Cooling*	Q^{27}	Q *Cooling*
$C_4H_{10}O$	7.826,7523		3.571,7360	
$C_8H_{14}O_2$	9.324,7904		4.255,3653	
$C_4H_6O_2$	2.770,4909		1.264,3127	
Cooler		1.053,7775		11.884,3971
Total	**20.975,811**		**20.975,811**	

6.2. Neraca Panas Total

Gambar 6. 16 Diagram Blok Neraca Energi Total

Besar Energi (Kj/jam) di arus sekitar alat ditunjukkan pada tabel 6.16

Tabel 6. 16 Neraca Energi Total

Senyawa	Masuk (Kj/hr)			Keluar (Kj/hr)	
	Q^3	Q^6	Q^{12}	Q^{16}	Q^{22}
$C_4H_6O_2$	24.067,1616			7,2712	119,6288
$C_4H_{10}O$	21.746,5105			10,1425	3,2798
H_2SO_4		631,0936			
$C_8H_{14}O_2$				1.196,3275	1.098.394,8794
NaOH			619,0287		
Na_2SO_4				1.028,2147	
$C_4H_5O_2Na$				204,1432	
H_20	1.375,6930	37,8541	1.707,3894	14.124,7120	
Steam	1.960.009,2753				
Cooling				1.665.478,9266	
Q reaksi	770.373,5196				
Total	**2.780.567,5258**			**2.780.567,5258**	