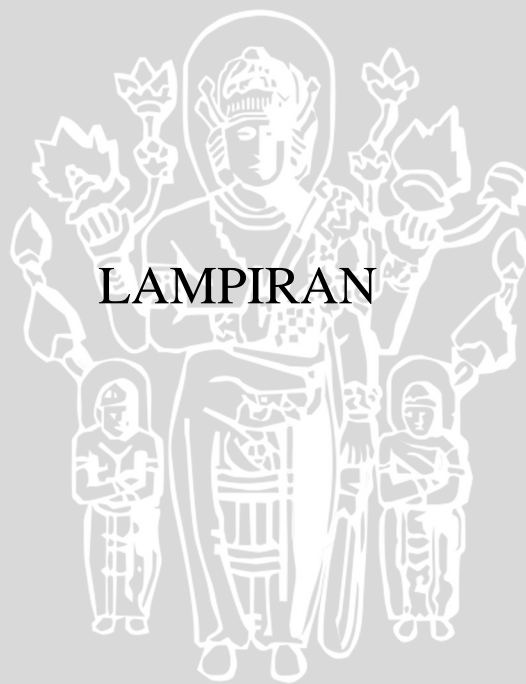


UNIVERSITAS BRAWIJAYA



LAMPIRAN

Lampiran 1 Hasil perhitungan *heat exchanger* tanpa pemasangan turbulator

No.	Q <sub>h</sub> (Liter/jam)	Fluida Panas (°C)			Q <sub>h</sub> (Liter/jam)	Fluida Dingin (°C)			LMTD	q <sub>c</sub> (Watt)	U (W/m <sup>2</sup> °C)	q <sub>HE</sub> (Watt)	ΔP mmH <sub>2</sub> O	Re <sub>c</sub>
		T <sub>h in</sub>	T <sub>h out</sub>	ΔT <sub>h</sub>		T <sub>C in</sub>	T <sub>C out</sub>	ΔT <sub>C</sub>						
1	60	61.765	45.1645	16.6005	180	23.3	28.7	5.4	27.06588	1134.39	316	404.75	9.4	1485.015
2	60	61.765	44.19833	17.5666	300	23.3	26.7	3.4	27.36872	1189.63	346.412	476.318	12.2	2423.321
3	60	61.765	43.67133	18.09366	420	23.3	25.9	2.6	27.38326	1281.29	369.876	508.852	16.2	3643.843
4	60	61.765	43.56593	18.19906	540	23.3	25.7	2.4	27.4281	1482.69	368.944	508.414	19.6	4685.089

Lampiran 2 Hasil perhitungan *heat exchanger* dengan pemasangan turbulator 1/4 lingkaran susunan melingkar searah jarum jam

No.	Q <sub>h</sub> (Liter/jam)	Fluida Panas (°C)			Q <sub>h</sub> (Liter/jam)	Fluida Dingin (°C)			LMTD	q <sub>c</sub> (Watt)	U (W/m <sup>2</sup> °C)	q <sub>HE</sub> (Watt)	ΔP mmH <sub>2</sub> O	Re <sub>c</sub>
		T <sub>h in</sub>	T <sub>h out</sub>	ΔT <sub>h</sub>		T <sub>C in</sub>	T <sub>C out</sub>	ΔT <sub>C</sub>						
1	60	61.8	44.0	17.7	180	23.3	29.3	6.0	26.17394	1244.08	307.800	429.305	12.46	1166.222
2	60	61.8	43.7	18.1	300	23.3	26.8	3.5	27.01489	1220.12	482.110	613.617	24.63	2364.991
3	60	61.8	43.1	18.6	420	23.3	26.1	2.8	26.98789	1366.68	544.052	737.666	32.58	3529.474
4	60	61.8	42.9	18.9	540	23.3	25.2	1.9	27.18759	1208.2	623.577	851.746	51.38	4945.773

Lampiran 3 Hasil perhitungan *heat exchanger* dengan pemasangan turbulator ½ lingkaran

No.	Q <sub>h</sub> (Liter/jam)	Fluida Panas (°C)			Q <sub>h</sub> (Liter/jam)	Fluida Dingin (°C)			LMTD	q <sub>c</sub> (Watt)	U (W/m <sup>2</sup> °C)	q <sub>HE</sub> (Watt)	ΔP mmH <sub>2</sub> O	Re <sub>c</sub>
		T <sub>h in</sub>	T <sub>h out</sub>	ΔT <sub>h</sub>		T <sub>C in</sub>	T <sub>C out</sub>	ΔT <sub>C</sub>						
1	60	61.8	43.6	18.2	180	23.3	29.9	6.6	25.65129	1372.01	349.844	444.408	23.00	1706.082
2	60	61.8	43.3	18.5	300	23.3	27.5	4.2	26.50702	1463.99	447.729	596.247	38.71	2173.149
3	60	61.8	42.8	19.0	420	23.3	26.2	2.9	26.73527	1409.35	533.848	717.054	53.08	4034.245
4	60	61.8	42.4	19.4	540	23.3	25.8	2.5	26.69782	1537.56	677.634	908.909	61.63	5408.033

Lampiran 4 Hasil perhitungan *heat exchanger* dengan pemasangan turbulator 3/4 lingkaran susunan melingkar searah jarum jam

No.	Q <sub>h</sub> (Liter/jam)	Fluida Panas (°C)			Q <sub>h</sub> (Liter/jam)	Fluida Dingin (°C)			LMTD	q <sub>c</sub> (Watt)	U (W/m <sup>2</sup> °C)	q <sub>HE</sub> (Watt)	ΔP mmH <sub>2</sub> O	Re <sub>c</sub>
		T <sub>h in</sub>	T <sub>h out</sub>	ΔT <sub>h</sub>		T <sub>C in</sub>	T <sub>C out</sub>	ΔT <sub>C</sub>						
1	60	61.8	41.7	20.1	180	23.3	31.2	7.9	23.9974	1646.09	304.242	671.385	28.33	5315.763
2	60	61.8	40.8	21.0	300	23.3	28.2	4.9	24.64823	1707.81	326.166	787.082	41.33	8581.605
3	60	61.8	40.3	21.5	420	23.3	27.1	3.8	24.8295	1836.21	339.0006	825.837	58.21	11871.87
4	60	61.8	39.4	22.4	540	23.3	26.6	3.3	24.3738	2086.46	361.912	997.216	67.96	15307.42

Lampiran 5 Hasil perhitungan *heat exchanger* dengan pemasangan turbulator 3/4 lingkaran susunan atas-bawah

No.	Q <sub>h</sub> (Liter/jam)	Fluida Panas (°C)			Q <sub>h</sub> (Liter/jam)	Fluida Dingin (°C)			LMTD	q <sub>c</sub> (Watt)	U (W/m <sup>2</sup> °C)	q <sub>HE</sub> (Watt)	ΔP mmH <sub>2</sub> O	Re <sub>c</sub>
		T <sub>h in</sub>	T <sub>h out</sub>	ΔT <sub>h</sub>		T <sub>C in</sub>	T <sub>C out</sub>	ΔT <sub>C</sub>						
1	60	61.8	41.5	20.3	180	23.3	29.9	6.6	24.4163	1649.45	411.712	600.4	27.22	4515.367
2	60	61.8	40.5	21.3	300	23.3	31.1	7.8	22.36796	1645.67	475.416	701.82	39.22	7185.556
3	60	61.8	40.0	21.8	420	23.3	30.0	6.7	23.12978	1701.46	505.36	780.082	47.10	10881.98
4	60	61.8	39.0	22.8	540	23.3	31.1	7.8	19.26635	2030.57	510.166	950.661	56.87	14997.44

Lampiran 6 Hasil perhitungan *heat exchanger* dengan pemasangan turbulator 1/4 lingkaran susunan atas-bawah

No.	Q <sub>h</sub> (Liter/jam)	Fluida Panas (°C)			Q <sub>h</sub> (Liter/jam)	Fluida Dingin (°C)			LMTD	q <sub>c</sub> (Watt)	U (W/m <sup>2</sup> °C)	q <sub>HE</sub> (Watt)	ΔP mmH <sub>2</sub> O	Re <sub>c</sub>
		T <sub>h in</sub>	T <sub>h out</sub>	ΔT <sub>h</sub>		T <sub>C in</sub>	T <sub>C out</sub>	ΔT <sub>C</sub>						
1	60	61.8	46.8	15.0	180	23.3	29.7	6.4	27.57686	1232.67	242.42	400.56	12.33	1219.341
2	60	61.8	47.2	14.6	300	23.3	29.5	6.2	27.88949	1219.2	279.221	578.89	23.63	2005.281
3	60	61.8	47.4	14.4	420	23.3	28.8	5.5	28.31728	1360.68	288.543	666.373	31.58	3329.346
4	60	61.8	47.8	14.0	540	23.3	27.6	4.3	29.08185	1204.67	300.172	746.851	50.38	5002.138