

LAMPIRAN

Lampiran 1. Data temperatur PATS 25 November 2016

Waktu (menit)	T HTF dr kolektor				T HTF ke kolektor	T air dingin ke tangki				T air panas dr tangki	Waktu (menit)	T PCM di kapsul												Waktu (menit)	T air di dalam tangki								Vert. bawah
	T1	T2	T3	T4		K3			K14			K24			Vert. atas tengah	Hor. Kanan	Vert. tengah	Hor. Kiri	Vert. bawah-tengah														
	T1	T2	T3	T4		T5	T6	T7	T8			T9	T10	T11						T12	T13	T14	T15		T16	T17							
5	30.03	27.60	28.79	28.14	5	28.16	28.18	27.72	27.61	27.30	27.79	5	28.52	27.96	20.96	27.89	27.81	27.76	27.50														
10	34.77	27.23	28.77	27.94	10	27.81	27.96	27.43	27.32	27.18	27.67	10	29.93	27.92	20.37	27.73	27.69	27.57	27.22														
15	37.74	27.81	29.49	29.21	15	28.94	29.05	27.98	27.87	27.53	28.05	15	33.09	29.34	20.64	28.04	28.10	27.59	27.81														
20	37.52	27.40	29.37	29.83	20	29.54	29.58	27.64	27.56	27.33	27.82	20	34.17	29.61	20.19	27.88	27.84	28.55	27.32														
25	38.16	27.65	29.63	31.18	25	30.58	30.63	27.83	27.79	27.54	28.00	25	34.96	30.68	20.30	28.05	27.94	27.60	27.78														
30	38.68	27.78	29.93	32.14	30	31.46	31.54	28.17	28.06	27.63	28.12	30	35.07	31.74	20.35	28.32	28.24	27.98	27.84														
35	39.12	27.98	30.35	33.08	35	32.45	32.53	28.73	28.69	27.88	28.40	35	36.47	32.88	20.53	28.79	28.67	28.12	28.04														
40	39.55	27.95	30.49	33.49	40	32.88	33.04	28.84	28.77	27.76	28.22	40	36.75	33.09	20.70	28.71	28.59	27.75	27.94														
45	40.35	28.14	30.79	34.26	45	33.79	33.91	29.42	29.35	27.97	28.53	45	37.65	33.98	21.06	29.35	29.16	28.18	28.03														
50	40.14	27.89	30.69	34.57	50	34.15	34.21	29.50	29.51	28.06	28.62	50	38.11	34.61	21.36	29.58	29.36	27.95	27.95														
55	40.07	28.36	31.02	35.19	55	34.98	35.11	30.22	30.23	28.38	28.84	55	38.07	35.11	21.72	30.05	29.83	28.57	28.25														
60	39.59	28.16	30.78	34.98	60	35.10	35.27	30.31	30.32	28.25	28.71	60	37.65	35.26	21.73	30.13	29.94	28.28	27.86														
65	40.10	28.35	30.97	35.40	65	35.54	35.71	30.86	30.84	28.39	28.99	65	37.90	35.69	22.13	30.53	30.38	28.76	28.21														
70	40.26	28.26	30.95	35.38	70	35.52	35.69	30.84	30.85	28.35	28.87	70	37.81	35.61	22.08	30.52	30.33	28.60	28.15														
75	42.86	28.30	30.99	35.53	75	35.96	36.16	31.24	31.29	28.53	29.02	75	39.09	36.87	22.41	30.90	30.67	28.59	28.34														
80	44.76	28.18	30.87	36.80	80	36.16	36.33	31.16	31.17	28.78	29.20	80	41.19	36.61	22.77	31.24	30.94	28.79	28.51														
85	44.37	29.07	31.58	38.75	85	37.87	37.90	32.12	32.02	29.64	30.10	85	42.43	38.30	23.89	32.18	31.88	29.51	29.04														
90	43.39	28.66	30.88	38.68	90	37.88	37.99	31.70	31.72	29.52	29.91	90	41.23	38.32	23.95	32.17	31.83	30.01	28.86														
95	43.41	28.75	30.91	38.69	95	38.34	38.44	32.12	32.03	29.79	30.21	95	41.35	39.16	32.90	32.47	32.13	29.84	29.02														
100	41.99	28.79	30.62	38.17	100	38.55	38.69	32.41	32.35	29.84	30.16	100	41.07	38.92	32.88	32.52	32.11	29.61	28.92														
105	42.16	29.43	31.04	38.61	105	39.26	39.40	33.41	33.39	30.24	30.67	105	40.47	39.07	33.68	33.17	32.77	30.63	29.44														
110	43.51	29.97	31.30	38.93	110	39.69	39.83	34.12	34.11	30.92	31.39	110	41.19	39.93	34.47	33.97	33.56	30.92	29.99														
115	44.97	29.97	31.12	39.07	115	39.55	39.69	34.12	34.11	31.10	31.50	115	42.24	39.96	34.71	34.25	33.88	30.88	30.13														
120	42.21	30.02	30.91	39.06	120	39.77	39.95	34.42	34.44	31.25	31.65	120	42.18	40.54	34.90	34.44	34.06	31.07	30.18														
125	39.89	30.04	30.69	38.88	125	39.83	39.97	34.77	34.75	31.31	31.70	125	40.93	40.24	35.03	34.60	34.19	31.17	30.12														
130	41.52	30.29	30.43	38.67	130	39.51	39.68	34.84	34.84	31.72	32.09	130	40.34	39.80	35.37	34.95	34.47	31.52	30.62														
135	44.07	30.85	30.75	38.45	135	39.75	39.97	35.37	35.46	31.96	32.43	135	41.19	40.00	35.68	35.26	34.85	32.30	30.83														
140	45.76	31.34	31.09	39.28	140	40.31	40.45	36.03	36.06	32.46	32.97	140	43.04	40.40	36.40	35.94	35.56	33.46	31.35														
145	45.70	31.86	31.43	40.79	145	40.93	41.04	36.44	36.43	33.15	33.66	145	43.78	41.37	36.84	36.49	36.08	33.14	32.20														
150	43.95	32.20	31.56	40.77	150	41.52	41.67	36.93	36.89	33.42	33.82	150	43.36	41.78	37.10	36.72	36.27	33.27	32.13														
155	43.28	32.06	31.02	40.38	155	41.31	41.49	36.82	36.88	33.16	33.78	155	42.34	41.49	37.10	36.61	36.23	33.30	32.06														
160	43.33	32.08	30.75	39.94	160	41.15	41.33	36.88	36.91	33.46	33.90	160	42.14	41.46	37.22	36.80	36.38	33.35	32.23														
165	43.76	32.83	31.23	40.78	165	41.47	41.69	37.45	37.41	34.34	34.82	165	42.92	42.06	38.06	37.57	37.16	34.85	33.19														
170	43.56	33.03	30.92	40.27	170	41.31	41.49	37.43	37.35	34.48	34.82	170	42.34	41.84	37.92	37.46	37.05	34.09	33.25														
175	44.83	33.34	30.91	40.08	175	41.44	41.62	37.78	37.84	34.64	35.08	175	42.59	41.82	38.18	37.73	37.35	34.40	33.38														
180	47.84	33.80	31.08	40.62	180	41.79	42.01	38.34	38.38	35.01	35.60	180	43.89	42.26	38.69	38.21	37.94	36.51	33.93														
185	48.89	34.39	31.39	41.84	185	42.45	42.60	38.79	38.72	35.49	35.98	185	46.26	42.92	39.11	38.69	38.28	36.09	34.38														
190	46.06	34.75	31.50	42.94	190	43.38	43.61	39.30	39.26	35.84	36.54	190	45.78	43.84	39.63	39.15	38.84	36.37	34.73														
195	45.83	34.88	31.28	42.60	195	43.59	43.78	39.47	39.47	36.11	36.67	195	44.83	43.97	39.72	39.31	38.93	36.07	35.04														
200	47.04	35.17	31.13	42.76	200	43.55	43.74	39.60	39.54	36.52	37.04	200	44.77	44.09	40.06	39.62	39.24	36.85	35.48														

Waktu (menit)	T HTF dr kolektor				T air dingin ke tangki	T air panas dr tangki	Waktu (menit)	T PCM di kapsul						T air di dalam tangki						
	T1	T2	T3	T4				K3		K14		K24		Waktu (menit)	Vert. atas	Vert. atas tengah	Hor. Kanan	Vert. tengah	Hor. Kiri	Vert. bawah-tengah
205	49,10	36,10	31,85	43,23	205	44,41	44,56	40,54	40,44	37,14	37,78	205	46,32	44,79	40,83	40,04	37,30	40,04	37,30	36,03
210	51,56	35,98	31,59	43,66	210	44,15	44,30	40,17	40,10	37,39	37,81	210	47,61	45,03	40,79	40,35	39,96	40,35	36,31	36,25
215	59,04	37,27	32,82	46,37	215	46,04	46,16	41,43	41,40	38,23	38,84	215	52,68	46,91	41,99	41,55	41,20	38,01	37,24	37,24
220	60,36	37,93	33,88	50,64	220	48,48	48,71	42,26	42,10	39,01	39,62	220	56,78	50,17	42,88	42,51	42,16	38,36	37,87	37,87
225	56,94	38,43	34,66	52,31	225	50,42	51,12	43,29	43,30	39,40	40,04	225	57,39	52,18	43,51	43,04	42,59	39,59	38,16	38,16
230	60,97	38,87	35,00	53,26	230	51,15	51,88	43,88	43,90	40,22	40,72	230	56,35	53,39	44,48	43,98	43,44	41,28	38,95	38,95
235	61,35	39,43	35,67	54,14	235	52,09	53,00	45,04	45,20	40,69	41,23	235	58,65	54,64	45,48	44,84	44,34	40,61	39,20	39,20
240	54,09	38,75	34,48	53,78	240	51,84	52,76	44,97	45,06	40,96	41,40	240	56,67	54,45	45,89	45,22	44,54	40,30	39,26	39,26
245	55,52	40,58	35,54	53,44	245	53,73	54,05	47,18	47,35	42,16	42,71	245	55,80	54,34	47,45	46,74	46,03	41,92	40,43	40,43
250	53,20	40,81	35,01	52,54	250	53,71	53,92	47,98	48,08	42,17	42,80	250	54,05	53,61	47,60	47,01	46,47	42,15	40,41	40,41
255	57,98	41,75	35,39	52,38	255	53,86	54,00	48,77	48,88	43,30	43,99	255	54,04	53,91	48,83	48,27	47,70	43,43	41,43	41,43
260	61,60	42,39	35,60	52,88	260	53,90	54,15	49,27	49,38	43,66	44,36	260	57,29	54,10	49,23	48,60	48,07	43,77	41,75	41,75
265	60,20	42,79	35,61	54,92	265	54,72	54,93	49,56	49,56	44,44	45,11	265	59,08	55,45	49,62	49,10	48,71	44,56	42,39	42,39
270	59,26	42,40	34,79	54,11	270	54,59	54,87	48,86	48,89	44,45	45,04	270	56,79	55,31	49,20	48,75	48,36	44,27	42,33	42,33
275	60,33	44,13	35,67	55,18	275	55,98	56,27	50,26	50,37	45,68	46,38	275	57,78	56,82	50,39	49,95	49,59	45,74	43,69	43,69
280	56,33	44,46	35,18	55,04	280	56,00	56,07	50,52	50,59	46,26	46,90	280	57,23	56,27	50,84	50,43	50,03	46,36	44,27	44,27
285	57,27	44,80	34,81	53,93	285	55,31	55,64	50,48	50,55	46,45	47,12	285	55,91	55,54	50,81	50,48	50,08	46,59	44,57	44,57
290	60,02	45,72	35,49	54,53	290	55,70	55,92	51,04	51,12	47,13	47,88	290	56,38	55,79	51,42	51,12	50,72	47,78	45,50	45,50
295	63,32	45,98	35,53	54,60	295	55,39	55,60	50,59	50,70	47,20	47,80	295	59,40	55,93	51,20	50,87	50,54	47,49	45,65	45,65
300	63,94	47,10	36,31	57,40	300	57,18	57,15	51,21	51,25	48,25	48,93	300	61,18	58,08	52,29	51,89	51,56	48,52	46,88	46,88

Waktu (menit)	Temperatur permukaan tangki						Waktu (menit)	T rata PCM	T rata air	K3 rata	K4 rata	K24 rata	Waktu (menit)	Temperatur permukaan kolektor							
	Bawah		Tengah		Atas									Kanan	Kiri	T1	T23	T24	T25	T26	Trata-rata
	T18	T19	T20	T21	T22	T22															
5	28,42	28,70	29,15	28,62	28,35	28,35	27,80	26,91	28,17	27,67	27,55	5	30,03	30,32	26,92	31,20	28,07	29,31			
10	28,05	28,40	32,17	28,68	28,04	28,04	27,56	26,92	27,89	27,38	27,43	10	34,77	30,84	27,58	31,20	28,82	30,64			
15	28,63	29,02	35,24	29,59	28,63	28,63	28,24	27,80	28,99	27,93	27,79	15	37,74	31,28	28,53	30,22	30,23	31,60			
20	28,22	28,64	35,61	29,35	28,17	28,17	28,25	27,94	29,56	27,60	27,58	20	37,52	31,63	28,81	30,31	30,97	31,85			
25	28,56	29,09	36,42	30,02	28,59	28,59	28,73	28,19	30,60	27,81	27,77	25	38,16	31,80	29,19	29,86	31,63	32,13			
30	28,70	29,48	37,16	30,65	28,87	28,87	29,16	28,59	31,50	28,11	27,87	30	38,68	31,80	29,19	29,95	31,81	32,29			
35	28,97	30,03	37,78	31,46	29,35	29,35	29,78	29,07	32,49	28,71	28,14	35	39,12	32,15	29,66	30,04	32,28	32,65			
40	28,76	30,08	38,04	31,65	29,33	29,33	29,92	29,08	32,96	28,80	27,99	40	39,55	32,33	29,95	29,95	32,84	32,92			
45	28,85	30,49	38,73	32,31	29,78	29,78	30,50	29,63	33,85	29,39	28,25	45	40,35	32,59	30,14	30,40	33,03	33,30			
50	28,77	30,65	38,96	32,69	29,91	29,91	30,68	29,84	34,18	29,51	28,34	50	40,14	32,76	30,23	30,48	33,31	33,39			
55	29,07	31,27	39,08	33,38	30,53	30,53	31,29	30,23	35,04	30,22	28,61	55	40,07	32,67	30,14	30,48	33,22	33,32			
60	28,64	31,13	38,59	33,35	30,29	30,29	31,33	30,12	35,19	30,31	28,48	60	39,59	32,67	30,14	30,40	33,22	33,20			
65	28,99	31,77	39,04	33,95	30,92	30,92	31,72	30,51	35,63	30,85	28,69	65	40,10	32,67	30,32	30,31	33,31	33,34			
70	28,94	31,79	39,17	33,97	30,94	30,94	31,69	30,44	35,60	30,84	28,61	70	40,26	33,72	31,65	29,59	34,43	33,93			
75	28,94	32,08	40,49	34,30	31,13	31,13	32,03	30,98	36,06	31,26	28,78	75	42,86	34,16	32,50	29,24	35,74	34,90			
80	29,22	32,67	42,63	35,03	31,69	31,69	32,13	31,44	36,24	31,16	28,99	80	44,76	34,60	32,97	28,61	36,58	35,51			
85	29,74	33,51	43,44	36,09	32,57	32,57	33,28	32,46	37,88	32,07	29,87	85	44,37	34,51	32,60	28,97	35,93	35,27			
90	29,42	33,44	42,41	36,16	32,46	32,46	33,12	32,34	37,94	31,71	29,72	90	43,39	34,25	32,31	29,15	35,74	34,97			
95	29,54	33,85	42,57	36,60	32,80	32,80	33,49	33,84	38,39	32,08	30,00	95	43,41	33,98	31,65	29,50	35,09	34,73			
100	29,26	33,79	41,76	36,54	32,70	32,70	33,67	33,72	38,62	32,38	30,00	100	41,99	33,81	31,55	29,33	34,81	34,30			
105	29,78	34,51	41,63	37,20	33,39	33,39	34,39	34,17	39,33	33,40	30,46	105	42,16	34,25	32,12	28,88	35,27	34,54			
110	30,36	35,34	42,31	37,88	34,19	34,19	35,01	34,86	39,76	34,12	31,16	110	43,51	34,51	32,69	28,70	35,93	35,07			
115	30,50	35,69	43,55	38,23	34,58	34,58	35,01	35,15	39,62	34,12	31,30	115	44,97	33,98	31,84	29,68	35,18	35,13			
120	30,41	35,64	42,89	38,14	34,56	34,56	35,25	35,34	39,86	34,43	31,45	120	42,21	33,90	31,46	30,22	34,62	34,48			
125	30,35	35,62	41,45	38,04	34,57	34,57	35,39	35,18	39,90	34,76	31,50	125	39,89	34,07	31,55	30,13	34,34	34,00			
130	30,81	36,07	41,20	38,29	35,00	35,00	35,45	35,29	39,60	34,87	31,90	130	41,52	34,33	32,12	29,59	34,90	34,49			
135	31,01	36,31	42,61	38,53	35,20	35,20	35,82	35,73	39,86	35,42	32,20	135	44,07	34,77	32,69	29,41	35,65	35,32			
140	31,57	37,00	44,18	39,12	35,97	35,97	36,38	36,59	40,38	36,04	32,71	140	45,76	34,86	32,97	29,68	35,37	35,73			
145	32,33	37,76	45,08	39,95	36,77	36,77	36,94	37,13	40,98	36,44	33,41	145	45,70	34,94	32,69	29,86	36,12	35,86			
150	32,20	37,66	44,17	39,89	36,71	36,71	37,37	37,23	41,59	36,91	33,62	150	43,95	35,03	32,50	30,04	35,65	35,43			
155	32,20	37,63	43,32	39,79	36,75	36,75	37,24	37,02	41,40	36,85	33,47	155	43,28	35,03	32,69	29,95	35,74	35,34			
160	32,30	37,69	43,35	39,84	36,73	36,73	37,27	37,08	41,24	36,89	33,68	160	43,33	34,94	32,69	29,95	35,65	35,31			
165	33,24	38,63	44,04	40,65	37,71	37,71	37,86	37,97	41,58	37,43	34,58	165	43,76	35,03	32,78	29,59	35,65	35,36			
170	33,16	38,48	43,43	40,39	37,53	37,53	37,81	37,71	41,40	37,39	34,65	170	43,56	34,86	32,50	29,86	35,37	35,23			
175	33,37	38,65	43,84	40,48	37,73	37,73	38,07	37,92	41,53	37,81	34,86	175	44,83	35,47	33,07	29,33	35,93	35,72			
180	34,02	39,33	45,37	41,06	38,27	38,27	38,52	38,78	41,90	38,36	35,30	180	47,84	35,21	32,88	29,41	36,02	36,27			
185	34,32	39,55	47,43	41,43	38,61	38,61	39,00	39,39	42,53	38,75	35,73	185	48,89	35,21	32,97	28,97	36,40	36,49			
190	34,74	40,01	46,44	42,03	39,14	39,14	39,66	39,77	43,50	39,28	36,19	190	46,06	35,47	33,07	29,33	36,12	36,01			
195	34,93	40,17	45,64	42,15	39,33	39,33	39,85	39,70	43,68	39,47	36,39	195	45,83	35,73	33,45	28,79	36,49	36,06			
200	35,41	40,68	46,29	42,56	39,78	39,78	40,00	40,02	43,64	39,57	36,78	200	47,04	36,08	33,92	28,34	37,14	36,50			

Waktu (menit)	Temperatur permukaan tangki						Waktu (menit)	T rata PCM	T rata air	K3 rata	K14 rata	K24 rata	Waktu (menit)	Temperatur permukaan kolektor					T rata-rata		
	Bawah		Tengah		Atas									Kanan	Kiri	T1	T23	T24		T25	T26
	T18	T19	T20	T21	T22	T21															
205	35,99	41,25	47,57	43,17	40,35	205	40,81	40,81	44,49	40,49	37,46	205	49,10	36,52	34,49	29,15	37,52	37,35			
210	36,06	41,36	48,95	43,27	40,42	210	40,65	40,90	44,22	40,13	37,60	210	51,56	37,30	35,62	28,88	38,92	38,46			
215	37,15	42,66	54,04	44,79	41,52	215	42,02	42,80	46,10	41,41	38,53	215	59,04	38,61	37,04	29,59	40,79	41,02			
220	37,63	43,56	57,35	46,19	42,21	220	43,36	44,39	48,59	42,18	39,31	220	60,36	39,13	37,61	31,20	41,45	41,95			
225	37,89	44,13	57,57	47,61	42,71	225	44,60	45,21	50,77	43,30	39,72	225	56,94	39,83	38,46	31,02	42,94	41,84			
230	38,64	45,41	57,75	49,10	43,89	230	45,29	45,98	51,52	43,89	40,47	230	60,97	40,36	39,31	32,45	43,22	43,26			
235	38,78	46,22	59,54	50,23	44,63	235	46,21	46,82	52,55	45,12	40,96	235	61,35	41,58	40,16	44,13	43,60	46,16			
240	38,66	46,35	56,89	50,32	44,87	240	46,16	46,62	52,30	45,01	41,18	240	54,09	43,06	42,24	46,18	45,75	46,27			
245	40,00	47,92	56,42	51,51	46,56	245	47,86	47,53	53,89	47,27	42,44	245	55,52	42,63	41,01	45,02	44,81	45,80			
250	40,01	48,01	54,82	51,27	46,85	250	48,11	47,33	53,82	48,03	42,49	250	53,20	43,24	41,77	45,47	45,47	45,83			
255	40,99	49,08	55,19	51,82	47,90	255	48,80	48,23	53,93	48,83	43,64	255	57,98	43,24	41,87	45,29	45,09	46,69			
260	41,31	49,47	58,42	52,10	48,33	260	49,12	48,97	54,02	49,32	44,01	260	61,60	43,41	41,77	45,20	44,81	47,36			
265	41,73	49,88	59,67	52,59	48,81	265	49,72	49,84	54,83	49,56	44,78	265	60,20	44,11	42,53	46,18	45,28	47,66			
270	41,41	49,40	57,51	52,14	48,36	270	49,45	49,29	54,73	48,88	44,74	270	59,26	45,33	43,57	47,25	46,21	48,33			
275	43,02	50,74	59,05	53,59	49,85	275	50,82	50,57	56,13	50,32	46,03	275	60,33	46,47	45,37	48,50	47,52	49,64			
280	43,52	50,99	57,94	53,74	50,18	280	51,06	50,78	56,03	50,56	46,58	280	56,33	46,12	44,14	47,97	47,52	48,42			
285	43,75	50,91	56,73	53,37	50,12	285	50,92	50,57	55,47	50,51	46,79	285	57,27	45,16	43,00	46,54	46,03	47,60			
290	44,81	51,85	57,60	54,00	50,97	290	51,46	51,25	55,81	51,08	47,50	290	60,02	43,76	41,30	44,94	44,34	46,87			
295	44,81	51,54	60,34	53,86	50,73	295	51,21	51,58	55,50	50,64	47,50	295	63,32	43,59	41,11	44,58	43,78	47,28			
300	46,11	52,76	62,21	55,22	51,92	300	52,33	52,91	57,16	51,23	48,59	300	63,94	42,89	40,83	44,04	43,50	47,04			

Waktu (menit)	Solar Radiation, W/m ²	Temp. udara luar, °C	Energi radiasi, MJ/m ²	Akumulasi energi radiasi, MJ/m ²	Waktu (menit)	kecepatan pemanasan T PCM di kapsul (°C/menit)										kecepatan pemanasan T air di dalam tangki (°C/menit)										Rata-rata (°C/menit)	
						K3			K14			K24			Waktu (menit)	Vert. atas tengah	Hor. Kanan	Vert. tengah	Hor. Kiri	Vert. bawah-tengah	Vert. bawah	Waktu (menit)	PCM	HTF			
						T5	T6	T7	T8	T9	T10		T11	T12	T13	T14	T15	T16	T17								
205	438.1	29.07	0.024636	3.58458	205	0.107086	0.143013	0.143005	0.107694	0.164478	0.165141	205	0.683	0.388	0.388	0.354	0.417	0.459	0.435	205	0.360	0.446					
210	545.6	29.57	0.029214	3.726444	210	0.389146	0.318711	0.354401	0.319781	0.388199	0.38983	210	1.997	0.974	0.834	0.801	0.907	0.701	0.676	210	0.717	0.984					
215	898.1	29.87	0.045264	3.931986	215	0.80707	0.808988	0.631007	0.668887	0.69111	0.693937	215	0.517	0.723	0.263	0.264	0.264	0.195	0.127	215	0.321	0.336					
220	863.1	30.34	0.050364	4.1952	220	0.456069	0.599477	0.172724	0.280578	0.263055	0.157076	220	-0.513	-0.223	-0.241	-0.277	-0.348	0.008	-0.522	220	-0.150	-0.302					
225	219.4	30.85	0.044886	4.441608	225	-0.0589	0.047544	-0.16595	-0.09506	-0.29484	-0.3317	225	0.156	0.012	-0.023	0.012	0.012	-0.132	0.039	225	-0.076	0.011					
230	841.9	30.90	0.050586	4.626672	230	-0.08473	-0.0849	-0.08511	-0.12109	0.012048	-0.09486	230	-0.069	0.180	0.110	0.181	0.110	0.147	-0.283	230	0.417	0.054					
235	864.4	32.05	0.050286	4.876908	235	0.52463	0.632113	0.562409	0.742679	0.038555	0.003067	235	-0.893	-0.278	-0.243	-0.244	-0.279	-0.499	-0.446	235	-0.458	-0.412					
240	471.9	30.87	0.019314	5.028822	240	-0.58121	-0.58231	-0.54803	-0.51415	-0.27885	-0.24439	240	-0.231	-0.015	0.162	0.198	0.162	0.168	0.035	240	0.155	0.069					
245	314.4	31.46	0.033564	5.143914	245	0.097877	0.098092	0.240332	0.276725	0.091287	0.127271	245	-0.164	-0.055	0.051	0.122	0.229	0.088	0.222	245	0.123	0.070					
250	284.4	32.74	0.014586	5.233122	250	0.070176	0.034867	0.283418	0.213105	0.050895	0.086713	250	0.002	0.214	0.285	0.321	0.392	0.325	0.437	250	0.245	0.282					
255	589.4	33.89	0.025686	5.345886	255	0.170902	0.171297	0.277853	0.278762	0.249631	0.321814	255	-0.046	-0.399	-0.364	-0.437	-0.436	-0.262	-0.442	255	-0.309	-0.341					
260	879.4	35.02	0.040464	5.516772	260	-0.2808	-0.24598	-0.24607	-0.24688	-0.39994	-0.43712	260	-0.359	-0.212	-0.461	-0.546	-0.439	-0.409	-0.375	260	-0.334	-0.400					
265	379.4	35.72	0.045714	5.731764	265	-0.18015	-0.25143	-0.39341	-0.537	-0.28379	-0.35604	265	-0.730	-0.400	-0.436	-0.473	-0.437	-0.442	-0.362	265	-0.611	-0.469					
270	741.9	36.36	0.042936	5.89515	270	-0.74919	-0.71548	-0.82289	-0.78971	-0.32997	-0.26022	270	0.348	0.272	0.343	0.380	0.344	0.420	0.369	270	0.285	0.354					
275	533.1	36.28	0.037986	6.078792	275	0.193099	0.264375	0.229178	0.265486	0.378682	0.380213	275	-0.176	-0.279	0.322	0.323	0.252	0.255	0.467	275	0.167	0.166					
280	321.9	35.90	0.022914	6.21045	280	0.159883	-0.05224	0.266736	0.125363	0.251262	0.252294	280	0.027	0.415	0.415	0.452	0.452	0.493	0.521	280	0.551	0.396					
285	306.9	35.93	0.039564	6.341742	285	0.580986	0.617745	0.65351	0.655647	0.344533	0.452507	285	-0.248	-0.279	-0.173	-0.174	-0.174	0.254	-0.108	285	-0.168	-0.129					
290	740.6	35.96	0.016164	6.444606	290	-0.19087	-0.19133	-0.15596	-0.15647	-0.20873	-0.10309	290	0.237	-0.225	-0.332	-0.475	-0.438	-0.372	-0.299	290	-0.428	-0.272					
295	699.4	36.99	0.038964	6.649914	295	-0.38558	-0.38647	-0.52834	-0.53005	-0.3668	-0.36831	295	0.588	0.897	0.686	0.618	0.652	0.660	0.693	295	0.768	0.685					
300	658.1	36.88	0.039414	6.852978	300	1.034768	0.895691	0.754726	0.757206	0.544985	0.618161	300	0.103	0.242	0.031	0.102	0.066	0.998	-0.247	300	-0.011	0.185					

Lampiran 3. Olah data 25 November 2016

Waktu (menit)	Massa air (kg)	Air sirkulasi					Air dalam TES					Perolehan kalor (Q collected)			
		Temp. masuk TES	Temp. keluar TES	Selish temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Temp. awal (°C)	Temp. akhir (°C)	Selish temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Sesaat (kJ)	Kumulatif (kJ)	
		T1 (°C)	T2 (°C)	(°C)	7 = (4+5)/2	8	(°C)	(°C)	(°C)	12 = (9+10)/2	13	(menit)	(kJ)	(kJ)	
5	47,84	3003	2756	2,48	28,80	4,18	5	26,887	26,912	0,026	26,900	4,180	5	5,106	-51,363
10	47,84	3477	2718	7,59	30,98	4,18	10	26,849	26,918	0,069	26,883	4,180	10	13,756	-50,332
15	47,84	3774	2776	9,98	32,75	4,18	15	27,666	27,802	0,135	27,734	4,179	15	27,006	126,413
20	47,84	3752	2735	10,16	32,44	4,18	20	27,846	27,936	0,090	27,891	4,179	20	17,961	153,335
25	47,84	3816	2761	10,55	32,88	4,18	25	27,981	28,189	0,208	28,085	4,179	25	41,616	203,819
30	47,84	3868	2773	10,94	33,20	4,18	30	28,404	28,590	0,185	28,497	4,179	30	37,084	283,971
35	47,84	3912	2793	11,19	33,53	4,18	35	29,032	29,071	0,039	29,051	4,179	35	7,845	380,191
40	47,84	3955	2790	11,65	33,73	4,18	40	29,209	29,077	-0,131	29,143	4,179	40	-26,279	381,485
45	47,84	4035	2809	12,26	34,22	4,18	45	29,619	29,631	0,012	29,625	4,179	45	2,471	492,240
50	47,84	4014	2785	12,30	33,99	4,18	50	29,923	29,844	-0,079	29,883	4,179	50	-15,745	534,712
55	47,84	4007	2831	11,76	34,19	4,18	55	29,959	30,229	0,270	30,094	4,179	55	53,994	611,761
60	47,84	3959	2812	11,47	33,85	4,18	60	30,254	30,122	-0,132	30,188	4,179	60	-26,390	590,428
65	47,84	4026	2821	12,04	34,23	4,18	65	30,621	30,514	-0,107	30,567	4,179	65	-14,116	668,609
70	47,84	4286	2825	14,60	35,56	4,18	70	30,514	30,443	-0,071	30,478	4,179	70	-32,794	634,493
75	47,84	4476	2814	16,63	36,45	4,18	75	31,146	30,982	-0,164	31,064	4,179	75	-7,241	762,342
80	47,84	4437	2902	15,34	36,69	4,18	80	31,472	31,436	-0,036	31,454	4,179	80	72,341	833,054
85	47,84	4339	2861	14,78	36,00	4,18	85	32,100	32,462	0,362	32,281	4,179	85	3,747	1058,046
90	47,84	4341	2871	14,71	36,06	4,18	90	32,320	32,339	0,019	32,330	4,179	90	294,729	1033,559
95	47,84	4199	2874	13,25	35,36	4,18	95	32,363	33,838	1,474	33,100	4,179	95	32,523	1333,107
100	47,84	4216	2938	12,78	35,77	4,18	100	33,558	33,720	0,163	33,639	4,179	100	-41,864	1309,672
105	47,84	4351	2992	13,59	36,72	4,18	105	34,384	34,175	-0,209	34,280	4,179	105	44,265	1400,561
110	47,84	4497	2992	15,05	37,44	4,18	110	34,639	34,861	0,221	34,750	4,179	110	-52,175	1537,636
115	47,84	4221	2997	12,24	36,09	4,18	115	35,412	35,151	-0,261	35,282	4,179	115	4,496	1595,695
120	47,84	3989	2999	9,89	34,94	4,18	120	35,316	35,339	0,022	35,328	4,179	120	-56,420	1633,233
125	47,84	4152	3024	11,28	35,88	4,18	125	35,466	35,184	-0,282	35,325	4,179	125	-7,313	1602,316
130	47,84	4407	3081	13,27	37,44	4,18	130	35,331	35,295	-0,037	35,313	4,179	130	-6,164	1624,421
135	47,84	4576	3129	14,47	38,53	4,18	135	35,761	35,730	-0,031	35,746	4,179	135	16,794	1711,467
140	47,84	4570	3181	13,90	38,76	4,18	140	36,507	36,591	0,084	36,549	4,179	140	-15,306	1883,516
145	47,84	4395	3215	11,80	38,05	4,18	145	37,204	37,128	-0,077	37,166	4,179	145	11,772	1990,821
150	47,84	4328	3201	11,27	37,64	4,18	150	37,175	37,234	0,059	37,204	4,179	150	31,789	2011,984
155	47,84	4333	3203	11,30	37,68	4,18	155	36,860	37,019	0,159	36,939	4,179	155	-26,535	1969,088
160	47,84	4376	3279	10,98	38,27	4,18	160	37,214	37,082	-0,133	37,148	4,179	160	10,745	1981,617
165	47,84	4356	3298	10,59	38,27	4,18	165	37,919	37,973	0,054	37,946	4,179	165	-3,479	2159,813
170	47,84	4483	3329	11,54	39,06	4,18	170	37,725	37,708	-0,017	37,717	4,179	170	13,870	2106,798
175	47,84	4784	3375	14,09	40,80	4,18	175	37,847	37,916	0,069	37,881	4,179	175	90,408	2148,392
180	47,84	4889	3434	14,55	41,61	4,18	180	38,324	38,550	0,452	38,550	4,179	180	58,886	2320,311
185	47,84	4606	3470	11,35	40,38	4,18	185	39,095	39,390	0,295	39,243	4,179	185	25,902	2443,061
190	47,84	4583	3484	11,00	40,34	4,18	190	39,636	39,766	0,130	39,701	4,179	190	-27,666	2518,223
195	47,84	4704	3512	11,92	41,08	4,18	195	39,834	39,696	-0,138	39,765	4,179	195	-14,573	2504,227

Waktu (menit)	Massa air (kg)	Air sirkulasi					Air dalam TES					Perolehan kalor (Q collected)		
		Temp. masuk TES (°C)	Temp. keluar TES (°C)	Selish temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Temp. awal (°C)	Temp. akhir (°C)	Selish temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Sesaat (kJ)
	3	4	5	6 = 4-5	7 = (4+5)/2	8	9	10	11 = 10-9	12 = (9+10)/2	13		14 = 3x13x11	15
200	47,84	49,10	36,05	13,04	42,58	4,18	40,089	40,016	-0,073	40,053	4,179	200	43,300	2568,246
205	47,84	51,56	35,93	15,63	43,74	4,18	40,598	40,815	0,217	40,707	4,179	205	89,226	2727,916
210	47,84	59,04	37,23	21,82	48,14	4,18	40,453	40,899	0,446	40,676	4,179	210	196,757	2744,750
215	47,84	60,36	37,89	22,48	49,13	4,18	41,814	42,798	0,984	42,306	4,179	215	67,214	3124,401
220	47,84	56,94	38,38	18,56	47,66	4,18	44,054	44,390	0,336	44,222	4,179	220	-60,460	3442,749
225	47,84	60,97	38,83	22,15	49,90	4,18	45,511	45,208	-0,302	45,360	4,180	225	2,169	3606,309
230	47,84	61,35	39,38	21,96	50,36	4,18	45,971	45,981	0,011	45,976	4,180	230	10,725	3760,880
235	47,84	54,09	38,70	15,39	46,40	4,18	46,769	46,823	0,054	46,796	4,180	235	-82,323	3929,100
240	47,84	55,52	40,53	14,98	48,02	4,18	47,029	46,617	-0,412	46,823	4,180	240	13,723	3888,067
245	47,84	53,20	40,76	12,44	46,98	4,18	47,461	47,530	0,069	47,496	4,180	245	14,045	4070,551
250	47,84	57,98	41,70	16,28	49,84	4,18	47,258	47,328	0,070	47,293	4,180	250	56,449	4030,175
255	47,84	61,60	42,34	19,26	51,97	4,18	47,948	48,230	0,282	48,089	4,180	255	-68,172	4210,565
260	47,84	60,20	42,74	17,46	51,47	4,18	49,314	48,973	-0,341	49,143	4,181	260	-80,019	4359,077
265	47,84	59,26	42,36	16,90	50,81	4,18	50,244	49,844	-0,400	50,044	4,181	265	-93,718	4533,359
270	47,84	60,33	44,08	16,25	52,21	4,18	49,754	49,286	-0,469	49,520	4,181	270	70,758	4421,706
275	47,84	56,33	44,41	11,92	50,37	4,18	50,211	50,565	0,354	50,388	4,181	275	33,259	4677,577
280	47,84	57,27	44,76	12,52	51,01	4,18	50,610	50,776	0,166	50,693	4,181	280	79,265	4719,758
285	47,84	60,02	45,68	14,34	52,85	4,18	50,173	50,570	0,396	50,372	4,181	285	-25,770	4678,476
290	47,84	63,32	45,93	17,39	54,63	4,18	51,375	51,246	-0,129	51,310	4,181	290	-54,395	4813,754
295	47,84	63,94	47,05	16,89	55,50	4,18	51,855	51,583	-0,272	51,719	4,181	295	137,030	4881,238
300	47,84	63,68	47,00	16,68	55,34	4,18	52,229	52,914	0,685	52,571	4,182	300	36,997	5147,345

Waktu (menit)	Energi matahari yang terjadi (Q incident)					Waktu (menit)	Efisiensi kumulatif (%)
	Luas kolektor (m ²)	Radiasi (W/m ²)	Sesaat (kJ) (kJ)	Kumulatif (kJ)			
				(kJ)	(kJ)		
200	16	17	18 = 16x17xt	19	20 = (15/19)*100	38,99	
205	1,9	438,1	49,9434	6586,2702	200	38,99	
210	1,9	545,6	62,1984	6813,1986	205	40,04	
215	1,9	898,1	102,3834	7094,9952	210	38,69	
220	1,9	863,1	98,3934	7525,71	215	41,52	
225	1,9	219,4	25,0116	8021,8266	220	42,92	
230	1,9	841,9	95,9766	8416,62	225	42,85	
235	1,9	864,4	98,5416	8839,2066	230	42,55	
240	1,9	471,9	53,7966	9317,22	235	42,17	
245	1,9	314,4	35,8416	9561,1116	240	40,67	
250	1,9	284,4	32,4216	9761,8314	245	41,70	
255	1,9	589,4	67,1916	9927,9066	250	40,59	
260	1,9	879,4	100,2516	10176,9282	255	41,37	
265	1,9	379,4	43,2516	10534,6716	260	41,38	
270	1,9	741,9	84,5766	10886,1564	265	41,64	
275	1,9	533,1	60,7734	11237,9148	270	39,35	
280	1,9	321,9	36,6966	11563,0314	275	40,45	
285	1,9	306,9	34,9866	11789,1048	280	40,03	
290	1,9	740,6	84,4284	12036,8496	285	38,87	
295	1,9	699,4	79,7316	12281,733	290	39,19	
300	1,9	658,1	75,0234	12667,1214	295	38,53	
300	1,9	655,6	74,7384	13048,2348	300	39,45	

Waktu (menit)	Energi matahari yang terjadi (Q incident)					Waktu (menit)	Efisiensi kumulatif (%)
	Luas kolektor (m ²)	Radiasi (W/m ²)	Sesaat (kJ) (kJ)	Kumulatif (kJ)			
				(kJ)	(kJ)		
5	16	17	18 = 16x17xt	19	20 = (15/19)*100	-53,96	
10	1,9	208,1	23,7234	95,1786	5	-23,68	
15	1,9	205,6	23,4384	212,5302	10	38,27	
20	1,9	208,1	23,7234	330,3036	15	34,03	
25	1,9	214,4	24,4416	450,642	20	35,33	
30	1,9	224,4	25,5816	576,8286	25	40,22	
35	1,9	229,4	26,1516	706,002	30	45,24	
40	1,9	240,6	27,4284	840,3054	35	38,67	
45	1,9	280,6	31,9884	986,5788	40	43,13	
50	1,9	268,1	30,5634	1141,4022	45	40,78	
55	1,9	283,1	32,2734	1311,1938	50	37,43	
60	1,9	266,9	30,4266	1448,6436	55	39,24	
65	1,9	223,1	25,4334	1577,3952	60	38,91	
70	1,9	279,4	31,8516	1703,787	65	43,90	
75	1,9	456,9	52,0866	1735,6386	70	39,76	
80	1,9	424,4	48,3816	1959,0102	75	47,81	
85	1,9	328,1	37,4034	2207,325	80	44,50	
90	1,9	348,1	39,6834	2409,8916	85	45,09	
95	1,9	319,4	36,4116	2599,3368	90	46,62	
100	1,9	265,6	30,2784	2788,2234	95	45,30	
105	1,9	305,6	34,8384	2943,1836	100	42,49	
110	1,9	388,1	44,2434	3106,272	105	41,23	
115	1,9	364,4	41,5416	3298,4418	110	43,00	
120	1,9	196,9	22,4466	3522,3834	115	42,42	
125	1,9	226,9	25,8666	3652,845	120	40,08	
130	1,9	336,9	38,4066	3770,7552	125	41,17	
135	1,9	351,9	40,1166	3939,555	130	38,48	
140	1,9	379,4	43,2516	4137,8466	135	39,87	
145	1,9	333,1	37,9734	4380,5982	140	40,49	
150	1,9	269,4	30,7116	4583,4498	145	39,21	
155	1,9	301,9	34,4166	4743,5628	150	38,96	
160	1,9	305,6	34,8384	4912,3626	155	41,17	
165	1,9	289,4	32,9916	5246,0976	160	38,48	
170	1,9	323,1	36,8334	5401,7874	165	39,87	
175	1,9	533,1	60,7734	5583,549	170	40,49	
180	1,9	311,9	35,5566	5819,0274	175	38,48	
185	1,9	255,6	29,1384	6058,3704	180	40,33	
190	1,9	309,4	35,2716	6218,757	185	40,49	
195	1,9	371,9	42,3966	6387,2718	190	39,21	

Lampiran 4. Data temperatur PATS 26 November 2016

Waktu (menit)	T HTF di kolektor				T air dingin ke tangki	T air panas di tangki	Waktu (menit)	T PCM di kapsul										T air di dalam tangki					Vert. bawah-tengah	Vert. bawah-T17
	T1	T2	T3	T4				K3			K14			K24				Vert. atas-tengah	Hor. Kanan	Vert. tengah	Hor. Kiri			
								T5	T6	T7	T8	T9	T10	T11	T12	T13	T14					T15		
5	27.17	26.32	27.14	26.87	5	26.83	26.80	26.52	26.34	26.11	26.67	5	29.09	26.70	26.82	26.76	26.72	26.88	26.36					
10	30.37	26.40	27.18	26.94	10	26.87	26.91	26.56	26.38	26.21	26.73	10	29.18	26.79	26.88	26.82	26.96	27.81	26.40					
15	32.84	26.62	27.54	27.32	15	27.20	27.32	26.82	26.71	26.28	26.87	15	30.47	27.19	27.02	27.00	27.03	27.05	26.56					
20	34.33	26.82	27.92	27.85	20	27.76	27.70	26.95	26.80	26.43	27.02	20	32.20	27.59	27.14	27.05	27.15	27.13	26.62					
25	34.82	26.91	28.13	28.78	25	28.40	28.26	27.08	26.97	26.53	27.13	25	33.34	28.27	27.28	27.22	27.25	27.13	26.84					
30	35.10	26.91	28.16	29.56	30	28.98	28.80	27.15	27.04	26.62	27.21	30	33.92	28.93	27.40	27.27	27.34	27.29	26.87					
35	35.46	27.02	28.41	30.35	35	29.55	29.45	27.37	27.29	26.70	27.22	35	34.31	29.45	27.52	27.50	27.46	27.41	27.08					
40	35.70	27.12	28.66	30.89	40	30.16	29.99	27.62	27.54	26.81	27.41	40	34.73	30.02	27.77	27.72	27.68	27.30	27.23					
45	36.43	27.28	28.89	31.28	45	30.67	30.54	27.84	27.81	26.93	27.49	45	35.23	30.65	28.04	27.88	27.87	27.46	27.30					
50	37.79	27.39	29.18	31.63	50	31.14	30.98	28.14	28.10	27.01	27.57	50	35.93	31.01	28.19	28.10	28.09	27.43	27.11					
55	40.40	27.58	29.55	32.95	55	31.84	31.67	28.47	28.47	27.32	28.03	55	37.42	31.83	28.71	28.52	28.51	27.82	27.61					
60	43.82	27.76	29.92	34.16	60	32.70	32.39	28.84	28.84	27.33	28.08	60	39.53	32.85	29.09	28.86	28.78	27.87	27.85					
65	46.45	27.63	30.10	35.70	65	33.53	33.12	28.88	28.81	27.40	28.14	65	41.91	34.13	29.30	29.14	29.02	28.51	27.79					
70	46.92	27.56	30.11	36.13	70	33.86	33.45	28.95	28.92	27.43	28.17	70	42.53	34.55	29.43	29.20	29.12	28.14	27.83					
75	48.71	28.05	30.77	39.11	75	36.27	35.73	29.76	29.84	27.85	28.55	75	45.18	37.04	30.06	29.87	29.75	28.31	28.00					
80	49.06	28.26	31.06	41.33	80	38.78	38.02	30.45	30.49	28.02	28.87	80	46.46	39.18	30.78	30.48	30.32	28.52	28.32					
85	49.54	28.14	30.98	42.10	85	40.40	39.62	30.76	30.94	28.07	28.88	85	46.85	40.80	31.22	30.85	30.66	29.08	28.10					
90	48.88	28.54	31.20	43.03	90	42.16	41.52	31.84	32.11	28.60	29.20	90	47.43	42.21	32.07	31.78	31.55	29.00	27.93					
95	48.58	28.82	31.36	43.94	95	43.32	42.79	32.76	33.13	29.11	29.78	95	47.72	43.32	33.19	32.79	32.52	29.88	28.46					
100	49.14	28.78	31.22	43.66	100	43.71	43.32	33.29	33.70	29.41	30.01	100	47.70	43.84	33.88	33.49	33.18	30.47	28.32					
105	50.00	29.65	31.91	44.92	105	44.86	44.55	34.63	35.15	30.28	31.00	105	48.47	45.03	35.26	34.87	34.53	31.51	29.35					
110	50.79	30.15	32.20	45.69	110	45.68	45.45	35.81	36.41	31.06	31.67	110	49.23	45.84	36.32	36.01	35.60	31.51	29.92					
115	50.02	30.52	32.37	46.22	115	46.31	46.08	36.77	37.48	31.70	32.32	115	49.64	46.40	37.35	36.97	36.56	32.22	30.20					
120	50.82	30.73	32.13	45.95	120	46.29	46.20	37.28	37.92	32.13	32.75	120	49.43	46.65	38.00	37.54	37.16	32.47	30.50					
125	51.64	31.41	32.46	46.26	125	47.00	46.88	38.57	39.21	32.70	33.42	125	50.08	47.25	38.99	38.47	38.05	33.12	30.75					
130	52.63	32.17	32.79	47.39	130	47.75	47.63	39.83	40.33	33.60	34.32	130	50.71	48.04	40.13	39.58	39.16	33.99	31.71					
135	52.86	31.80	31.98	47.48	135	47.13	47.08	39.63	40.03	33.98	34.49	135	50.98	48.53	40.27	39.82	39.30	33.91	32.21					
140	54.87	32.94	32.73	48.49	140	48.30	48.25	40.98	41.38	34.77	35.40	140	52.61	48.89	41.38	40.83	40.30	34.79	33.06					
145	57.03	34.30	33.53	50.01	145	49.76	49.71	42.52	42.99	35.96	36.77	145	55.14	50.29	42.71	42.17	41.68	36.03	34.28					
150	57.76	34.72	33.45	51.00	150	49.96	50.02	42.98	43.24	36.58	37.43	150	56.01	51.22	43.36	42.79	42.29	36.51	34.85					
155	58.88	35.89	34.23	51.99	155	51.02	51.19	44.18	44.55	37.49	38.31	155	57.06	52.23	44.20	43.66	43.13	37.44	35.38					
160	59.43	36.88	34.93	54.03	160	52.14	52.28	45.48	45.97	38.92	39.85	160	58.10	53.83	45.77	45.20	44.74	39.07	37.04					
165	60.42	37.82	35.08	54.49	165	52.75	53.03	46.31	46.62	40.27	40.99	165	59.09	54.71	46.62	46.09	45.59	39.89	37.83					
170	61.01	38.91	35.57	55.64	170	54.15	54.29	47.61	48.03	41.14	42.01	170	59.73	55.55	47.67	47.25	46.71	41.14	38.97					
175	61.59	39.50	35.34	56.04	175	55.24	54.92	47.99	48.41	42.02	42.75	175	60.27	56.10	48.19	47.74	47.27	41.81	39.66					
180	62.03	40.26	35.14	55.96	180	56.10	55.82	48.50	48.99	41.94	42.92	180	60.16	55.96	48.19	47.84	47.41	44.21	40.01					
185	62.70	41.37	35.43	57.35	185	56.74	56.64	49.32	50.06	44.09	44.90	185	61.79	57.56	49.94	49.60	49.17	44.41	41.64					
190	63.63	42.74	36.52	57.98	190	58.03	57.61	50.18	50.61	44.98	45.86	190	62.42	58.49	50.76	50.46	50.10	45.32	42.82					
195	64.49	43.72	36.41	58.89	195	59.07	58.52	50.78	50.96	46.07	46.92	195	63.29	59.46	51.53	51.34	51.01	46.56	44.07					
200	64.07	43.12	35.23	58.10	200	58.44	57.99	49.47	49.71	45.90	46.57	200	62.48	59.23	50.76	50.57	50.27	45.71	43.76					

Waktu (menit)	T HTF dr kolektor		T HTF ke kolektor		T air dingin ke tangki		T air panas dr tangki		Waktu (menit)		T PCM di kapsul					T air di dalam tangki							
	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	K3		K14			K24		Waktu (menit)	Vert. atas tengah	Hor. Kanan	Vert. tengah	Hor. Kiri	Vert. bawah-tengah
205	66,27	45,76	36,96	60,77	61,14	60,91	51,50	51,97	47,90	48,72	205	65,03	61,61	52,83	52,64	52,27	47,85	46,22					
210	66,41	45,87	36,29	59,65	61,07	60,91	51,01	51,41	47,51	48,16	210	64,38	61,19	52,12	51,90	51,57	47,42	45,62					
215	67,39	47,51	37,33	61,66	62,91	62,75	52,50	53,08	48,45	49,35	215	65,84	62,76	53,56	53,34	53,01	48,91	47,20					
220	67,44	47,90	37,48	61,36	63,30	63,22	52,62	53,34	49,00	49,61	220	66,06	63,44	53,96	53,81	53,44	48,64	47,12					
225	68,30	48,85	38,00	62,99	64,48	64,47	53,95	54,88	49,73	50,48	225	66,90	64,23	55,08	54,90	54,60	50,34	48,66					
230	68,20	49,59	38,11	63,39	64,80	64,76	54,76	55,95	50,63	51,22	230	67,27	64,93	55,95	55,63	55,22	50,94	49,25					
235	69,44	50,42	39,06	63,88	65,63	65,69	56,23	57,14	50,21	51,22	235	67,17	64,86	56,16	55,88	55,58	50,94	50,00					
240	64,47	49,65	37,67	61,55	64,72	64,92	56,09	57,10	49,45	50,31	240	65,34	64,21	54,91	54,97	54,67	49,78	48,42					
245	57,63	49,48	36,28	61,12	63,71	64,01	56,95	57,83	50,18	51,08	245	64,67	63,31	55,81	55,70	55,23	50,62	49,29					
250	62,18	50,35	35,94	60,61	62,63	62,76	57,50	57,98	50,99	52,04	250	64,13	62,47	57,29	56,73	56,15	51,48	49,98					
255	69,15	50,87	35,83	61,60	62,38	62,54	58,09	58,54	51,66	52,85	255	66,45	63,14	58,70	58,14	57,59	54,91	51,24					
260	69,77	51,39	36,10	63,99	63,14	62,99	58,40	58,60	52,11	53,45	260	68,36	64,40	59,36	58,74	58,26	54,94	51,74					
265	66,49	51,58	35,98	64,55	64,08	63,96	58,59	58,76	52,47	53,77	265	68,33	65,21	59,57	59,09	58,65	53,37	52,13					
270	68,51	52,67	36,65	63,57	64,70	64,79	59,67	59,78	52,76	54,16	270	66,49	66,13	59,79	59,35	58,76	53,70	52,21					
275	64,22	53,92	37,45	64,59	65,87	65,83	61,06	61,24	54,00	55,52	275	67,46	65,58	61,00	60,46	59,87	54,82	53,67					
280	70,34	54,01	36,90	62,18	65,16	65,50	61,33	61,58	53,14	54,62	280	66,73	64,34	60,32	59,88	59,33	54,16	52,94					
285	67,85	53,41	35,93	64,69	64,24	64,30	60,27	60,31	54,20	55,75	285	67,93	65,11	61,31	60,87	60,35	55,84	54,27					
290	69,99	54,12	35,86	64,45	64,56	64,59	60,31	60,28	54,67	56,34	290	68,42	65,97	61,57	61,13	60,65	57,82	54,60					
295	71,21	55,82	37,44	66,22	66,71	66,70	62,34	62,49	57,75	58,15	295	69,84	67,32	62,92	62,56	62,14	59,12	55,85					
300	71,19	56,40	37,57	66,42	67,53	67,53	63,11	63,23	58,21	59,01	300	70,12	67,75	63,35	62,99	62,61	58,95	56,06					

Waktu (menit)	Temperatur permukaan tangki						Waktu (menit)	T rata PCM	T rata air	K3 rata	K14 rata	K24 rata	Waktu (menit)	Temperatur permukaan kolektor					Trata-rata				
	Bawah		Tengah		Atas									Kanan		Kiri		T1		T23	T24	T25	T26
	T18	T19	T20	T21	T22	T22								T22									
5	27,27	27,48	27,61	27,43	27,26	27,26	26,55	27,05	26,82	26,43	26,39	5	31,54	29,53	25,78	29,53	25,88	28,45					
10	27,23	27,52	28,86	27,50	27,22	27,22	26,61	27,26	26,89	26,47	26,47	10	34,56	30,14	26,35	30,14	26,54	29,55					
15	27,50	27,71	30,98	27,95	27,46	27,46	26,87	27,47	27,26	26,77	26,57	15	36,38	32,41	28,81	30,58	27,39	31,11					
20	27,56	27,81	32,33	28,12	27,55	27,55	27,11	27,84	27,73	26,87	26,73	20	36,97	30,67	27,01	31,19	28,24	30,82					
25	27,78	28,09	33,29	28,48	27,80	27,80	27,40	28,19	28,33	27,03	26,83	25	37,32	30,23	26,92	31,02	28,34	30,76					
30	27,80	28,19	33,74	28,65	27,87	27,87	27,64	28,43	28,89	27,10	26,92	30	37,75	30,06	26,82	30,93	28,34	30,78					
35	27,98	28,41	34,28	29,01	28,16	28,16	27,93	28,67	29,50	27,33	26,96	35	38,05	29,97	26,82	31,02	28,43	30,86					
40	28,13	28,73	34,60	29,47	28,41	28,41	28,25	28,92	30,07	27,58	27,11	40	38,94	29,71	26,54	30,84	28,43	30,89					
45	28,13	28,94	34,99	29,69	28,55	28,55	28,55	29,20	30,60	27,82	27,21	45	40,60	28,66	25,50	30,14	30,23	31,03					
50	27,97	28,90	35,76	29,86	28,54	28,54	28,82	29,41	31,06	28,12	27,29	50	43,79	28,31	25,12	29,88	30,61	31,54					
55	28,55	29,75	37,75	30,79	29,33	29,33	29,30	30,06	31,75	28,47	27,67	55	47,95	28,40	26,35	31,28	32,97	33,39					
60	28,67	30,06	40,36	31,35	29,61	29,61	29,70	30,69	32,55	28,84	27,71	60	51,73	33,64	32,22	37,21	36,38	38,24					
65	28,64	30,42	42,78	32,00	29,89	29,89	29,98	31,40	33,32	28,84	27,77	65	53,82	33,98	32,50	37,48	36,66	38,89					
70	28,76	30,54	43,39	32,29	29,98	29,98	30,13	31,54	33,65	28,94	27,80	70	53,92	34,51	33,16	37,83	36,85	39,25					
75	28,89	31,17	45,53	33,42	30,61	30,61	31,33	32,60	36,00	29,80	28,20	75	54,35	35,73	34,11	38,70	37,23	40,02					
80	29,14	31,95	46,52	34,72	31,37	31,37	32,44	33,44	38,40	30,47	28,45	80	54,94	36,08	34,39	38,79	37,14	40,27					
85	28,81	32,38	47,05	35,67	31,71	31,71	33,11	33,94	40,01	30,85	28,48	85	54,13	36,08	34,30	38,70	36,85	40,01					
90	28,75	33,03	47,13	36,71	32,33	32,33	34,24	34,57	41,84	31,97	28,90	90	53,76	36,25	34,30	38,70	36,76	39,95					
95	29,17	34,30	47,40	38,23	33,57	33,57	35,15	35,41	43,06	32,95	29,44	95	54,45	36,43	34,68	38,96	36,76	40,25					
100	28,88	34,72	47,36	38,73	33,89	33,89	35,57	35,84	43,52	33,50	29,71	100	55,50	36,52	34,87	39,13	36,57	40,52					
105	29,98	36,49	48,69	40,56	35,67	35,67	36,75	37,00	44,70	34,89	30,64	105	56,46	36,25	34,30	38,61	36,47	40,42					
110	30,40	37,61	49,49	41,62	36,76	36,76	37,68	37,77	45,56	36,11	31,37	110	55,52	36,87	34,96	39,31	36,95	40,72					
115	30,68	38,50	49,59	42,40	37,62	37,62	38,44	38,48	46,19	37,13	32,01	115	56,50	36,52	34,68	38,96	36,76	40,68					
120	30,58	38,83	49,35	42,66	37,91	37,91	38,76	38,82	46,24	37,60	32,44	120	57,49	36,69	35,05	39,22	36,76	41,04					
125	30,86	39,68	50,23	43,40	38,76	38,76	39,63	39,53	46,94	38,89	33,06	125	58,71	37,04	35,43	39,57	36,95	41,54					
130	31,82	40,98	51,17	44,52	40,07	40,07	40,58	40,47	47,69	40,08	33,96	130	58,99	37,13	35,53	39,66	36,95	41,65					
135	31,88	41,36	51,83	44,76	40,35	40,35	40,39	40,72	47,10	39,83	34,24	135	61,44	38,44	36,76	41,06	38,55	43,25					
140	32,65	42,44	53,22	45,60	41,29	41,29	41,51	41,69	48,28	41,18	35,08	140	64,07	38,35	36,66	40,97	38,46	43,70					
145	33,72	43,75	55,22	46,91	42,61	42,61	42,95	43,19	49,74	42,76	36,37	145	64,96	38,61	37,14	41,58	39,03	44,26					
150	34,11	44,38	55,89	47,47	43,14	43,14	43,37	43,86	49,99	43,11	37,01	150	66,33	39,75	38,18	42,54	39,97	45,35					
155	34,45	44,90	56,65	48,09	43,71	43,71	44,46	44,73	51,11	44,37	37,90	155	67,00	39,83	38,46	42,54	40,16	45,60					
160	36,21	46,92	58,37	50,04	45,72	45,72	46,77	46,25	52,21	45,72	39,38	160	68,21	39,75	38,27	42,37	39,88	45,69					
165	36,67	47,52	58,79	50,61	46,33	46,33	46,66	47,12	52,89	46,46	40,63	165	68,92	40,79	39,41	43,41	40,92	46,69					
170	37,91	48,85	59,90	51,87	47,63	47,63	47,87	48,14	54,22	47,82	41,57	170	69,64	40,71	39,41	43,50	41,11	46,87					
175	38,35	49,25	60,30	52,23	48,10	48,10	48,55	48,72	55,08	48,20	42,38	175	70,17	41,14	39,41	43,50	41,01	47,05					
180	38,58	49,37	60,39	52,40	48,23	48,23	49,05	49,11	55,96	48,74	42,43	180	70,99	41,49	39,88	43,94	41,49	47,56					
185	40,16	50,87	61,60	53,61	49,59	49,59	50,29	50,59	56,69	49,69	44,49	185	72,12	41,84	40,45	44,29	42,06	48,15					
190	41,40	51,89	62,61	54,63	50,58	50,58	51,21	51,48	57,82	50,40	45,42	190	73,18	42,37	40,64	44,46	42,24	48,58					
195	42,58	52,81	63,52	55,52	51,54	51,54	52,45	52,47	58,50	50,87	46,49	195	72,67	43,85	42,72	46,03	44,04	49,86					
200	42,02	51,90	62,80	54,72	50,70	50,70	51,35	51,83	58,22	49,59	46,24	200	75,34	43,85	42,72	46,38	44,33	50,52					

Waktu (menit)	Temperatur permukaan tangki						Temperatur permukaan kolektor											
	Bawah		Tengah	Atas	Kanan	Kiri	T rata PCM	T rata air	K3 rata	K14 rata	K24 rata	Waktu (menit)	T1	T23	T24	T25	T26	Trata-rata
	T18	T19	T20	T21	T22													
205	44,71	54,36	65,24	57,25	53,14	53,69	54,06	61,02	51,74	48,31	205	75,51	44,11	43,47	47,17	44,99	51,05	
210	43,87	53,17	64,30	56,23	52,05	53,34	53,46	60,99	51,21	47,83	210	76,72	44,20	43,57	47,25	44,99	51,34	
215	45,57	54,83	65,95	58,03	53,71	54,84	54,94	62,83	52,79	48,90	215	76,77	44,37	43,66	47,43	45,37	51,52	
220	45,46	54,65	65,42	57,92	53,50	55,18	55,21	63,26	52,98	49,30	220	77,82	44,55	43,85	47,78	45,84	51,97	
225	47,16	56,23	66,92	59,86	55,16	56,33	56,39	64,48	54,42	50,10	225	77,69	44,72	43,85	48,04	46,03	52,07	
230	47,82	56,88	66,87	60,65	55,85	57,02	57,03	64,78	55,36	50,92	230	79,21	44,02	43,28	47,25	45,18	51,79	
235	48,71	58,05	67,89	61,78	56,80	57,69	57,23	65,66	56,68	50,72	235	73,14	42,10	40,45	44,46	43,28	48,69	
240	46,82	55,89	64,35	59,83	54,92	57,10	56,04	64,82	56,60	49,88	240	64,80	42,89	41,68	45,60	43,76	47,74	
245	47,76	56,54	63,84	60,20	55,75	57,29	56,38	63,86	57,39	50,63	245	70,35	44,02	43,38	47,52	45,27	50,11	
250	48,69	57,43	63,30	60,18	56,54	57,32	56,89	62,70	57,74	51,51	250	78,85	45,25	44,51	48,65	46,69	52,79	
255	50,12	59,13	66,84	61,46	58,28	57,68	58,60	62,46	58,32	52,25	255	79,61	44,20	42,91	46,82	45,56	51,82	
260	50,54	59,62	68,41	61,81	58,85	58,11	59,40	63,07	58,50	52,78	260	75,62	45,07	43,85	48,13	46,69	51,87	
265	50,78	59,96	68,19	62,26	59,16	58,60	59,48	64,02	58,68	53,12	265	78,08	44,98	43,85	48,13	46,97	52,40	
270	50,82	59,79	65,86	62,16	59,05	59,31	59,49	64,74	59,72	53,46	270	72,84	44,46	43,28	47,95	46,79	51,06	
275	52,41	61,19	67,05	63,56	60,53	60,59	60,41	65,85	61,15	54,76	275	80,30	45,51	44,04	48,39	47,45	53,14	
280	51,41	60,23	66,82	62,25	59,57	60,22	59,67	65,33	61,46	53,88	280	77,27	45,77	44,61	49,26	48,58	53,10	
285	52,80	61,65	67,99	63,49	61,03	59,84	60,81	64,27	60,29	54,98	285	79,88	45,51	44,33	48,74	48,11	53,31	
290	53,13	61,87	68,73	63,64	61,25	60,12	61,45	64,57	60,29	55,51	290	81,38	45,94	45,18	49,96	49,06	54,30	
295	54,47	63,27	70,06	65,09	62,66	62,36	62,82	66,71	62,41	57,95	295	81,35	45,51	44,42	48,83	48,11	53,64	
300	54,65	63,44	70,06	65,26	62,90	63,10	63,12	67,53	63,17	58,61	300	81,07	45,51	44,42	48,91	48,20	53,62	

Lampiran 5. Data radiasi dan kecepatan pemanasan PATS 26 November

Waktu (menit)	Solar Radiation, W/m ²	Temp. udara luar, °C	Energi radiasi, MJ/m ²	Akumulasi energi radiasi, MJ/m ²	kecepatan pemanasan T PCM di kapsul (°C/menit)										kecepatan pemanasan T air di dalam tangki (°C/menit)										Rata-rata (°C/menit)	
					K3			K14			K24				Waktu (menit)	Vert. atas	Vert. tengah	Hor. Kanan	Vert. tengah	Hor. Kiri	Vert. bawah	Waktu (menit)	PCM	HTF		
					T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	Vert. bawah	Waktu (menit)				
5	143.1	26.28	0.008664	0.034914	0.012	0.012	0.048	0.048	0.084	0.013	0.083	0.085	0.085	0.085	0.013	-0.060	0.150	0.150	0.150	5	0.036	0.063				
10	128.1	26.55	0.007836	0.073644	-0.056	0.016	0.052	-0.056	0.017	-0.019	10	-0.054	-0.019	-0.055	-0.055	0.161	0.852	-0.015	10	-0.008	0.116					
15	145.6	27.11	0.007914	0.108852	0.076	0.076	0.040	0.076	-0.031	-0.031	15	0.354	0.113	-0.001	0.035	-0.001	0.072	-0.047	15	0.034	0.075					
20	121.9	27.33	0.007764	0.152166	0.093	0.093	0.057	0.021	0.024	-0.012	20	0.338	0.060	-0.012	-0.084	0.024	-0.158	-0.119	20	0.052	0.007					
25	120.6	27.11	0.007164	0.188873	0.107	0.107	0.000	0.000	0.065	0.065	25	0.223	0.187	0.115	0.072	0.098	0.099	0.025	25	0.132	0.087					
30	119.4	27.11	0.007236	0.224988	0.107	0.107	0.000	0.000	0.065	0.065	30	0.133	0.209	0.029	-0.007	0.065	0.102	-0.053	30	0.051	0.068					
35	124.4	27.16	0.007464	0.261552	0.022	0.095	0.058	0.023	0.011	-0.025	35	0.046	0.047	-0.025	0.047	0.011	-0.012	0.011	35	0.031	0.018					
40	133.1	27.46	0.007914	0.299616	0.204	0.133	0.097	0.097	0.117	0.261	40	0.114	0.225	0.083	0.155	0.191	0.192	0.40	0.152	0.139						
45	209.4	27.63	0.009786	0.344502	0.071	0.108	0.000	-0.037	-0.012	-0.048	45	0.093	0.132	-0.012	-0.012	0.024	-0.012	0.038	45	0.014	0.036					
50	589.4	28.02	0.034836	0.477738	0.127	0.163	0.128	-0.015	-0.015	-0.015	50	0.159	0.021	-0.015	0.057	0.057	-0.052	-0.269	50	0.086	-0.006					
55	641.9	28.39	0.037836	0.661824	0.160	0.160	0.052	0.052	0.113	0.222	55	0.319	0.149	0.078	0.042	0.078	0.151	-0.076	55	0.126	0.106					
60	626.9	30.07	0.038436	0.854166	0.397	0.326	0.254	0.255	0.101	0.219	60	0.628	0.361	0.254	0.147	0.146	0.148	0.309	60	0.259	0.285					
65	600.6	29.09	0.037314	1.004466	0.120	0.012	-0.167	-0.204	-0.249	-0.142	65	0.418	0.181	-0.177	-0.106	-0.142	0.365	-0.078	65	-0.105	0.066					
70	575.6	29.32	0.036036	1.040502	0.326	0.327	0.076	0.112	0.028	0.028	70	0.616	0.421	0.135	0.064	0.099	-0.371	0.046	70	0.149	0.144					
75	560.6	29.39	0.033036	1.210782	0.332	0.333	-0.026	0.010	0.022	0.022	75	0.403	0.415	0.222	0.022	0.022	-0.050	-0.237	75	0.115	0.085					
80	534.4	29.14	0.036186	1.389762	0.673	0.711	0.389	0.355	0.166	0.310	80	0.403	0.594	0.381	0.418	0.310	0.313	0.439	80	0.434	0.408					
85	546.9	28.77	0.032064	1.554048	0.548	0.549	0.336	0.409	-0.002	0.249	85	0.240	0.532	0.320	0.285	0.249	0.624	0.363	85	0.348	0.373					
90	570.6	29.34	0.033036	1.707834	0.043	0.115	-0.028	-0.028	-0.205	-0.278	90	-0.337	-0.169	-0.206	-0.134	-0.244	-0.634	-0.276	90	-0.064	-0.276					
95	549.4	29.49	0.033264	1.869276	0.237	0.202	0.239	0.239	-0.103	0.040	95	-0.065	0.040	0.147	0.076	0.076	0.403	-0.237	95	0.142	0.063					
100	558.1	29.54	0.032286	2.03154	-0.196	-0.161	-0.162	-0.162	-0.055	-0.127	100	-0.123	-0.126	-0.055	-0.091	-0.055	-0.273	-0.183	100	-0.144	-0.130					
105	533.1	30.02	0.034314	2.199954	0.110	0.110	0.146	0.183	0.229	0.082	105	-0.024	0.224	0.153	0.226	0.225	0.807	0.125	105	0.143	0.248					
110	506.9	30.44	0.029214	2.347896	0.384	0.385	0.423	0.424	0.159	0.159	110	0.188	0.264	0.194	0.310	0.238	0.205	0.175	110	0.322	0.225					
115	554.4	29.74	0.033636	2.508432	0.114	0.150	0.115	0.259	0.240	0.133	115	0.025	0.097	0.204	0.276	0.240	0.279	0.151	115	0.169	0.182					
120	545.6	30.37	0.033714	2.675424	0.168	0.169	0.241	0.313	0.240	0.276	120	0.197	0.203	0.275	0.312	0.347	0.351	0.436	120	0.234	0.303					
125	629.4	30.65	0.035064	2.844481	-0.309	-0.309	-0.203	-0.203	-0.244	-0.245	125	-0.202	-0.243	-0.173	-0.173	-0.173	-0.103	-0.411	125	-0.246	-0.211					
130	618.1	31.18	0.034986	3.025674	-0.123	-0.182	-0.111	-0.147	0.212	0.106	130	-0.133	-0.030	0.005	-0.066	-0.074	-0.038	-0.169	130	-0.081	-0.072					
135	699.4	31.89	0.040464	3.223236	-0.217	-0.182	-0.111	-0.147	0.212	0.106	135	0.033	0.140	0.034	0.070	-0.002	-0.038	0.141	135	-0.056	0.054					
140	705.6	30.93	0.044286	3.441546	-0.678	-0.680	-0.682	-0.791	-0.041	-0.256	140	-0.177	-0.253	-0.219	-0.219	-0.290	-0.330	-0.332	140	-0.521	-0.260					
145	761.9	31.38	0.045786	3.663732	0.271	0.236	0.164	0.236	0.365	0.366	145	0.525	0.328	0.364	0.330	0.365	0.370	0.552	145	0.273	0.405					
150	771.9	31.92	0.046164	3.895146	1.026	1.028	1.066	1.034	0.807	0.954	150	1.055	0.945	0.984	0.916	0.986	0.999	0.966	150	0.986	0.979					
155	765.6	31.69	0.046236	4.12566	0.531	0.568	0.569	0.642	0.444	0.216	155	0.208	0.249	0.250	0.215	0.215	0.875	0.718	155	0.445	0.223					
160	768.1	31.71	0.046386	4.356546	0.435	0.401	0.508	0.474	0.925	0.857	160	0.653	0.920	0.923	0.891	0.925	0.865	0.842	160	0.600	0.842					
165	766.9	32.41	0.046164	4.586904	0.823	0.860	0.897	0.900	0.434	0.507	165	0.454	0.467	0.504	0.470	0.541	0.512	0.317	165	0.737	0.467					
170	773.1	32.77	0.046464	4.819368	0.351	0.245	0.316	0.353	0.350	0.316	170	0.098	0.207	0.278	0.350	0.279	0.355	0.179	170	0.322	0.249					
175	774.4	32.51	0.046386	5.051976	-0.166	-0.202	-0.273	-0.274	0.198	-0.050	175	-0.117	-0.014	-0.156	-0.157	-0.156	-0.158	-0.006	175	-0.128	-0.109					
180	770.6	33.03	0.046086	5.282712	-0.187	-0.152	-0.187	-0.117	-1.285	-1.183	180	-1.140	-1.385	-1.212	-1.145	-1.073	-1.910	-0.935	180	-0.518	-1.257					
185	766.9	33.11	0.046164	5.51367	-0.459	-0.319	-0.355	-0.107	0.208	0.102	185	0.167	-0.252	0.066	0.031	-0.076	0.318	0.347	185	-0.155	0.086					
190	778.1	33.16	0.046314	5.744706	-0.166	-0.273	-0.273	-0.273	0.316	0.281	190	0.168	0.279	0.402	0.368	0.403	0.336	0.377	190	-0.065	0.334					
195	789.4	33.39	0.047136	5.979492	0.676	0.572	0.537	0.432	0.534	0.643	195	0.483	0.567	0.463	0.500	0.570	0.685	0.548	195	0.566	0.545					
200	800.6	32.48	0.047514	6.219684	-1.355	-1.253	-1.468	-1.473	-0.891	-1.037	200	-1.342	-1.064	-1.209	-1.284	-1.176	-1.190	-0.740	200	-1.246	-1.143					

Waktu (menit)	Solar Radiation, W/m ²	Temp. udara luar, °C	Energi radiasi, MJ/m ²	Akumulasi energi radiasi, MJ/m ²	Waktu (menit)	kecepatan pemanasan T PCM di kapsul (°C/menit)										kecepatan pemanasan T air di dalam tangki (°C/menit)										Rata-rata (°C/menit)																																																																											
						K3			K14			K24				Waktu (menit)	Vert. atas	Vert. atas tengah	Hor. Kanan	Vert. tengah	Hor. Kiri	Vert. bawah-tengah	Vert. bawah	Waktu (menit)	PCM	HTF																																																																											
						T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23	T24	T25	T26	T27	T28	T29	T30	T31	T32	T33	T34	T35	T36	T37	T38	T39	T40	T41	T42	T43	T44	T45	T46	T47	T48	T49	T50	T51	T52	T53	T54	T55	T56	T57	T58	T59	T60	T61	T62	T63	T64	T65	T66	T67	T68	T69	T70	T71	T72	T73	T74	T75	T76	T77	T78	T79	T80	T81	T82	T83	T84	T85	T86	T87	T88	T89	T90	T91	T92	T93	T94	T95	T96	T97	T98	T99	T100
205	825.6	32.36	0.048864	6.46137	205	0.062	0.062	-0.044	-0.009	0.320	0.322	0.310	0.284	0.214	0.215	0.215	0.110	0.251	205	0.119	0.228																																																																																
210	781.9	31.94	0.047514	6.705534	210	0.592	0.558	0.560	0.597	0.754	0.757	0.696	0.857	0.754	0.721	0.826	0.765	0.858	210	0.637	0.782																																																																																
215	789.4	32.92	0.047214	6.940398	215	0.495	0.531	0.498	0.677	0.266	0.374	0.497	0.582	0.513	0.373	0.444	0.377	0.674	215	0.473	0.494																																																																																
220	789.4	31.97	0.047436	7.177434	220	-0.194	-0.159	-0.266	-0.160	-0.503	-0.612	-0.624	-0.783	-0.574	-0.540	-0.434	-0.153	-0.727	220	-0.316	-0.548																																																																																
225	748.1	32.33	0.042936	7.406748	225	0.812	0.849	0.852	0.961	0.854	0.964	0.895	0.956	0.959	0.998	0.961	0.973	0.982	225	0.882	0.961																																																																																
230	813.1	33.91	0.048186	7.639056	230	0.909	0.841	1.021	1.023	0.296	0.368	0.321	0.435	0.437	0.332	0.367	0.443	0.101	230	0.743	0.348																																																																																
235	754.4	32.28	0.027414	7.797798	235	-0.522	-0.418	-0.384	-0.349	-0.792	-0.795	-0.596	-0.798	-0.765	-0.732	-0.731	-0.847	-0.376	235	-0.543	-0.692																																																																																
240	191.9	31.00	0.011586	7.890912	240	-0.800	-0.732	-0.486	-0.452	-0.941	-1.015	-1.390	-0.585	-1.011	-0.943	-0.942	-1.347	-1.219	240	-0.738	-1.062																																																																																
245	379.4	31.31	0.053964	8.020398	245	-0.243	-0.208	0.321	0.145	0.502	0.469	0.316	0.395	0.608	0.468	0.503	0.438	0.563	245	0.164	0.470																																																																																
250	876.9	31.69	0.052086	8.231484	250	0.034	0.034	0.387	0.388	0.137	0.138	-0.141	-0.004	0.207	0.208	0.243	0.282	0.125	250	0.186	0.132																																																																																
255	808.1	32.30	0.048636	8.484126	255	-0.742	-0.884	-0.743	-0.746	0.150	0.079	1.581	0.044	0.114	0.185	0.185	0.151	0.211	255	-0.481	0.353																																																																																
260	204.4	32.92	0.036114	8.71299	260	-0.038	-0.073	-0.285	-0.215	0.047	0.047	-1.125	-0.199	0.223	-0.094	0.012	-0.273	-0.110	260	-0.086	-0.081																																																																																
265	814.4	32.48	0.049314	8.852376	265	-1.413	-1.346	-1.523	-1.528	-0.406	-0.655	-0.632	-0.580	-0.686	-0.724	-0.688	-0.697	-0.584	265	-1.145	-0.656																																																																																
270	593.1	32.07	0.009186	8.983212	270	0.368	0.404	0.545	0.547	-0.149	-0.150	-0.623	0.588	-0.079	-0.114	-0.220	-0.116	-0.516	270	0.261	-0.154																																																																																
275	776.9	32.02	0.046764	9.208176	275	0.874	0.701	0.877	0.844	0.179	0.286	-0.168	0.249	0.249	0.215	0.250	0.074	0.489	275	0.627	0.194																																																																																
280	645.6	32.48	0.014586	9.393912	280	0.377	0.448	0.483	0.520	0.217	0.217	1.372	0.181	0.287	0.288	0.322	0.255	0.294	280	0.377	0.428																																																																																
285	715.6	32.15	0.043014	9.610548	285	-0.046	-0.081	-0.116	-0.187	-0.018	0.159	-0.325	0.158	0.052	0.052	0.010	-0.240	-0.002	285	-0.048	-0.042																																																																																
290	708.1	32.85	0.042936	9.825834	290	-0.268	-0.234	-0.269	-0.341	-0.034	-0.034	0.275	0.142	-0.034	-0.104	-0.069	0.500	-0.121	290	-0.196	0.084																																																																																
295	700.6	32.15	0.041586	10.03527	295	0.259	0.295	0.171	0.277	0.644	0.682	0.489	0.643	0.609	0.681	0.645	0.973	0.689	295	0.388	0.676																																																																																
300	695.6	32.41	0.042186	10.23098	300	-0.400	-0.471	-0.436	-0.508	-0.087	-0.088	-0.221	-0.157	-0.158	-0.158	-0.193	-0.409	-0.204	300	-0.332	-0.214																																																																																

Lampiran 6. Olah data 26 November 2016

Waktu (menit)	Massa air (kg)	Air sirkulasi					Air dalam TES					Perolehan kalor (Q collected)			
		Temp. masuk TES (°C)	Temp. keluar TES (°C)	Selsih temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Temp. awal (°C)	Temp. akhir (°C)	Selsih temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Sesaat (kJ)	Kumulatif (kJ)
5	47,84	27,17	26,32	0,85	26,75	4,180	5	26,983	27,045	0,063	27,014	4,180	5	12,577	38,739
10	47,84	30,37	26,40	3,97	28,38	4,179	10	27,146	27,262	0,116	27,204	4,180	10	23,284	82,121
15	47,84	32,84	26,62	6,23	29,73	4,179	15	27,399	27,474	0,075	27,437	4,180	15	14,994	124,511
20	47,84	34,33	26,82	7,51	30,57	4,179	20	27,832	27,839	0,007	27,836	4,179	20	1,378	197,479
25	47,84	34,82	26,91	7,91	30,87	4,179	25	28,103	28,190	0,087	28,147	4,179	25	17,392	267,590
30	47,84	35,10	26,91	8,19	31,01	4,179	30	28,362	28,430	0,068	28,396	4,179	30	13,623	315,651
35	47,84	35,46	27,02	8,44	31,24	4,179	35	28,656	28,674	0,018	28,665	4,179	35	3,592	364,359
40	47,84	35,70	27,12	8,58	31,41	4,179	40	28,783	28,922	0,139	28,853	4,179	40	27,743	415,980
45	47,84	36,43	27,28	9,15	31,85	4,179	45	29,167	29,204	0,036	29,186	4,179	45	7,200	470,216
50	47,84	37,79	27,39	10,40	32,59	4,179	50	29,414	29,408	-0,006	29,411	4,179	50	-1,248	511,120
55	47,84	40,40	27,58	12,82	33,99	4,179	55	29,954	30,060	0,106	30,007	4,179	55	21,143	641,426
60	47,84	43,82	27,76	16,05	35,79	4,179	60	30,407	30,691	0,285	30,549	4,179	60	56,937	767,682
65	47,84	46,92	27,56	19,36	37,24	4,179	65	31,398	31,543	0,144	31,471	4,179	65	28,878	937,911
70	47,84	48,71	28,05	20,66	38,38	4,179	70	32,518	32,604	0,085	32,561	4,179	70	17,081	1149,977
75	47,84	49,06	28,26	20,80	38,66	4,179	75	33,030	33,438	0,408	33,234	4,179	75	81,604	1316,804
80	47,84	49,54	28,14	21,40	38,84	4,179	80	33,565	33,938	0,373	33,751	4,179	80	74,640	1416,724
85	47,84	48,88	28,54	20,34	38,71	4,179	85	34,842	34,566	-0,276	34,704	4,179	85	-55,112	1542,307
90	47,84	48,58	28,82	19,77	38,70	4,179	90	35,348	35,411	0,063	35,380	4,179	90	12,558	1711,137
95	47,84	49,14	28,78	20,37	38,96	4,179	95	35,969	35,839	-0,130	35,904	4,179	95	-25,900	1796,723
100	47,84	50,00	29,65	20,36	39,83	4,179	100	36,754	37,002	0,248	36,878	4,179	100	49,587	2029,109
105	47,84	50,79	30,15	20,63	40,47	4,179	105	37,550	37,775	0,225	37,663	4,179	105	44,947	2183,704
110	47,84	50,02	30,52	19,50	40,27	4,179	110	38,297	38,479	0,182	38,388	4,179	110	36,345	2324,438
115	47,84	50,82	30,73	20,09	40,78	4,179	115	38,520	38,823	0,303	38,672	4,179	115	60,567	2393,267
120	47,84	51,64	31,41	20,23	41,53	4,179	120	39,740	39,529	-0,211	39,635	4,179	120	-42,214	2534,378
125	47,84	52,63	32,17	20,46	42,40	4,179	125	40,547	40,475	-0,072	40,511	4,179	125	-14,415	2723,389
130	47,84	52,86	31,80	21,07	42,33	4,179	130	40,662	40,716	0,054	40,689	4,179	130	10,803	2771,576
135	47,84	54,87	32,94	21,94	43,91	4,179	135	41,953	41,693	-0,260	41,823	4,179	135	-51,996	2966,902
140	47,84	57,03	34,30	22,73	45,66	4,180	140	42,780	43,185	0,405	42,983	4,179	140	80,961	3265,313
145	47,84	57,76	34,72	23,04	46,24	4,180	145	42,886	43,864	0,979	43,375	4,179	145	195,667	3401,051
150	47,84	58,88	35,89	22,99	47,39	4,180	150	44,506	44,729	0,223	44,618	4,180	150	44,572	3574,009
155	47,84	59,43	36,88	22,55	48,15	4,180	155	45,407	46,249	0,842	45,828	4,180	155	168,364	3877,866
160	47,84	60,42	37,82	22,61	49,12	4,181	160	46,650	47,117	0,467	46,884	4,180	160	93,303	4051,460
165	47,84	61,01	38,91	22,10	49,96	4,181	165	47,895	48,144	0,249	48,019	4,180	165	49,879	4256,835
170	47,84	61,59	39,50	22,09	50,55	4,181	170	48,831	48,722	-0,109	48,777	4,181	170	-21,853	4372,431
175	47,84	62,03	40,26	21,77	51,14	4,181	175	50,368	49,111	-1,257	49,740	4,181	175	-251,448	4450,253
180	47,84	62,70	41,37	21,33	52,03	4,181	180	50,501	50,587	0,086	50,544	4,181	180	17,181	4745,351
185	47,84	63,63	42,74	20,89	53,18	4,182	185	51,147	51,480	0,334	51,314	4,181	185	66,720	4924,164
190	47,84	64,49	43,72	20,77	54,11	4,182	190	51,920	52,466	0,545	52,193	4,182	190	109,062	5121,234
195	47,84	64,07	43,12	20,96	53,60	4,182	195	52,970	51,826	-1,143	52,398	4,182	195	-228,751	4993,371

Waktu (menit)	Massa air (kg)	Air sirkulasi					Air dalam TES					Perolehan kalor (Q collected)			
		Temp. masuk TES (°C)	Temp. keluar TES (°C)	Selisih temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Temp. awal (°C)	Temp. akhir (°C)	Selisih temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Sesaat (kJ)	Kumulatif (kJ)
	3	4	5	6 = 4-5	7 = (4+5)/2	8		9	10	11 = 10-9	12 = (9+10)/2	13	14 = 3x13x11	15	
200	47,84	66,27	45,76	20,50	56,01	4,183	200	53,835	54,064	0,228	53,949	4,182	200	45,701	5440913
205	47,84	66,41	45,87	20,54	56,14	4,183	205	52,674	53,457	0,782	53,066	4,182	205	156,513	5319,505
210	47,84	67,39	47,51	19,89	57,45	4,184	210	54,450	54,944	0,494	54,697	4,182	210	98,910	5617,145
215	47,84	67,44	47,90	19,53	57,67	4,184	215	55,758	55,210	-0,548	55,484	4,183	215	-109,579	5670,375
220	47,84	68,30	48,85	19,45	58,57	4,184	220	55,426	56,387	0,961	55,906	4,183	220	192,262	5905,760
225	47,84	68,20	49,59	18,60	58,89	4,184	225	56,678	57,026	0,348	56,852	4,184	225	69,620	6033,605
230	47,84	69,44	50,42	19,02	59,93	4,185	230	57,921	57,229	-0,692	57,575	4,184	230	-138,540	6074,295
235	47,84	64,47	49,65	14,82	57,06	4,183	235	57,103	56,041	-1,062	56,572	4,183	235	-212,596	5836,600
240	47,84	57,63	49,48	8,14	53,55	4,182	240	55,907	56,377	0,470	56,142	4,183	240	94,055	5903,760
245	47,84	62,18	50,35	11,83	56,26	4,183	245	56,759	56,891	0,132	56,825	4,183	245	26,327	6006,653
250	47,84	69,15	50,87	18,28	60,01	4,185	250	58,244	58,597	0,353	58,421	4,184	250	70,658	6348,172
255	47,84	69,77	51,39	18,38	60,58	4,185	255	59,481	59,400	-0,081	59,441	4,184	255	-16,196	6508,885
260	47,84	66,49	51,58	14,91	59,04	4,184	260	60,134	59,478	-0,656	59,806	4,185	260	-131,281	6524,565
265	47,84	68,51	52,67	15,84	60,59	4,185	265	59,644	59,489	-0,154	59,566	4,184	265	-30,891	6526,706
270	47,84	64,22	53,92	10,30	59,07	4,184	270	60,213	60,407	0,194	60,310	4,185	270	38,816	6710,491
275	47,84	70,34	54,01	16,32	62,17	4,186	275	59,242	59,671	0,428	59,457	4,184	275	85,754	6563,041
280	47,84	67,85	53,41	14,44	60,852	4,185	280	60,852	60,810	-0,042	60,831	4,185	280	-84,29	6791,137
285	47,84	69,99	54,12	15,87	62,05	4,186	285	61,366	61,451	0,084	61,408	4,185	285	16,853	6919,366
290	47,84	71,21	55,82	15,40	63,52	4,186	290	62,145	62,821	0,676	62,483	4,186	290	135,277	7193,762
295	47,84	71,19	56,40	14,80	63,80	4,186	295	63,331	63,117	-0,214	63,224	4,186	295	-42,934	7253,083
300	47,84	70,96	56,83	14,13	63,90	4,187	300	63,063	63,006	-0,057	63,035	4,186	300	-11,428	7230,885

Waktu (menit)	Energi matahari yang terjadi (Q incident)						Efisiensi kumulatif (%) 20 = 15/19
	Luas kolektor (m ²)	Radiasi (W/m ²)	Sesaat (kJ)	Kumulatif (kJ)		Waktu (menit)	
				(kJ)	(kJ)		
200	16	17	18 = 16x17xt	19	19	200	44,02
205	19	825,6	94,1184	12359,6748	12359,6748	205	41,50
210	19	781,9	89,1366	12818,6046	12818,6046	210	42,34
215	19	789,4	89,9916	13268,7012	13268,7012	215	41,34
220	19	789,4	89,9916	13716,0696	13716,0696	220	41,75
225	19	748,1	85,2834	14147,058	14147,058	225	41,34
230	19	813,1	92,6934	14598,8532	14598,8532	230	40,79
235	19	754,4	86,0016	14890,7712	14890,7712	235	38,90
240	19	191,9	21,8766	15003,5628	15003,5628	240	38,66
245	19	379,4	43,2516	15270,9612	15270,9612	245	38,19
250	19	876,9	99,9666	15728,7396	15728,7396	250	39,18
255	19	808,1	92,1234	16200,9162	16200,9162	255	39,29
260	19	204,4	23,3016	16666,936	16666,936	260	38,60
265	19	814,4	92,8416	16901,3094	16901,3094	265	38,11
270	19	593,1	67,6134	17124,6696	17124,6696	270	36,64
275	19	776,9	88,5666	17573,0544	17573,0544	275	37,05
280	19	645,6	73,5984	17910,9846	17910,9846	280	36,93
285	19	715,6	81,5784	18330,573	18330,573	285	37,59
290	19	708,1	80,7234	18738,7614	18738,7614	290	37,18
295	19	700,6	79,8684	19135,8348	19135,8348	295	36,34
300	19	695,6	79,2984	19507,11	19507,11	300	
	19	674,4	76,8816	19897,0584	19897,0584		

Waktu (menit)	Energi matahari yang terjadi (Q incident)						Efisiensi kumulatif (%) 20 = 15/19
	Luas kolektor (m ²)	Radiasi (W/m ²)	Sesaat (kJ)	Kumulatif (kJ)		Waktu (menit)	
				(kJ)	(kJ)		
5	16	17	18 = 16x17xt	19	19	5	54,10
10	19	143,1	16,3134	71,6034	71,6034	10	57,24
15	19	128,1	14,6034	143,4804	143,4804	15	58,63
20	19	145,6	16,5984	212,3706	212,3706	20	67,64
25	19	121,9	13,8966	291,9654	291,9654	25	74,07
30	19	120,6	13,7484	361,2888	361,2888	30	73,40
35	19	119,4	13,6116	430,0422	430,0422	35	72,86
40	19	124,4	14,1816	500,0838	500,0838	40	72,20
45	19	133,1	15,1734	573,3972	573,3972	45	70,46
50	19	209,4	23,8716	667,3788	667,3788	50	53,03
55	19	589,4	67,1916	963,8472	963,8472	55	48,61
60	19	641,9	73,1766	1319,5956	1319,5956	60	45,61
65	19	626,9	71,4666	1683,324	1683,324	65	46,17
70	19	575,6	65,6184	2031,5256	2031,5256	70	48,87
75	19	560,6	63,9084	2353,3476	2353,3476	75	48,94
80	19	534,4	60,9216	2690,4228	2690,4228	80	47,16
85	19	546,9	62,3466	3003,9912	3003,9912	85	46,75
90	19	570,6	65,0484	3298,8864	3298,8864	90	47,49
95	19	549,4	62,6316	3603,2094	3603,2094	95	45,92
100	19	558,1	63,6234	3912,5028	3912,5028	100	47,97
105	19	533,1	60,7734	4229,6394	4229,6394	105	48,44
110	19	506,9	57,7866	4507,7424	4507,7424	110	46,61
115	19	554,4	63,2016	4818,1758	4818,1758	115	46,37
120	19	545,6	62,1984	5134,4574	5134,4574	120	46,89
125	19	629,4	71,7516	5465,844	5465,844	125	44,75
130	19	618,1	70,4634	5808,1974	5808,1974	130	44,90
135	19	699,4	79,7316	6192,879	6192,879	135	45,48
140	19	705,6	80,4384	6608,3292	6608,3292	140	45,15
145	19	761,9	86,8566	7036,9008	7036,9008	145	46,42
150	19	771,9	87,9966	7477,7274	7477,7274	150	46,08
155	19	765,6	87,2784	7914,9858	7914,9858	155	46,10
160	19	768,1	87,5634	8353,9542	8353,9542	160	45,19
165	19	766,9	87,4266	8791,4976	8791,4976	165	44,00
170	19	773,1	88,1334	9233,886	9233,886	170	44,97
175	19	774,4	88,2816	9675,9894	9675,9894	175	44,80
180	19	770,6	87,8484	10113,9546	10113,9546	180	44,77
185	19	766,9	87,4266	10552,353	10552,353	185	44,80
190	19	778,1	88,7034	10992,5982	10992,5982	190	44,77
195	19	789,4	89,9916	11439,9798	11439,9798	195	41,97
	19	800,6	91,2684	11897,6214	11897,6214		

Waktu (menit)	Temperatur permukaan tangki						Waktu (menit)	T rata PCM	T rata air	K3 rata	K14 rata	K24 rata	Waktu (menit)	Temperatur permukaan kolektor				
	Bawah	Tengah	Atas	Kanan	Kiri	T1								T23	T24	T25	T26	Trata-rata
	T18	T19	T20	T21	T22	T1								T23	T24	T25	T26	Trata-rata
5	27,73	28,11	28,84	28,44	28,34	27,69	27,65	28,13	27,95	26,99	5	32,78	28,50	28,40	28,60	29,80	29,62	
10	27,64	28,03	32,84	28,71	28,21	27,51	27,88	27,92	27,67	26,94	10	37,68	28,90	28,80	29,60	31,00	31,20	
15	27,94	28,29	36,17	29,37	28,48	28,16	28,78	29,14	28,15	27,18	15	39,68	29,40	29,40	30,70	32,50	32,34	
20	27,83	28,33	37,28	29,62	28,48	28,22	29,07	29,83	27,78	27,06	20	40,21	29,70	29,70	31,30	34,60	33,10	
25	27,63	28,23	37,93	29,89	28,24	28,53	29,22	30,83	27,81	26,96	25	40,46	30,10	30,40	31,70	34,90	33,51	
30	27,21	28,06	37,69	30,11	28,07	28,87	29,27	31,82	28,07	26,73	30	40,85	29,90	29,80	32,00	35,20	33,55	
35	28,03	29,21	38,57	31,51	29,10	29,65	30,07	33,03	28,69	27,24	35	41,29	30,00	31,50	33,50	35,30	34,32	
40	27,50	29,07	39,47	31,70	28,89	30,02	30,31	33,81	29,00	27,24	40	42,85	30,50	31,10	33,50	35,50	34,69	
45	28,06	29,96	41,07	32,87	29,78	30,74	31,10	34,94	29,70	27,58	45	43,82	32,10	33,10	34,80	36,00	35,96	
50	27,87	30,20	41,28	33,31	29,86	31,02	31,30	35,67	29,94	27,43	50	44,44	32,30	33,20	34,90	35,80	36,13	
55	28,32	31,12	42,11	34,42	30,72	31,76	32,08	36,84	30,52	27,91	55	43,68	32,30	33,30	35,00	35,80	36,02	
60	28,31	31,54	41,99	34,95	31,07	32,04	32,30	37,44	30,78	27,89	60	44,77	32,80	33,80	35,40	36,00	36,55	
65	28,70	32,36	43,33	35,98	31,89	33,05	33,28	38,83	31,99	28,33	65	46,42	34,10	35,20	36,70	37,10	37,90	
70	28,78	32,62	43,77	36,17	32,04	32,99	33,30	38,70	31,80	28,47	70	45,92	34,40	35,50	36,90	37,30	38,00	
75	28,89	33,13	44,34	36,85	32,51	33,47	33,78	39,44	32,22	28,76	75	47,61	34,70	35,80	37,30	37,60	38,60	
80	29,12	33,96	46,13	37,87	33,31	34,59	34,82	41,15	33,48	29,14	80	49,61	35,60	36,80	38,40	38,70	39,82	
85	29,36	34,74	47,36	38,90	34,01	35,10	35,74	42,11	33,88	29,32	85	49,86	35,60	37,00	38,90	39,60	40,19	
90	28,98	34,76	47,30	39,23	33,92	35,44	35,62	42,99	34,25	29,07	90	48,63	36,30	37,80	39,50	39,80	40,45	
95	30,14	36,57	48,17	41,03	35,62	36,87	36,95	44,60	35,67	30,35	95	51,46	36,60	37,90	39,80	39,80	41,11	
100	30,74	37,73	50,03	42,30	36,71	37,88	37,98	45,79	36,94	30,90	100	52,53	37,50	38,80	40,40	40,30	41,91	
105	30,78	38,35	50,64	42,99	37,18	38,55	38,68	46,68	37,80	31,18	105	53,79	38,10	39,60	41,20	41,10	42,76	
110	31,42	39,52	51,94	44,26	38,24	39,64	39,75	47,90	39,10	31,93	110	54,53	38,50	39,80	41,40	41,40	43,13	
115	31,40	39,93	52,49	44,75	38,65	39,33	39,88	47,34	38,63	32,01	115	54,89	36,90	38,20	40,60	41,30	42,38	
120	32,50	41,60	52,93	46,40	40,35	41,54	41,57	49,79	41,49	33,34	120	50,67	37,80	39,00	40,60	41,40	41,89	
125	32,80	42,18	51,50	46,70	40,93	42,05	41,59	50,10	42,44	33,60	125	50,68	38,30	39,60	41,20	41,20	42,20	
130	32,99	42,65	52,25	46,79	41,37	42,27	42,15	49,58	42,90	34,34	130	56,18	39,30	40,80	42,90	42,90	44,42	
135	34,66	44,65	55,95	48,66	43,39	43,92	44,14	51,05	44,98	35,74	135	59,22	40,60	42,10	44,10	44,10	46,02	
140	35,33	45,59	57,35	49,61	44,41	44,53	45,28	51,41	45,54	36,64	140	58,78	39,90	41,10	43,30	43,70	45,36	
145	34,91	45,28	55,60	49,34	44,17	44,19	44,98	50,88	44,92	36,77	145	54,40	40,00	41,00	43,00	43,50	44,38	
150	35,32	45,66	53,99	49,50	44,58	45,24	45,34	51,95	46,08	37,69	150	54,90	39,10	40,00	42,00	42,50	43,70	
155	36,74	46,93	53,88	50,48	45,95	46,08	46,17	52,47	47,00	38,77	155	53,48	38,30	39,20	41,00	41,80	42,76	
160	37,23	47,13	53,13	50,47	46,33	46,38	46,39	52,45	47,48	39,21	160	51,53	38,60	39,60	41,20	41,70	42,53	
165	38,66	48,35	53,41	51,15	47,54	47,44	47,07	53,12	48,71	40,49	165	53,46	38,90	39,80	41,40	41,70	43,05	
170	39,22	48,47	53,72	51,03	47,71	47,54	47,38	52,69	48,69	41,25	170	55,04	39,20	40,30	42,00	42,10	43,73	
175	38,77	47,70	53,76	50,08	46,94	47,51	47,28	52,49	48,88	41,18	175	57,16	39,30	40,40	42,30	42,60	44,35	
180	40,79	49,34	56,83	51,71	48,67	48,34	48,77	52,92	49,52	42,57	180	57,02	39,40	40,40	42,20	42,70	44,34	
185	40,34	48,35	54,30	50,70	47,80	46,98	48,12	51,06	47,50	42,37	185	54,58	39,40	40,20	42,10	42,70	43,74	
190	40,15	47,74	53,51	50,08	47,22	47,55	47,59	51,88	48,32	42,45	190	55,15	39,40	40,30	41,90	42,00	43,75	
195	41,72	48,98	54,79	51,29	48,53	47,89	48,35	51,89	48,35	43,42	195	56,08	39,50	40,70	42,70	43,00	44,40	
200	41,59	48,57	55,01	50,80	48,08	48,58	48,60	52,82	49,37	43,56	200	56,97	39,30	40,40	42,20	42,50	44,27	

Waktu (menit)	Temperatur permukaan tangki					Waktu (menit)	T rata PCM	T rata air	K3 rata	K14 rata	K24 rata	Waktu (menit)	Temperatur permukaan kolektor					T rata-rata
	Bawah	Tengah	Atas	Kanan	Kiri								T1	T23	T24	T25	T26	
	T18	T19	T20	T21	T22													
205	43,27	49,93	56,22	52,17	49,51	205	49,19	49,64	53,10	49,54	44,93	205	56,24	40,20	41,30	43,10	43,50	44,87
210	44,26	50,71	57,07	52,91	50,32	210	50,20	50,42	54,29	50,56	45,73	210	59,28	40,00	41,10	43,10	43,30	45,36
215	43,50	49,59	56,53	51,91	49,26	215	49,84	49,90	54,07	50,12	45,33	215	58,19	39,20	40,30	42,40	42,80	44,58
220	43,33	49,14	55,40	51,52	48,79	220	49,64	49,52	53,98	49,79	45,16	220	55,82	39,50	40,60	42,80	43,00	44,34
225	45,36	50,95	56,14	53,15	50,71	225	50,76	50,92	54,81	50,74	46,72	225	55,90	39,40	40,40	42,00	42,50	44,04
230	45,73	51,08	55,46	53,06	50,83	230	50,28	50,63	53,78	50,01	47,06	230	55,53	39,20	40,00	41,80	42,10	43,73
235	45,14	50,35	55,05	52,26	50,07	235	50,25	50,23	53,75	50,28	46,72	235	57,23	39,50	40,20	41,20	42,00	44,03
240	46,23	51,22	56,55	53,10	51,01	240	50,76	51,02	54,12	50,71	47,45	240	58,14	40,00	40,70	42,80	43,10	44,95
245	45,53	50,41	56,34	52,29	50,10	245	50,52	50,57	54,10	50,65	46,82	245	58,47	40,60	41,60	43,60	43,60	45,57
250	47,31	52,19	58,75	54,11	51,94	250	51,60	52,16	55,14	51,43	48,24	250	59,88	41,40	42,30	44,60	45,00	46,64
255	46,43	51,17	58,40	53,30	50,92	255	51,41	51,65	55,31	51,21	47,71	255	61,25	41,60	42,70	45,20	45,40	47,23
260	47,52	52,26	60,44	54,60	52,01	260	52,37	52,72	56,69	52,01	48,41	260	62,77	42,00	43,30	45,70	46,30	48,01
265	46,89	51,60	59,07	54,15	51,32	265	52,25	52,24	57,02	51,72	48,00	265	60,26	43,60	44,40	47,00	47,40	48,53
270	48,25	53,07	62,36	55,76	52,71	270	52,95	53,47	57,95	52,10	48,79	270	66,03	43,10	44,20	46,80	46,80	49,39
275	48,62	53,68	64,55	56,80	53,29	275	53,68	54,62	59,25	52,42	49,35	275	63,88	44,70	45,40	48,10	48,50	50,12
280	48,30	53,46	63,49	56,86	53,03	280	54,33	54,48	60,68	52,79	49,53	280	64,28	43,30	44,40	47,30	48,20	49,50
285	48,21	53,45	61,72	56,99	52,98	285	54,26	54,31	60,61	52,81	49,35	285	62,22	44,00	45,30	48,30	49,00	49,76
290	48,70	54,29	65,12	57,83	53,68	290	54,85	55,22	61,20	53,66	49,68	290	66,71	44,50	46,00	49,40	50,30	51,38
295	49,00	54,88	64,47	58,55	54,23	295	55,11	55,62	61,78	53,73	49,81	295	65,83	43,90	45,30	48,10	48,60	50,35
300	48,68	54,70	63,00	58,66	54,16	300	55,27	55,37	62,00	54,06	49,74	300	59,66	42,60	44,00	46,00	46,70	47,79

Lampiran 8. Data radiasi dan kecepatan pemanasan PATS 06 Desember 2016

Waktu (menit)	Solar Radiation, W/m ²	Temp. udara luar, °C	Energi radiasi, MJ/m ²	Akumulasi energi radiasi, MJ/m ²	kecepatan pemanasan T PCM di kapsul (°C/menit)			kecepatan pemanasan T air di dalam tangki (°C/menit)			Rata-rata (°C/menit)											
					K3	K14	K24	Vert. atas	Hor. Kiri	Vert. bawah	PCM	HTF										
				Waktu (menit)	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	Waktu (menit)				
5	188.1	27.92	0.011136	0.04395	5	0.052326	0.088047	0.052326	0.08806	0.037332	0.073115	5	0.001	0.073	0.073	0.109	0.001	0.037	-0.096	5	0.065	0.029
10	189.4	28.00	0.011286	0.055236	10	0.066879	0.030756	0.030857	0.030768	0.087014	0.086718	10	0.878	0.159	0.159	0.123	0.087	0.243	0.276	10	0.055	0.275
15	335.6	28.57	0.017286	0.121578	15	0.369366	0.368147	0.225559	0.153061	0.136256	0.171691	15	0.710	0.172	0.136	0.208	0.208	0.638	0.248	15	0.237	0.331
20	241.9	29.09	0.015036	0.231414	20	0.091959	0.055815	-0.16001	-0.08769	-0.25883	-0.11429	20	0.208	0.209	-0.079	-0.150	-0.151	-0.007	-0.123	20	-0.079	-0.013
25	526.9	30.44	0.033786	0.35295	25	0.127835	0.163248	-0.08798	-0.08769	0.255608	0.146986	25	0.254	0.397	0.183	0.183	0.147	0.075	0.337	25	0.086	0.225
30	705.6	31.71	0.041514	0.537792	30	0.278974	0.206461	0.135656	0.09932	0.017772	0.16189	30	-0.126	0.116	-0.028	-0.063	0.008	-0.171	-0.201	30	0.096	-0.066
35	859.4	32.25	0.041436	0.727128	35	0.189757	0.153378	0.154334	0.046214	0.259378	0.078946	35	-0.100	-0.208	0.259	0.222	0.151	0.617	0.122	35	0.147	0.152
40	338.1	30.85	0.025836	0.915564	40	-0.33369	-0.29687	-0.40675	-0.44129	-0.36823	-0.3311	40	-0.222	-0.187	-0.332	-0.331	-0.368	-0.403	-0.694	40	-0.363	-0.362
45	508.1	31.05	0.023286	1.060122	45	0.262695	0.226115	0.191691	0.226908	0.151764	0.043542	45	0.401	0.258	0.188	0.151	0.152	0.115	-0.135	45	0.184	0.161
50	559.4	31.28	0.027036	1.207086	50	0.156745	0.156233	0.049474	0.085156	0.38436	0.203484	50	0.238	0.417	0.276	0.203	0.240	0.167	0.312	50	0.173	0.265
55	435.6	30.93	0.022086	1.33335	55	0.269794	0.268912	0.23502	0.162565	0.330602	0.257627	55	0.256	0.363	0.294	0.293	0.294	0.186	0.466	55	0.254	0.307
60	583.1	31.43	0.036114	1.483608	60	0.226452	0.225712	0.22748	0.226725	0.283478	0.318347	60	0.352	0.495	0.499	0.497	0.355	0.282	0.906	60	0.251	0.484
65	890.6	31.20	0.053286	1.685316	65	0.462556	0.479301	0.483088	0.481497	0.166244	0.380835	65	0.593	0.343	0.417	0.452	0.417	0.918	0.381	65	0.409	0.503
70	263.1	31.61	0.019314	1.861188	70	-0.10075	-0.15461	-0.19174	-0.19111	0.344331	-0.05161	70	0.270	0.269	0.092	0.163	0.128	-0.876	0.116	70	-0.058	0.023
75	306.9	30.77	0.015786	1.876974	75	0.202058	0.272621	0.203025	0.130772	0.187382	0.222528	75	0.292	0.363	0.295	0.330	0.295	0.330	0.295	75	0.203	0.175
80	203.1	28.07	0.011814	1.942116	80	0.248741	0.212355	0.142388	0.14191	-0.0881	-0.08774	80	0.305	0.055	-0.016	0.056	0.020	-0.553	-0.294	80	0.095	-0.061
85	214.4	28.27	0.012864	2.00448	85	-0.07028	-0.0345	-0.2141	-0.14191	0.037871	0.073554	85	0.215	0.251	0.002	0.073	0.074	0.181	0.005	85	0.005	0.114
90	230.6	28.44	0.013536	2.070666	90	0.584081	0.582135	0.443982	0.513986	0.386884	0.656018	90	0.616	0.793	0.764	0.726	0.657	0.261	1.169	90	0.561	0.712
95	275.6	28.57	0.015786	2.144652	95	0.41228	0.410908	0.378889	0.449009	0.221887	0.328351	95	0.197	0.374	0.413	0.412	0.342	0.270	0.029	95	0.367	0.291
100	429.4	28.59	0.025014	2.23671	100	0.803642	0.765489	0.844095	0.816741	0.138459	0.352617	100	0.492	0.278	0.388	0.387	0.568	0.138	0.385	100	0.620	0.377
105	444.4	28.97	0.025386	2.362446	105	0.03131	0.031195	-0.04005	0.031378	-0.29054	-0.2176	105	-0.038	-0.038	-0.146	-0.110	-0.110	-0.146	-0.281	105	-0.076	-0.124
110	331.9	28.92	0.024564	2.47941	110	0.606321	0.568886	0.609748	0.572107	0.086667	0.122232	110	0.192	0.298	0.194	0.264	0.122	0.122	0.130	110	0.428	0.189
115	359.4	29.07	0.023064	2.594424	115	-0.01973	-0.01968	-0.05559	-0.01978	0.11438	0.113594	115	0.077	0.183	0.078	0.220	0.114	0.006	0.289	115	0.019	0.138
120	448.1	29.14	0.025686	2.712366	120	0.518486	0.587515	0.628267	0.626214	0.285853	0.355874	120	0.176	0.600	0.463	0.604	0.427	0.356	0.408	120	0.500	0.433
125	510.6	29.24	0.027636	2.853702	125	0.458241	0.421315	0.638793	0.601131	0.098238	0.169153	125	-0.116	0.274	0.205	0.097	0.348	0.205	0.515	125	0.398	0.218
130	546.9	29.87	0.032214	3.01221	130	-0.45382	-0.45272	-0.24183	-0.38315	-0.10824	-0.17906	130	-0.036	-0.531	-0.179	-0.143	-0.143	-0.072	-0.446	130	-0.303	-0.222
135	568.1	30.34	0.033336	3.179724	135	0.31107	0.274293	0.3831	0.381823	0.147614	0.253784	135	0.783	0.252	0.325	0.288	0.289	0.254	0.124	135	0.292	0.331
140	325.6	29.69	0.026514	3.344988	140	0.592955	0.520245	0.630703	0.628629	0.430126	0.570265	140	0.318	0.812	0.534	0.391	0.535	0.463	0.426	140	0.562	0.497
145	531.9	30.34	0.039336	3.513096	145	-0.17946	-0.17884	-0.14452	-0.14403	0.382196	0.507544	145	-0.027	0.468	0.329	0.435	0.436	0.436	0.689	145	0.074	0.395
150	655.6	31.36	0.037686	3.690732	150	0.160626	0.19542	0.232364	0.231605	0.067308	0.031293	150	-0.429	0.102	0.031	0.102	0.031	0.138	0.004	150	0.153	-0.003
155	680.6	31.89	0.040164	3.885996	155	-0.29714	-0.33144	-0.19147	-0.20562	0.184285	0.147608	155	-0.101	-0.030	0.202	0.201	0.202	0.237	0.295	155	-0.116	0.144
160	729.4	31.03	0.045114	4.09506	160	0.027736	0.062952	0.134456	0.204887	0.056316	0.127136	160	-0.086	0.232	0.163	0.127	0.198	0.127	0.165	160	0.102	0.132
165	250.6	30.85	0.014964	4.233324	165	0.207541	0.242133	0.492305	0.45528	0.169806	0.204338	165	-0.009	0.132	0.204	0.204	0.204	0.204	0.311	165	0.295	0.179
170	669.4	31.18	0.041064	4.390188	170	0.519258	0.552794	0.627104	0.660447	0.045035	0.115863	170	0.151	-0.874	0.080	0.009	0.080	0.080	0.217	170	0.420	-0.036
175	885.6	31.84	0.051786	4.611702	175	-0.71026	-0.63719	-0.60527	-0.56785	-0.50232	-0.57045	175	-0.427	-0.002	-0.748	-0.675	-0.606	-0.570	-0.817	175	-0.599	-0.549
180	640.6	31.89	0.052314	4.867116	180	0.375291	0.338672	0.340529	0.445568	0.389501	0.458293	180	0.598	0.385	0.352	0.280	0.352	0.458	0.549	180	0.391	0.425
185	613.1	31.05	0.036864	5.042052	185	-0.32303	-0.35726	-0.46588	-0.4289	0.191666	0.04858	185	-0.235	0.931	0.013	0.013	-0.094	0.049	0.109	185	-0.222	0.112
190	539.4	30.95	0.027114	5.193138	190	-0.03268	0.002757	0.002778	0.038186	-0.15853	0.015799	190	0.087	-0.338	0.016	0.087	0.051	0.122	0.490	190	-0.022	0.074
195	330.6	30.93	0.019464	5.31663	195	-1.04345	-1.00451	-1.11664	-1.11291	-0.25693	-0.43727	195	-0.472	-0.612	-0.473	-0.543	-0.509	-0.471	-0.132	195	-0.835	-0.459
200	475.6	31.10	0.025536	5.431188	200	0.192768	0.192113	0.228668	0.192528	0.070221	0.069845	200	0.282	-0.036	-0.001	0.070	0.070	0.070	0.076	200	0.158	0.076

Waktu (menit)	Solar Radiation, W/m ²	Temp. udara luar, °C	Energi radiasi, MJ/m ²	Akumulasi energi radiasi, MJ/m ²	kecepatan pemanasan T PCM di kapsul (°C/menit)										kecepatan pemanasan T air di dalam tangki (°C/menit)										Rata-rata (°C/menit)	
					K3			K14			K24			Waktu (menit)	Vert. atas tengah	Hor. Kanan	Vert. tengah	Hor. Kiri	Vert. bawah-tengah	Vert. bawah	Waktu (menit)	PCM	HTF			
					T5	T6	T7	T8	T9	T10		T11	T12	T13	T14	T15	T16	T17								
205	433.1	31.43	0.028836	5,572746	0.247138	0.316907	0.28316	0.211438	0.41567	0.3426	205	0.023	0.270	0.237	0.200	0.237	0.272	0.189	205	0.303	0.204					
210	478.1	31.64	0.038436	5,742426	0.208068	0.207351	0.208521	0.137104	0.419832	0.346809	210	0.488	0.381	0.312	0.346	0.312	0.347	0.406	210	0.255	0.370					
215	416.9	31.08	0.022314	5,871318	215	0.216991	0.110373	0.110051	0.110983	0.123134	0.016177	215	-0.161	-0.054	-0.055	-0.090	-0.019	-0.293	215	0.115	-0.109					
220	458.1	30.52	0.026064	6,005082	220	-0.15783	-0.29844	-0.2647	-0.26384	-0.57096	-0.53275	220	-0.496	-0.495	-0.605	-0.567	-0.534	-0.568	-0.448	220	-0.348	-0.530				
225	519.4	30.72	0.030714	6,14799	225	0.384666	0.489208	0.421093	0.45506	0.147761	0.182475	225	0.005	0.534	0.147	0.182	0.218	0.128	0.225	225	0.347	0.205				
230	443.1	30.85	0.025986	6,295704	230	-0.30853	-0.3075	-0.20277	-0.23747	0.145693	0.074188	230	-0.032	0.003	0.003	0.145	0.074	0.039	0.001	230	-0.139	0.033				
235	556.9	31.18	0.031164	6,436812	235	0.023195	0.023119	0.05874	0.02318	0.164604	0.163858	235	0.305	0.163	0.200	0.164	0.093	0.164	0.151	235	0.076	0.177				
240	524.4	30.90	0.025764	6,583254	240	1.049886	1.081676	1.052016	1.048566	0.474643	0.61416	240	0.720	0.541	0.580	0.649	0.651	0.614	0.558	240	0.887	0.616				
245	378.1	30.50	0.022386	6,70629	245	-0.11148	-0.04053	-0.1117	-0.07597	-0.11044	-0.07453	245	-0.004	-0.074	-0.039	0.032	-0.039	0.280	0.095	245	-0.087	0.036				
250	356.9	31.13	0.020136	6,808476	250	-0.02616	0.009199	-0.09714	-0.09682	0.106831	0.177156	250	0.212	0.141	0.071	0.071	0.071	0.106	0.268	250	0.012	0.134				
255	391.9	30.98	0.023886	6,923862	255	0.038593	0.073737	0.074162	0.073908	0.214518	0.178157	255	0.425	0.283	0.214	0.178	0.179	0.178	0.280	255	0.109	0.248				
260	491.9	31.18	0.025914	7,050204	260	0.55785	0.465589	0.326612	0.325533	0.309586	0.379005	260	0.378	0.554	0.451	0.449	0.415	0.379	0.623	260	0.391	0.464				
265	481.9	30.80	0.029736	7,190418	265	0.558032	0.321604	0.323675	0.322629	-0.16569	-0.09417	265	-0.447	-0.058	-0.130	-0.094	-0.130	-0.059	0.103	265	0.178	-0.116				
270	564.4	31.43	0.030486	7,335132	270	0.228435	0.192467	0.016512	0.01647	0.104909	0.069064	270	1.127	0.069	0.069	0.069	0.069	0.069	0.116	270	0.105	0.227				
275	573.1	31.46	0.031614	7,504152	275	1.191821	1.223135	0.877461	0.945305	0.573664	0.465088	275	0.921	0.850	0.572	0.570	0.501	0.571	0.487	275	0.879	0.639				
280	754.4	31.48	0.012414	7,628544	280	0.266856	0.265948	0.090894	0.090597	-0.04381	-0.00826	280	-0.043	0.132	-0.008	-0.008	-0.044	-0.079	-0.185	280	0.110	-0.034				
285	808.1	32.00	0.047436	7,845258	285	0.356735	0.320372	0.39381	0.498455	0.640353	0.640354	285	0.286	0.531	0.641	0.604	0.641	0.675	0.592	285	0.475	0.567				
290	913.1	32.02	0.020514	8,051394	290	0.27376	0.202544	0.274959	0.379969	-0.03332	-0.06855	290	1.235	-0.068	-0.069	0.002	-0.069	-0.033	0.031	290	0.172	0.147				
295	278.1	31.43	0.016464	8,208708	295	0.115595	0.220588	0.116121	0.080435	0.338754	0.337318	295	-0.016	0.581	0.408	0.407	0.479	0.408	0.493	295	0.201	0.394				
300	335.6	32.10	0.052764	8,4381	300	-0.25464	-0.32402	-0.11421	-0.1491	0.07907	-0.06272	300	-0.485	-0.062	-0.027	0.008	0.008	0.043	-0.176	300	-0.138	-0.099				

Lampiran 9. Olah data 06 Desember 2016

Waktu (menit)	Massa air (kg)	Air sirkulasi					Air dalam TES					Perolehan kalor (Q collected)		
		Temp. masuk TES (°C)	Temp. keluar TES (°C)	Selsh temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Temp. awal (°C)	Temp. akhir (°C)	Selsh temp. (°C)	Temp. rata2 (°C)	Kalor jenis (kJ/kg.C)	Waktu (menit)	Sesaat (kJ)	Kumulatif (kJ)
		T1	T2	6=4-5	7=(4+5)/2	8	9	10	11=10-9	12=(9+10)/2	13	14=3x13x11		
5	47,84	31,49	27,27	4,22	29,38	4,179	27,619	27,648	0,029	27,633	4,179	5	5,702	17,018
10	47,84	36,61	27,02	9,58	31,82	4,179	27,601	27,876	0,275	27,738	4,179	10	54,953	62,968
15	47,84	39,90	27,58	12,32	33,74	4,179	28,448	28,779	0,331	28,614	4,179	15	66,241	243,262
20	47,84	40,43	27,21	13,22	33,82	4,179	29,080	29,067	-0,013	29,073	4,179	20	-2,631	300,741
25	47,84	40,35	26,99	13,36	33,67	4,179	28,997	29,223	0,225	29,110	4,179	25	45,035	331,924
30	47,84	40,37	26,94	13,43	33,66	4,179	29,338	29,271	-0,066	29,304	4,179	30	-13,263	341,646
35	47,84	40,70	27,27	13,43	33,99	4,179	29,919	30,071	0,152	29,995	4,179	35	30,385	501,619
40	47,84	42,53	27,21	15,31	34,87	4,179	30,669	30,307	-0,362	30,488	4,179	40	-72,444	548,646
45	47,84	43,89	27,55	16,34	35,72	4,179	30,939	31,100	0,161	31,019	4,179	45	32,236	707,200
50	47,84	43,97	27,41	16,56	35,69	4,179	31,036	31,301	0,265	31,169	4,179	50	52,938	747,429
55	47,84	43,99	27,72	16,27	35,86	4,179	31,777	32,084	0,307	31,930	4,179	55	61,470	903,965
60	47,84	43,81	27,57	16,23	35,69	4,179	31,812	32,295	0,484	32,054	4,179	60	96,687	946,234
65	47,84	46,42	28,17	18,25	37,30	4,179	33,279	33,302	0,023	33,291	4,179	65	4,638	1147,469
70	47,84	47,03	28,29	18,74	37,66	4,179	33,609	33,784	0,175	33,697	4,179	70	34,933	1243,787
75	47,84	49,30	29,11	20,19	39,20	4,179	34,885	34,824	-0,061	34,855	4,179	75	-12,215	1451,715
80	47,84	49,74	28,95	20,79	39,35	4,179	35,628	35,742	0,114	35,685	4,179	80	22,853	1655,253
85	47,84	48,60	28,73	19,87	38,66	4,179	34,904	35,616	0,712	35,260	4,179	85	142,367	1610,046
90	47,84	50,54	30,01	20,53	40,27	4,179	36,660	36,951	0,291	36,806	4,179	90	58,154	1876,964
95	47,84	52,28	30,77	21,51	41,53	4,179	37,602	37,979	0,377	37,790	4,179	95	75,314	2082,317
100	47,84	53,50	31,19	22,31	42,35	4,179	38,806	38,682	-0,124	38,744	4,179	100	-24,844	2222,818
105	47,84	54,33	31,81	22,52	43,07	4,179	39,559	39,748	0,189	39,653	4,179	105	37,769	2435,974
110	47,84	54,58	31,03	23,55	42,80	4,179	39,738	39,877	0,138	39,807	4,179	110	27,618	2461,714
115	47,84	52,61	33,11	19,50	42,86	4,179	41,133	41,566	0,433	41,350	4,179	115	86,647	2799,548
120	47,84	48,73	33,37	15,36	41,05	4,179	41,374	41,592	0,218	41,483	4,179	120	43,628	2804,737
125	47,84	55,47	33,79	21,68	44,63	4,180	42,371	42,150	-0,222	42,260	4,179	125	-44,287	2916,144
130	47,84	59,57	35,56	24,01	47,57	4,180	43,812	44,143	0,331	43,977	4,179	130	66,123	3314,631
135	47,84	59,63	35,98	23,65	47,80	4,180	44,787	45,284	0,497	45,036	4,180	135	99,375	3542,829
140	47,84	54,63	35,48	19,15	45,05	4,180	44,586	44,981	0,395	44,783	4,180	140	79,005	3482,178
145	47,84	54,81	36,59	18,22	45,70	4,180	45,346	45,343	-0,003	45,345	4,180	145	-0,577	3554,633
150	47,84	53,61	37,44	16,17	45,52	4,180	46,031	46,174	0,144	46,102	4,180	150	28,720	3720,819
155	47,84	51,37	38,07	13,30	44,72	4,180	46,259	46,391	0,132	46,325	4,180	155	26,453	3764,251
160	47,84	52,75	39,57	13,18	46,16	4,180	46,888	47,067	0,179	46,978	4,180	160	35,749	3899,352
165	47,84	54,99	40,19	14,80	47,59	4,180	47,413	47,377	-0,036	47,395	4,180	165	-7,284	3961,268
170	47,84	56,80	40,70	16,10	48,75	4,180	47,828	47,279	-0,549	47,553	4,180	170	-109,871	3941,686
175	47,84	58,13	41,79	16,33	49,96	4,181	48,350	48,562	0,212	48,562	4,180	175	84,994	4240,846
180	47,84	53,72	40,58	13,14	47,15	4,180	48,004	48,117	0,112	48,061	4,180	180	22,453	4109,277
185	47,84	54,96	41,48	13,48	48,22	4,180	47,521	47,595	0,074	47,558	4,180	185	14,720	4004,882
190	47,84	55,43	41,99	13,44	48,71	4,180	48,806	48,347	-0,459	48,576	4,180	190	-91,760	4155,282
195	47,84	57,10	43,03	14,07	50,06	4,181	48,520	48,596	0,076	48,558	4,180	195	15,151	4205,069

Waktu (menit)	Massa air (kg)	Temp masuk TES		Temp keluar TES		Air sirkulasi		Temp awal		Temp akhir		Air dalam TES		Temp rata2		K calor jenis (kJ/kg.C)	Waktu (menit)	Peroksehan kalor (Q collected)	
		T1 (°C)	T2 (°C)	T1 (°C)	T2 (°C)	Selish temp. (°C)	Temp. awal (°C)	Temp. akhir (°C)	Selish temp. (°C)	Temp. rata2 (°C)	Temp. awal (°C)	Temp. akhir (°C)	Selish temp. (°C)	Temp. rata2 (°C)	Sesaat (kJ)			Kumulatif (kJ)	
200	47,84	4	5	44,00	44,00	6 = 4-5	7 = (4+5)/2	49,436	10	11 = 10-9	12 = (9+10)/2	13	200	40,813	14 = 3x13x11	15			
205	47,84	59,03	45,23	44,75	45,23	13,80	52,13	50,052	50,422	0,370	50,237	4,181	205	74,015		4570,347			
210	47,84	57,65	44,75	44,75	44,75	12,89	51,20	50,012	49,903	-0,109	49,957	4,181	210	-21,802		4466,495			
215	47,84	56,12	44,88	44,88	44,88	11,23	50,50	50,053	49,522	-0,530	49,787	4,181	215	-106,081		4390,342			
220	47,84	55,99	46,25	46,25	46,25	9,75	51,12	50,713	50,917	0,205	50,815	4,181	220	40,951		4669,431			
225	47,84	55,39	46,06	46,06	46,06	9,32	50,72	50,595	50,628	0,033	50,612	4,181	225	6,666		4611,564			
230	47,84	56,45	46,18	46,18	46,18	10,27	51,32	50,958	50,235	0,177	50,146	4,181	230	35,426		4532,900			
235	47,84	57,97	47,03	47,03	47,03	10,94	52,50	50,403	51,019	0,616	50,711	4,181	235	123,250		4689,724			
240	47,84	58,22	46,61	46,61	46,61	11,61	52,42	50,535	50,571	0,036	50,553	4,181	240	7,153		4600,042			
245	47,84	59,93	47,70	47,70	47,70	12,24	53,82	52,021	52,155	0,134	52,088	4,182	245	26,892		4917,040			
250	47,84	60,44	47,28	47,28	47,28	13,15	53,86	51,404	51,652	0,248	51,528	4,181	250	49,626		4816,331			
255	47,84	62,13	48,35	48,35	48,35	13,78	55,24	52,255	52,719	0,464	52,487	4,182	255	92,822		5029,870			
260	47,84	59,57	48,11	48,11	48,11	11,46	53,84	52,352	52,236	-0,116	52,294	4,182	260	-23,280		4933,155			
265	47,84	65,34	48,72	48,72	48,72	16,62	57,03	53,245	53,472	0,227	53,358	4,182	265	45,383		5180,422			
270	47,84	65,60	49,20	49,20	49,20	16,40	57,40	53,983	54,622	0,639	54,302	4,182	270	127,823		5410,445			
275	47,84	66,07	49,57	49,57	49,57	16,50	57,82	54,312	54,478	-0,054	54,405	4,182	275	-6,717		5381,788			
280	47,84	59,76	48,87	48,87	48,87	10,89	54,31	53,744	54,311	0,567	54,028	4,182	280	113,498		5348,341			
285	47,84	67,94	49,61	49,61	49,61	18,32	58,78	55,076	55,223	0,147	55,149	4,183	285	29,431		5530,707			
290	47,84	65,63	49,30	49,30	49,30	16,33	57,46	55,225	55,620	0,394	55,422	4,183	290	78,927		5610,141			
295	47,84	60,70	49,25	49,25	49,25	11,45	54,98	55,467	55,368	-0,099	55,417	4,183	295	-19,771		5559,807			
300	47,84	58,23	49,67	49,67	49,67	8,56	53,95	55,65	55,17	-0,48	55,41	4,183	300	-96,817		5519,664			

Waktu (menit)	Energi matahari yang terjadi (Q incident)						Efisiensi kumulatif (%)
	Luas kolektor (m ²)	Radiasi (W/m ²)	Sesaat (kJ)	Kumulatif (kJ)		Waktu (menit)	
				(kJ)	(kJ)		
200	1,9	640,6	73,0284	10910,6094	19	200	40,46
205	1,9	371,9	42,3966	11155,5042	205	40,97	40,97
210	1,9	434,4	49,5216	11409,6558	210	39,15	39,15
215	1,9	511,9	58,3566	11681,181	215	37,58	37,58
220	1,9	433,1	49,3734	11961,8376	220	39,04	39,04
225	1,9	519,4	59,2116	12229,9428	225	37,71	37,71
230	1,9	429,4	48,9516	12508,1826	230	36,24	36,24
235	1,9	373,1	42,5334	12741,951	235	36,81	36,81
240	1,9	335,6	38,2584	12936,1044	240	35,56	35,56
245	1,9	398,1	45,3834	13155,3378	245	37,38	37,38
250	1,9	431,9	49,2366	13395,3876	250	35,96	35,96
255	1,9	495,6	56,4984	13661,7942	255	36,82	36,82
260	1,9	508,1	57,9234	13936,7508	260	35,40	35,40
265	1,9	526,9	60,0666	14257,8888	265	36,33	36,33
270	1,9	206,9	23,5866	14494,2336	270	37,33	37,33
275	1,9	790,6	90,1284	14905,9902	275	36,10	36,10
280	1,9	341,9	38,9766	15297,6486	280	34,96	34,96
285	1,9	274,4	31,2816	15596,5452	285	35,46	35,46
290	1,9	879,4	100,2516	16032,39	290	34,99	34,99
295	1,9	793,1	90,4134	16413,9252	295	33,87	33,87
300	1,9	600,6	68,4684	16670,0718	300	33,11	33,11

Waktu (menit)	Energi matahari yang terjadi (Q incident)						Efisiensi kumulatif (%)	
	Luas kolektor (m ²)	Radiasi (W/m ²)	Sesaat (kJ)	Kumulatif (kJ)		Waktu (menit)		
				(kJ)	(kJ)			
5	1,9	17	18 = 16x17xt	19	20 = 15/19	20 = 15/19	16,22	
10	1,9	188,1	21,4434	104,9484	10	27,10	16,22	16,22
15	1,9	288,1	32,8434	230,9982	15	44,85	55,33	55,33
20	1,9	250,6	28,5684	439,6866	20	44,85	32,48	32,48
25	1,9	563,1	64,1934	670,605	25	32,48	24,73	24,73
30	1,9	691,9	78,8766	1021,8048	30	24,73	28,84	28,84
35	1,9	690,6	78,7284	1381,5432	35	28,84	27,24	27,24
40	1,9	430,6	49,0884	1739,5716	40	27,24	30,84	30,84
45	1,9	388,1	44,2434	2014,2318	45	30,84	29,55	29,55
50	1,9	450,6	51,3684	2293,4634	50	29,55	32,18	32,18
55	1,9	368,1	41,9634	2533,365	55	32,18	33,71	33,71
60	1,9	601,9	68,6166	2818,852	60	33,71	38,12	38,12
65	1,9	888,1	101,2434	3202,1004	65	38,12	41,56	41,56
70	1,9	196,9	22,4466	3566,2506	70	41,56	39,51	39,51
75	1,9	214,4	24,4416	3690,0204	75	39,51	44,17	44,17
80	1,9	225,6	25,7184	3934,2654	80	44,17	46,39	46,39
85	1,9	263,1	29,9934	4074,8388	85	46,39	47,18	47,18
90	1,9	416,9	47,5266	4249,749	90	47,18	105	105
95	1,9	423,1	48,2334	4488,6474	95	105	110	110
100	1,9	409,4	46,6716	4710,879	100	110	115	115
105	1,9	384,4	43,8216	4929,4056	105	115	120	120
110	1,9	428,1	48,8034	5153,4954	110	120	125	125
115	1,9	460,6	52,5084	5422,0338	115	125	130	130
120	1,9	536,9	61,2066	5723,199	120	130	135	135
125	1,9	555,6	63,3384	6041,4756	125	135	140	140
130	1,9	441,9	50,3766	6355,4772	130	140	145	145
135	1,9	655,6	74,7384	6674,8824	135	145	155	155
140	1,9	628,1	71,6034	7012,3908	140	155	160	160
145	1,9	669,4	76,3116	7383,3924	145	160	165	165
150	1,9	751,9	85,7166	7780,614	150	165	170	170
155	1,9	249,4	28,4316	8043,3156	155	170	175	175
160	1,9	684,4	78,0216	8341,3572	160	175	180	180
165	1,9	863,1	98,3934	8762,2338	165	180	185	185
170	1,9	871,9	99,3966	9247,5204	170	185	190	190
175	1,9	614,4	70,0416	9579,8988	175	190	195	195
180	1,9	451,9	51,5166	9866,9622	180	195	195	195
185	1,9	324,4	36,9816	10101,597	185	195	195	195
190	1,9	425,6	48,5184	10319,2572	190	195	195	195
195	1,9	480,6	54,7884	10588,2174	195	195	195	195