

LAMPIRAN 1. Diagram p-h R-134a (Cengel, 2003)m

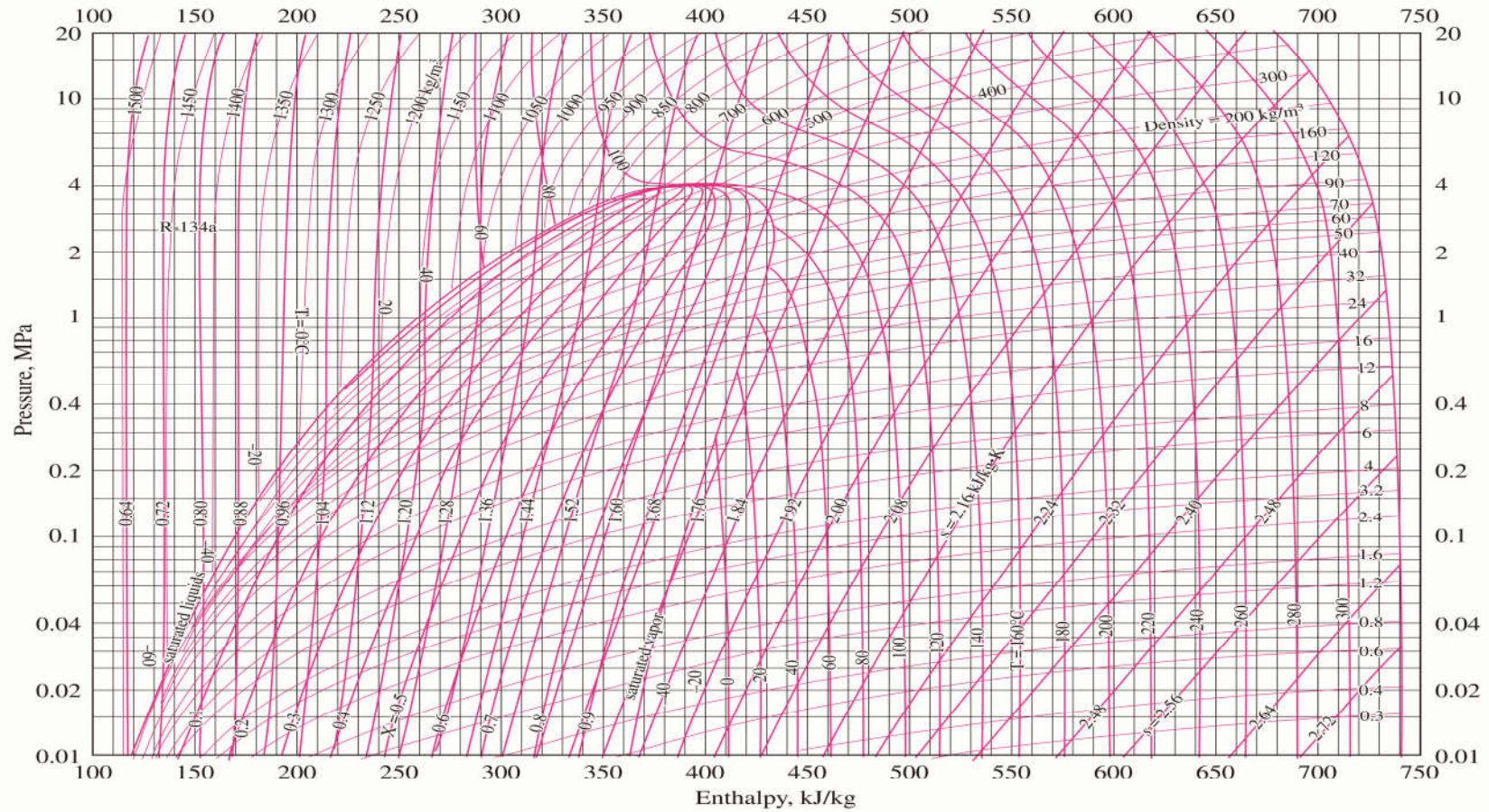


FIGURE A-14
P-h diagram for refrigerant-134a.

LAMPIRAN 2. Tabel *thermal dan mechanical properties* (khantal, 2012)

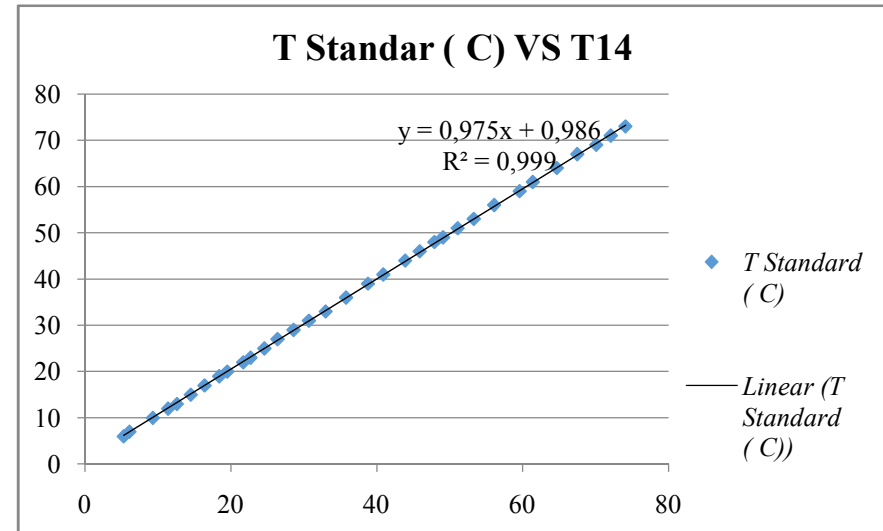
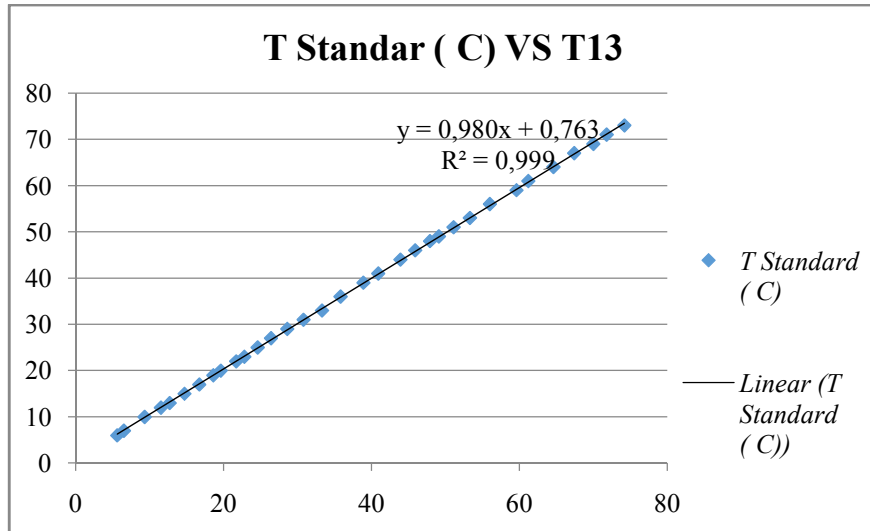
	Kanthal APM™	Kanthal® A-1	Kanthal A	Kanthal AF	Kanthal AE	Kanthal D
Max continuous operating temp. °C (element temperature in air) (°F)	1425 (2600)	1400 (2550)	1350 (2460)	1300 (2370)	1300 (2370)	1300 (2370)
Nominal composition, %	Cr	22	22	22	22	22
	Al	5.8	5.8	5.3	5.3	5.3
	Fe	balance	balance	balance	balance	balance
	Ni	-	-	-	-	-
Density ρ	7.10 (lb/in³) (0.256)	7.10 (0.256)	7.15 (0.258)	7.15 (0.258)	7.15 (0.258)	7.25 (0.262)
Resistivity at 20°C at 68°F	1.45 (Ω/CMF) (872)	1.45 (872)	1.39 (836)	1.39 (836)	1.39 (836)	1.35 (812)
Temperature factor of the resistivity, C _t	250°C (480°F)	1.00	1.00	1.01	1.01	1.01
	500°C (930°F)	1.01	1.01	1.03	1.03	1.03
	800°C (1470°F)	1.03	1.03	1.05	1.05	1.06
	1000°C (1830°F)	1.04	1.04	1.06	1.06	1.07
	1200°C (2190°F)	1.05	1.04	1.06	1.06	1.06
Linear thermal expansion coefficient α, × 10 ⁻⁶ /K	20–100°C (68–210°F)	-	-	-	-	-
	20–250°C (68–480°F)	11	11	11	11	11
	20–500°C (68–930°F)	12	12	12	12	12
	20–750°C (68–1380°F)	14	14	14	14	14
	20–1000°C (68–1840°F)	15	15	15	15	15
Thermal conductivity λ at 50°C at 122°F	11 (W/m K) (76 (Btu in/ft²h °F))	11 (76)	11 (76)	11 (76)	11 (76)	11 (76)
Specific heat capacity at 20°C at 68°F	0.46 (kJ/kg K) (0.110 (Btu/lb °F))	0.46 (0.110)	0.46 (0.110)	0.46 (0.110)	0.46 (0.110)	0.46 (0.110)
Melting point (approx.)	1500 °C (2730 °F)	1500 (2730)	1500 (2730)	1500 (2730)	1500 (2730)	1500 (2730)
Mechanical properties* (approx.)						
Tensile strength	680 (psi) (98600**)	680 (98600)	725 (105200)	700 (101500)	720 (104400)	670 (97200)
Yield point	470 (psi) (68200**)	545 (79000)	550 (79800)	500 (72500)	520 (74500)	485 (70300)
Hardness	Hv 230	240	230	230	230	230
Elongation at rupture	% 20**	20	22	23	20	22
Tensile strength at 900°C at 1650°F	40 (psi) (5800)	34 (4900)	34 (4900)	37 (5400)	34 (4900)	34 (4900)
Creep strength***	at 800°C	8.2 (psi) (1190)	1.2 (170)	1.2 (170)	-	1.2 (170)
	at 1470°F	-	0.5 (70)	0.5 (70)	-	0.5 (70)
	at 1000°C	-	-	-	0.7 (100)	-
	at 1830°F	-	-	-	0.3 (40)	-
	at 1100°C	-	-	-	-	-
	at 2010°F	-	-	-	-	-
	at 1200°C	-	-	-	-	-
at 2190°F	-	-	-	-	-	
Magnetic properties	†)	†)	†)	†)	†)	†)
Emissivity, fully oxidized condition	0.70	0.70	0.70	0.70	0.70	0.70

* The values given apply for sizes of approx. 1.0 mm diameter (0.039 in)
 ** 4.0 mm (0.157 in) Thinner gauges have higher strength and hardness values while the corresponding values are lower for thicker gauge
 *** Calculated from observed elongation in a Kanthal standard furnace test. 1% elongation after 1000 hours

Alkrothal®	Nikrothal® 80	Nikrothal TE	Nikrothal 70	Nikrothal 60	Nikrothal 40	Nikrothal 20	Nifethal™ 70	Nifethal 52
1100 (2010)	1200 (2190)	1200 (2190)	1250 (2280)	1150 (2100)	1100 (2010)	1050 (1920)	600 (1110)	600 (1110)
15 (4.3)	20 (-)	22 (-)	30 (-)	16 (-)	20 (-)	24 (-)	-	-
balance (-)	-	9 (balance)	-	balance (60)	balance (35)	balance (20)	balance (72)	balance (52)
7.28 (0.263)	8.30 (0.300)	8.10 (0.293)	8.10 (0.293)	8.20 (0.296)	7.90 (0.285)	7.80 (0.281)	8.45 (0.305)	8.20 (0.296)
1.25 (744)	1.09 (655)	1.19 (716)	1.18 (709)	1.11 (668)	1.04 (626)	0.95 (572)	0.20 (120)	0.37 [¶] (220)
1.02	1.02	1.04	1.02	1.04	1.08	1.12	2.19	1.93
1.05	1.05	1.06	1.05	1.08	1.15	1.21	3.66	2.77
1.10	1.04	1.06	1.04	1.10	1.21	1.28	-	-
1.11	1.05	1.07	1.05	1.11	1.23	1.32	-	-
-	1.07	1.07	1.06	-	-	-	-	-
-	-	-	-	-	-	-	-	10
11	15	14	14	16	16	16	-	-
12	16	15	15	17	17	17	13	-
14	17	16	16	18	18	18	-	-
15	18	17	17	18	19	19	15	-
16	15	14	14	14	13	13	17	17
(110)	(104)	(97)	(97)	(97)	(90)	(90)	(120)	(120)
0.46	0.46	0.46	0.46	0.46	0.50	0.50	0.52	0.52
(0.110)	(0.110)	(0.110)	(0.110)	(0.110)	(0.119)	(0.119)	(0.120)	(0.120)
1500	1400	1380	1380	1390	1380	1380	1430	1435
(2730)	(2550)	(2515)	(2515)	(2535)	(2535)	(2515)	(2610)	(2620)
630	810	800	820	730	675	675	640	610
(91400)	(117500)	(116000)	(118900)	(105900)	(97900)	(97500)	(92800)	(88500)
455	420	390	430	370	340	335	340	340
(66000)	(60900)	(56600)	(62400)	(53700)	(49300)	(48600)	(49300)	(49300)
220	180	190	185	180	180	160	-	-
22	30	30	30	35	35	30	-	30
30	100	-	120	100	120	120	-	-
(4300)	(14500)	-	(17400)	(14500)	(17400)	(17400)	-	-
1.2	15	15	-	15	20	20	-	-
(170)	(2160)	(2160)	-	(2160)	(2900)	(2900)	-	-
1	4	4	-	4	4	4	-	-
(140)	(560)	(560)	-	(560)	(560)	(560)	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
†)	‡)	‡)	‡)	‡)	‡)	‡)	‡)	‡)
0.70	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88

†) Magnetic (Curie point approx. 600°C (1100°F))
 ‡) Non-magnetic
 §) Slightly magnetic
 ¶) Magnetic up to 610°C (1130°F) (Curie point)
 §) Magnetic up to 530°C (990°F) (Curie point)
 ¶) = 10%

LAMPIRAN 3. Kalibrasi *Termocouple*



Keterangan:

T13= Temperatur masuk katup ekspansi

T14= Temperatur keluar katup ekspansi

LAMPIRAN 4 . Tabel Kalibrasi *Orifice*

Keterangan: D1 = 0,5 inch = 0,0127 m
 D2 = 2 mm = 0,002 m

No	V _{air} (LPM)	V _{air} (m ³ /s)	Exp. 1			P (N/m ²)	Re	C
			h1	h2	h			
			(cm)	(cm)	(cm)			
1	0,0	0,000000	74,5	74,5	0	0	0	
2	1,0	0,000017	82,3	66,7	15,6	20812,90	1670,92	0,8220
3	1,2	0,000020	86,4	62,6	23,8	31753,01	2005,10	0,7986
4	1,4	0,000023	91,0	58,0	33,0	44027,28	2339,29	0,7913
5	1,6	0,000027	97,0	52,0	45,0	60037,20	2673,47	0,7744
6	1,8	0,000030	104,0	45,0	59,0	78715,44	3007,65	0,7608
7	2,0	0,000033	107,0	42,0	65,0	86720,40	3341,84	0,8054

LAMPIRAN 5. Data Awal Seksi Uji Posisi Vertikal

No	Frekuensi <i>Inverter</i> (Hz)	h (mm)	P	Re	C	ρrefrigeran (Kg/s)	V R Aktual (m /s)	T In Eks (C)
			Pascal					
1	14	3,7	4936,392	6778,6033	0,8481217	1172,07	7,73543E-06	30
2	16	4	5336,64	6827,4934	0,847354	1163,6474	8,06466E-06	31,5
3	18	4,5	6003,72	6908,9768	0,8460883	1159,7974	8,55525E-06	32,6
4	20	5,4	7204,464	7055,6468	0,8438518	1153,1474	9,37395E-06	34,5
5	22	6,5	8672,04	7234,9103	0,8411883	1144,7474	1,02896E-05	36,9

No	Frekuensi <i>Inverter</i> (Hz)	T in Eks Real (C)	T Out Eks (C)	T Out Eks Real (C)	P In Eks (Psi)	Pin Eks (MPa)	P Out Eks (Psi)	Pout Eks (Mpa)
1	14	30,1752	15,9	16,44824	160	1,2031616	66	0,55505416
2	16	31,6458	15,6	16,15556	158	1,18937208	65	0,5481594
3	18	32,72424	15,5	16,058	168	1,25831968	62	0,52747512
4	20	34,587	16,5	17,0336	186	1,38242536	64	0,54126464
5	22	36,93996	18	18,497	208	1,53411008	62	0,52747512

LAMPIRAN 6. Data Awal Seksi Uji Posisi Horizontal

No	Frekuensi <i>Inverter</i> (Hz)	h (mm)	P	Re	C	prefrigeran (Kg/s)	V R Aktual (m /s)	T In Eks (C)
			Pascal					
1	14	4	5336,64	6827,4934	0,847354	1170	8,04274E-06	32,2
2	16	4,4	5870,304	6892,6801	0,8463401	1169,56	8,42679E-06	32,2
3	18	4,6	6137,136	6925,2734	0,8458372	1160,87	8,64323E-06	34,2
4	20	5,5	7337,88	7071,9435	0,8436065	1158,69	9,43495E-06	36
5	22	6	8004,96	7153,4269	0,8423897	1154,35	9,85875E-06	37,7

No	Frekuensi <i>Inverter</i> (Hz)	T in Eks Real (C)	T Out Eks (C)	T Out Eks Real (C)	P In Eks (Psi)	Pin Eks (MPa)	P Out Eks (Psi)	Pout Eks (Mpa)
1	14	32,33208	16	16,5458	155	1,1686878	64	0,54126464
2	16	32,33208	15,9	16,44824	150	1,134214	64	0,54126464
3	18	34,29288	15,5	16,058	170	1,2721092	62	0,52747512
4	20	36,0576	16,1	16,64336	190	1,4100044	64	0,54126464
5	22	37,72428	17	17,5214	210	1,5478996	68	0,56884368

LAMPIRAN 7. Data perhitungan $Q_{refrigeran}$ seksi uji posisi vertikal

No	Frekuensi <i>Inverter</i> (Hz)	Grafik diagram p-h				X Awal	h4'	h4'	h4'	h4'	h4'	h4'	h4'	h4'
		hf	hg	hfg	h3=h4		(x_0,2)	(x_0,3)	(x_0,4)	(x_0,5)	(x_0,6)	(x_0,7)	(x_0,8)	(x_0,9)
		kJ/kg	kJ/kg	kJ/kg	kJ/kg		kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg
1	14	228,6	414,5	185,90	252,85	0,13061	265,75	284,34	302,93	321,52	340,11	358,7	377,29	395,88
2	16	227,4	414	186,58	253,3	0,13887	264,736	283,394	302,052	320,71	339,368	358,026	376,684	395,342
3	18	226,2	413,3	187,14	255,2	0,15502	263,618	282,332	301,046	319,76	338,474	357,188	375,902	394,616
4	20	227,1	413,6	186,47	255,9	0,15423	264,434	283,081	301,728	320,375	339,022	357,669	376,316	394,963
5	22	226,2	413,3	187,14	257,4	0,16688	263,618	282,332	301,046	319,76	338,474	357,188	375,902	394,616

No	Frekuensi <i>Inverter</i> (Hz)	m R-134a (Kg/s)	Qref	Qref	Qref	Qref	Qref	Qref	Qref	Qref
			(x_0,2)	(x_0,3)	(x_0,4)	(x_0,5)	(x_0,6)	(x_0,7)	(x_0,8)	(x_0,9)
			Watt	Watt	Watt	Watt	Watt	Watt	Watt	Watt
1	14	0,009066461	116,95735	285,50286	454,04837	622,59388	791,13939	959,68491	1128,2304	1296,7759
2	16	0,009384424	107,03874	282,13331	457,22789	632,32247	807,41705	982,51162	1157,6062	1332,7008
3	18	0,009922361	83,526435	269,2135	454,90056	640,58763	826,27469	1011,9618	1197,6488	1383,3359
4	20	0,010809547	92,248672	293,81429	495,37991	696,94553	898,51114	1100,0768	1301,6424	1503,208
5	22	0,011778955	73,005964	293,43733	513,8687	734,30006	954,73143	1175,1628	1395,5942	1616,0255

LAMPIRAN 8. Data perhitungan $Q_{refrigeran}$ seksi uji posisi horisontal

No	Frekuensi <i>Inverter</i> (Hz)	Grafik diagram p-h				X Awal	h4'	h4'	h4'	h4'	h4'	h4'	h4'	h4'
		hf	hg	hfg	h3=h4		(x_0,2)	(x_0,3)	(x_0,4)	(x_0,5)	(x_0,6)	(x_0,7)	(x_0,8)	(x_0,9)
		kJ/kg	kJ/kg	kJ/kg	kJ/kg		kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg	kJ/kg
1	14	227,1	413,6	186,47	253	0,13868	264,434	283,081	301,728	320,375	339,022	357,669	376,316	394,963
2	16	227,1	413,6	186,47	253,3	0,14045	264,434	283,081	301,728	320,375	339,022	357,669	376,316	394,963
3	18	226,2	413,3	187,14	256,5	0,16196	263,618	282,332	301,046	319,76	338,474	357,188	375,902	394,616
4	20	227,1	413,6	186,47	257,5	0,16281	264,434	283,081	301,728	320,375	339,022	357,669	376,316	394,963
5	22	230	415,8	185,83	259,2	0,15697	267,166	285,749	304,332	322,915	341,498	360,081	378,664	397,247

No	Frekuensi <i>Inverter</i> (Hz)	m R-134a (Kg/s)	Qref	Qref	Qref	Qref	Qref	Qref	Qref	
			(x_0,2)	(x_0,3)	(x_0,4)	(x_0,5)	(x_0,6)	(x_0,7)	(x_0,8)	(x_0,9)
			Watt	Watt	Watt	Watt	Watt	Watt	Watt	
1	14	0,009410005	107,59399	283,06235	458,53071	633,99906	809,46742	984,93577	1160,4041	1335,8725
2	16	0,009855633	109,43695	293,21494	476,99292	660,77091	844,5489	1028,3269	1212,1049	1395,8829
3	18	0,010033663	71,41961	259,18957	446,95953	634,72949	822,49945	1010,2694	1198,0394	1385,8093
4	20	0,010932184	75,803762	279,65619	483,50862	687,36105	891,21348	1095,0659	1298,9183	1502,7708
5	22	0,01138045	90,998077	302,48098	513,96388	725,44678	936,92968	1148,4126	1359,8955	1571,3784

LAMPIRAN 9. Data perhitungan Q_{loss}

No	Asumsi				T Film K	Beta K ⁻¹	Hasil interpolasi tabel sifat udara			
	T Surface C	T Lingkungan C	T Surface K	T Lingkungan K			k 10 ⁻³ W/m.K	v 10 ⁻⁶ m ² /s	a 10 ⁻⁶ m ² /s	pr
	1	30	28	303			301	302	0,003311258	
2	35	28	308	301	304,5	0,003284072	26,633	16,3427	22,51216216	0,70637
3	40	28	313	301	307	0,003257329	26,818	16,5942	22,51891892	0,70602
4	45	28	318	301	309,5	0,003231018	27,003	16,8457	22,52567568	0,70567

No	Ral	Nul	h	Q Konveksi	Q Radiasi	Q loss Total
			W/m ² .K	Watt	Watt	Watt
1	238778292,470	79,25877788	1,905669234	1,905669234	0,437287115	2,342956349
2	815862156,379	115,3074092	2,791802027	9,771307095	1,569019712	11,34032681
3	1365796753,726	135,1786475	3,295655427	19,77393256	2,757232072	22,53116463
4	1890028886,479	149,5034255	3,670037271	31,1953168	4,003772756	35,19908956

LAMPIRAN 10. Tabel uji putus kawat pemanas

No	Panjang m	Jumlah Lilitan	<i>Voltase</i> Volt	Arus Ampere	Tahanan Ω	Daya Watt
1	1	1	6,5	1	6,5	6,5
2			18,7	3	6,2	56,1
3			31,2	5	6,2	156,0
4			50,3	8	6,3	402,4
5			55,5	9	6,2	499,5
6			62,5	10	6,3	625,0
7			70,3	11	6,4	773,3
1	2	1	12,3	1	12,3	12,3
2			36,5	3	12,2	109,5
3			61,2	5	12,2	306,0
4			97,3	8	12,2	778,4
5			109,4	9	12,2	984,6
6			122,8	10	12,3	1228,0
7			135	11	12,3	1485,0

No	Panjang m	Jumlah Lilitan	<i>Voltase</i> Volt	Arus Ampere	Tahanan Ω	Daya Watt
1	1	2	3	1	3,0	3,0
2			9,4	3	3,1	28,2
3			15,6	5	3,1	78,0
4			25	8	3,1	200,0
5			28,2	9	3,1	253,8
6			30,7	10	3,1	307,0
7			33,2	11	3,0	365,2
8			36	12	3,0	432,0
9			39,4	13	3,0	512,2
10			42,2	14	3,0	590,8
11			46,1	15	3,1	691,5

LAMPIRAN 10. Tabel Uji putus kawat pemanas (lanjutan)

No	Panjang	Jumlah	<i>Voltase</i>	Arus	Tahanan	Daya
	m	Lilitan	Volt	Ampere	Ω	Watt
1	2,5	1	16,8	1	16,8	16,8
2			47,9	3	16,0	143,7
3			79,8	5	16,0	399,0
4			127,1	8	15,9	1016,8
5			143,2	9	15,9	1288,8
6			159,3	10	15,9	1593,0
7			176,4	11	16,0	1940,4
1	2,5	2	8,2	1	8,2	8,2
2			23,7	3	7,9	71,1
3			39,9	5	8,0	199,5
4			63,9	8	8,0	511,2
5			71,6	9	8,0	644,4
6			79,1	10	7,9	791,0
7			87,6	11	8,0	963,6
8			94,4	12	7,9	1132,8
9			102,8	13	7,9	1336,4
10			110,9	14	7,9	1552,6
11			120,3	15	8,0	1804,5

No	Panjang	Jumlah	<i>Voltase</i>	Arus	Tahanan	Daya
	m	Lilitan	Volt	Ampere	Ω	Watt
1	2,5	3	5,3	1	5,3	5,3
2			15,6	3	5,2	46,8
3			25,7	5	5,1	128,5
4			41,9	8	5,2	335,2
5			46,7	9	5,2	420,3
6			51,7	10	5,2	517,0
7			56,5	11	5,1	621,5
8			61,8	12	5,2	741,6
9			66,8	13	5,1	868,4
10			72	14	5,1	1008,0
11			77,4	15	5,2	1161,0

LAMPIRAN 11. Data kalibrasi heater

No	Debit Air	m Air	Cp Air	T Air Masuk	T Air Keluar	Voltase	Arus heater 1	Arus heater 2	Arus heater 3	Daya heater	Q diterima air	Q _{loss}
	LPM	kg/detik	kJ/kg.K	C	C	Volt	Ampere			Watt		
1	1,2	0,02	4,8	29,5	31,6	20	3,56	3,75	3,56	217,4	175,56	41,84
2				29,6	36,4	40	7,11	7,8	7,4	892,4	568,48	323,92
3				29,7	45,4	60	10,9	11,45	11,19	2012,4	1312,5	699,88
4				28,8	58,9	80	14,31	15,22	15,22	3580	2516,4	1063,6

LAMPIRAN 12. Data perhitungan nilai rcr

No	K (glasswool)	h Konveksi bebas (Hasil Perhitungan Q _{loss})	rcr	ri
	W/m.K	W/m ² .K	mm	mm
1	0,038	1,9	20,00	25,25
2		2,7	14,07	
3		3,2	11,88	
4		3,6	10,56	

LAMPIRAN 13. Tabel unjuk kerja *heater* seksi uji posisi horisontal

No	Inverter (Hz)	x	mR (kg/s)	Rencana						Real						Daya	Daya	x		
				V1	V1	V3	I1	I2	I3	V1	V2	V3	I1	I2	I3	Rencana	Real	Rencana	Real	Standar deviasi (%)
	Volt			Ampere			Volt			Ampere			(Watt)	(Watt)						
1	14	x ₁	0,00831	20,7			3,7	3,9	3,7	21,0	20,9	21,0	3,7	3,7	3,6	235	232	0,23	0,29	22,01
2		x ₂	0,00869	29,5			5,3	5,6	5,4	29,3	29,5	29,9	5,4	5,4	5,4	480	479	0,33	0,41	24,01
3		x ₃	0,00984	36,4			6,5	6,9	6,7	36,5	36,6	36,8	6,7	6,9	6,8	730	747	0,43	0,52	19,32
4		x ₄	0,01065	42,1			7,5	8,0	7,8	42,5	42,0	42,3	7,9	7,7	8,0	982	996	0,53	0,61	13,21
5		x	0,01130	47,2			8,5	9,0	8,8	47,2	47,6	47,6	8,7	8,8	8,8	1236	1244	0,63	0,69	8,94
6	16	x ₁	0,00896	21,4			3,8	4,1	3,8	21,5	20,6	21,1	3,7	3,5	3,7	250	227	0,24	0,30	25,20
7		x ₂	0,00964	30,5			5,4	5,8	5,5	30,1	31,2	30,4	5,4	5,3	5,2	511	484	0,34	0,41	22,37
8		x ₃	0,01017	37,5			6,7	7,1	6,9	36,8	37,0	36,8	6,7	6,6	5,4	776	688	0,44	0,49	12,80
9		x ₄	0,01067	43,4			7,8	8,2	8,0	43,0	43,1	43,2	7,8	7,7	7,5	1044	992	0,54	0,62	16,35
10		x	0,01122	48,7			8,7	9,2	9,1	47,8	48,3	49,2	8,7	8,5	8,5	1314	1247	0,64	0,72	12,99
11	18	x ₁	0,00915	21,5			3,8	4,1	3,8	21,4	21,3	21,5	3,8	3,6	3,3	254	230	0,26	0,31	18,04
12		x ₂	0,00992	30,7			5,5	5,8	5,6	30,0	30,0	30,3	5,4	5,3	5,0	519	469	0,36	0,42	15,96
13		x ₃	0,01053	37,8			6,8	7,2	6,9	37,3	37,3	37,3	6,7	6,5	6,3	788	727	0,46	0,53	14,64
14		x ₄	0,01119	43,8			7,8	8,3	8,1	43,0	43,9	44,0	7,4	7,6	7,6	1061	988	0,56	0,62	11,14
15		x	0,01178	49,0			8,8	9,3	9,1	48,5	49,0	49,0	8,5	8,7	8,6	1335	1256	0,66	0,71	7,93

LAMPIRAN 13. Tabel unjuk kerja *heater* seksi uji posisi horisontal (Lanjutan)

No	<i>Inverter</i> (Hz)	x	mR (kg/s)	Rencana						Real						Daya	Daya	x		
				V1	V1	V3	I1	I2	I3	V1	V2	V3	I1	I2	I3	Total	Total	Rencana	Real	Standar deviasi (%)
	Volt			Ampere			Volt			Ampere			(Watt)	(Watt)						
16	20	x ₁	0,00907	22,5			4,0	4,3	4,0	22,4	22,6	22,6	4,0	3,9	3,7	277	260	0,26	0,32	22,62
17		x ₂	0,00985	32,0			5,7	6,1	5,8	31,4	31,9	32,2	5,7	5,6	5,5	565	533	0,36	0,45	24,04
18		x ₃	0,01047	39,4			7,1	7,5	7,3	39,3	39,6	39,0	6,9	6,8	6,7	859	802	0,46	0,56	20,87
19		x ₄	0,01123	45,7			8,2	8,7	8,5	45,7	45,3	45,4	8,0	7,9	7,8	1156	1077	0,56	0,65	16,95
20		x	0,01220	51,2			9,2	9,7	9,5	51,1	50,6	50,7	9,4	9,1	9,0	1455	1393	0,66	0,75	13,59
21	22	x ₁	0,00910	22,8			4,1	4,3	4,1	22,8	22,1	22,9	4,0	3,8	3,6	286	256	0,26	0,33	29,64
22		x ₂	0,00977	32,5			5,8	6,2	5,9	32,6	32,2	32,4	5,7	5,6	5,5	584	543	0,36	0,46	28,70
23		x ₃	0,01050	40,0			7,2	7,6	7,4	40,4	40,1	40,1	7,2	7,0	6,9	887	851	0,46	0,58	26,13
24		x ₄	0,01116	46,4			8,3	8,8	8,6	46,1	47,0	46,5	8,2	8,2	8,0	1194	1132	0,56	0,68	22,33
25		x	0,01238	52,0			9,3	9,9	9,7	51,2	51,8	51,7	9,2	9,0	9,0	1502	1403	0,66	0,74	12,93
Standar deviasi rata-rata =																			18,51	

LAMPIRAN 14. Tabel unjuk kerja heater seksi uji posisi vertikal

No	Inverter (Hz)	mR-134a (kg/s)	X	Rencana				Aktual						Daya Rencana	Daya Aktual	x		
				V1-3	I1	I2	I3	V1	I1	V2	I2	V3	I3	(Watt)	(Watt)	Rencana	Real	Standar deviasi (%)
1	14	0,00762	x ₁	20,34	3,62	3,88	3,62	20	3,4	20,4	3,47	20,3	3,29	226,15	206,595	0,24	0,31	28,37
2		0,00802	x ₂	28,99	5,17	5,52	5,26	29	5,03	29,5	5,38	29,1	4,92	462,25	447,752	0,34	0,45	33,21
3		0,00864	x ₃	35,67	6,38	6,78	6,53	36	6,28	35,3	6,48	35,9	6,04	702,28	669,148	0,44	0,58	30,49
4		0,00908	x ₄	41,32	7,39	7,85	7,62	41	7,27	41,2	7,87	41,4	6,82	944,90	903,935	0,54	0,69	27,37
5		0,00983	x	46,31	8,30	8,79	8,59	46	8,1	46,3	8,4	46,5	7,96	1189,47	1130,04	0,64	0,77	19,79
6	16	0,00771	x ₁	20,73	3,69	3,95	3,70	21	3,4	20,3	3,27	21	3,28	235,11	205,981	0,25	0,32	25,94
7		0,00825	x ₂	29,55	5,27	5,62	5,36	30	5,17	29,7	4,78	29,7	4,6	480,57	431,618	0,35	0,43	21,52
8		0,00874	x ₃	36,36	6,50	6,91	6,67	36	6,7	35,9	6,6	36,1	6	730,11	695,41	0,45	0,57	26,79
9		0,00932	x ₄	42,12	7,54	8,00	7,78	42	7,8	42,2	8,1	42,4	7	982,34	966,22	0,55	0,70	27,03
10		0,00984	x	47,21	8,46	8,96	8,77	47	8,8	47	8,6	47,2	8	1236,61	1191,88	0,65	0,80	22,92
11	18	0,00846	x ₁	21,39	3,81	4,08	3,82	21	3,6	21,1	3,6	21,3	3,1	250,44	217,95	0,27	0,32	18,03
12		0,00905	x ₂	30,49	5,44	5,80	5,54	31	5,2	30,1	5,3	30,6	4,2	511,91	447,482	0,37	0,44	19,05
13		0,00970	x ₃	37,52	6,71	7,13	6,89	38	7,2	37,4	6,1	37,5	6,2	777,74	731,36	0,47	0,57	22,98
14		0,01009	x ₄	43,46	7,78	8,26	8,04	44	8,1	43,9	7,8	43,2	7,2	1046,43	1007,43	0,57	0,70	23,98
15		0,01075	x	48,72	8,73	9,25	9,06	49	9,1	48,3	9,2	49,1	8,3	1317,28	1295,97	0,67	0,81	21,73

LAMPIRAN 14. Tabel unjuk kerja heater seksi uji posisi vertikal (Lanjutan)

No	Inverter (Hz)	mR-134a (kg/s)	X	Heater Direncanakan				Heater Aktual						Daya Rencana	Daya Aktual	x		
				V1-3	I1	I2	I3	V1	I1	V2	I2	V3	I3	(Watt)	(Watt)	Rencana	Real	Standar deviasi (%)
16	20	0,00908	x ₁	22,29	3,97	4,25	3,99	22	3,9	22,1	3,8	22,3	3,7	272,02	251,9	0,27	0,33	21,66
17		0,00952	x ₂	31,77	5,67	6,04	5,79	32	6,1	31,4	6,6	31,9	5,3	556,01	570,29	0,37	0,50	33,81
18		0,01004	x ₃	39,09	6,99	7,43	7,19	39	7,6	39,1	7,7	39	6,8	844,74	864,95	0,47	0,63	34,70
19		0,01052	x ₄	45,28	8,11	8,60	8,39	45	8,7	44,8	9	45	7,9	1136,58	1148,46	0,57	0,75	31,84
20		0,01133	x	50,75	9,10	9,63	9,46	51	10	50,8	10,8	50,4	9,2	1430,77	1518,32	0,67	0,89	32,00
21	22	0,00889	x ₁	23,36	4,16	4,45	4,19	24	4,1	23,1	4,5	23,3	3,8	298,91	288,84	0,29	0,36	23,14
22		0,00968	x ₂	33,29	5,95	6,33	6,08	33	6	33,4	6,6	33,4	6	610,99	620,04	0,39	0,52	33,41
23		0,01030	x ₃	40,96	7,33	7,78	7,55	42	8	41	7,5	41	7,3	928,27	941,2	0,49	0,66	34,67
24		0,01086	x ₄	47,45	8,50	9,01	8,81	47	8,5	46,8	8,6	47	8,6	1248,97	1201,93	0,59	0,76	28,85
25		0,01184	x	53,18	9,54	10,09	9,93	53	10,2	53,3	10,3	53,3	9,4	1572,26	1589,59	0,69	0,89	28,28
															Standar deviasi rata-rata =		26,86	

LAMPIRAN 15. Tabel perhitungan tahanan listrik seksi uji posisi vertikal

No	Frekuensi <i>inverter</i>	Q loss	<i>Qheater</i>	<i>Voltase</i>	Tahanan	<i>Qheater</i>	<i>Voltase</i>	Tahanan	<i>Qheater</i>	<i>Voltase</i>	Tahanan	<i>Qheater</i>	<i>Voltase</i>	Tahanan
			(x_0,2)			(x_0,3)			(x_0,4)			(x_0,5)		
	Hz	Watt	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm
1	14	35,19	152,15	7,37	1,07	320,69	15,54	2,26	489,24	23,70	3,45	657,78	31,87	4,63
2	16		142,23	6,89	1,00	317,32	15,37	2,23	492,42	23,86	3,47	667,51	32,34	4,70
3	18		118,72	5,75	0,84	304,40	14,75	2,14	490,09	23,74	3,45	675,78	32,74	4,76
4	20		127,44	6,17	0,90	329,00	15,94	2,32	530,57	25,71	3,74	732,14	35,47	5,16
5	22		108,20	5,24	0,76	328,63	15,92	2,31	549,06	26,60	3,87	769,49	37,28	5,42

No	Frekuensi <i>inverter</i>	<i>Qheater</i>	<i>Voltase</i>	Tahanan	<i>Qheater</i>	<i>Voltase</i>	Tahanan	<i>Qheater</i>	<i>Voltase</i>	Tahanan	<i>Qheater</i>	<i>Voltase</i>	Tahanan
		(x_0,6)			(x_0,7)			(x_0,8)			(x_0,9)		
	Hz	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm
1	14	826,33	40,03	5,82	994,87	48,20	7,01	1163,42	56,37	8,19	1331,97	64,53	9,38
2	16	842,61	40,82	5,93	1017,70	49,31	7,17	1192,80	57,79	8,40	1367,89	66,27	9,63
3	18	861,46	41,74	6,07	1047,15	50,73	7,37	1232,84	59,73	8,68	1418,53	68,73	9,99
4	20	933,70	45,24	6,58	1135,27	55,00	7,99	1336,83	64,77	9,41	1538,40	74,53	10,83
5	22	989,92	47,96	6,97	1210,35	58,64	8,52	1430,78	69,32	10,08	1651,22	80,00	11,63

Tabel Untuk Interpolasi

	Daya	<i>Voltase</i>
Minimal	0	0
Maksimal	1651,22	80

LAMPIRAN 16. Tabel perhitungan tahanan listrik seksi uji posisi horisontal

No	Frekuensi	Q loss	Qheater	Voltase	Tahanan	Qheater	Voltase	Tahanan	Qheater	Voltase	Tahanan	Qheater	Voltase	Tahanan
	<i>inverter</i>		(x_0,2)			(x_0,3)			(x_0,4)			(x_0,5)		
	Hz	Watt	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm
1	14	35,19	142,78	6,92	1,01	318,25	15,42	2,24	493,72	23,92	3,48	669,19	32,42	4,71
2	16		144,63	7,01	1,02	328,40	15,91	2,31	512,18	24,81	3,61	695,96	33,72	4,90
3	18		106,61	5,17	0,75	294,38	14,26	2,07	482,15	23,36	3,40	669,92	32,46	4,72
4	20		110,99	5,38	0,78	314,85	15,25	2,22	518,70	25,13	3,65	722,55	35,01	5,09
5	22		126,19	6,11	0,89	337,67	16,36	2,38	549,15	26,61	3,87	760,64	36,85	5,36

No	Frekuensi	Qheater	Voltase	Tahanan	Qheater	Voltase	Tahanan	Qheater	Voltase	Tahanan	Qheater	Voltase	Tahanan
	<i>inverter</i>	(x_0,6)			(x_0,7)			(x_0,8)			(x_0,9)		
	Hz	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm	Watt	Volt	Ohm
1	14	844,66	40,92	5,95	1020,13	49,42	7,18	1195,59	57,93	8,42	1371,06	66,43	9,65
2	16	879,74	42,62	6,20	1063,52	51,53	7,49	1247,29	60,43	8,78	1431,07	69,33	10,08
3	18	857,69	41,55	6,04	1045,46	50,65	7,36	1233,23	59,75	8,68	1421,00	68,85	10,01
4	20	926,40	44,88	6,52	1130,26	54,76	7,96	1334,11	64,64	9,39	1537,96	74,51	10,83
5	22	972,12	47,10	6,85	1183,60	57,34	8,33	1395,09	67,59	9,82	1606,57	77,84	11,31

Tabel Untuk Interpolasi

	Daya	Voltase
Minimal	0	0
Maksimal	1606,57	80

LAMPIRAN 17. Tabel perhitungan *voltase* seksi uji posisi vertikal

No	Frekuensi	Q loss	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>
	<i>inverter</i>		(x_0,2)		(x_0,3)		(x_0,4)		(x_0,5)	
	Hz	Watt	Watt	Volt	Watt	Volt	Watt	Volt	Watt	Volt
1	14	35,19	152,15	24,29	320,69	35,26	489,24	43,55	657,78	50,49
2	16		142,23	23,48	317,32	35,07	492,42	43,69	667,51	50,87
3	18		118,72	21,45	304,40	34,35	490,09	43,58	675,78	51,18
4	20		127,44	22,23	329,00	35,71	530,57	45,35	732,14	53,27
5	22		108,20	20,48	328,63	35,69	549,06	46,13	769,49	54,61

No	Frekuensi	Q loss	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>
	<i>inverter</i>		(x_0,6)		(x_0,7)		(x_0,8)		(x_0,9)	
	Hz	Watt	Watt	Volt	Watt	Volt	Watt	Volt	Watt	Volt
1	14	35,19	826,33	56,59	994,87	62,10	1163,42	67,15	1331,97	71,85
2	16		842,61	57,15	1017,70	62,81	1192,80	67,99	1367,89	72,81
3	18		861,46	57,78	1047,15	63,71	1232,84	69,13	1418,53	74,15
4	20		933,70	60,16	1135,27	66,33	1336,83	71,98	1538,40	77,22
5	22		989,92	61,94	1210,35	68,49	1430,78	74,47	1651,22	80,00

LAMPIRAN 18. Tabel perhitungan *voltase* seksi uji posisi horisontal

No	Frekuensi	Qloss	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>
	<i>inverter</i>		(x_0,2)		(x_0,3)		(x_0,4)		(x_0,5)	
	Hz	Watt	Watt	Volt	Watt	Volt	Watt	Volt	Watt	Volt
1	14	35,19	142,78	23,53	318,25	35,12	493,72	43,75	669,19	50,93
2	16		144,63	23,68	328,40	35,68	512,18	44,56	695,96	51,94
3	18		106,61	20,33	294,38	33,78	482,15	43,23	669,92	50,96
4	20		110,99	20,74	314,85	34,94	518,70	44,84	722,55	52,92
5	22		126,19	22,12	337,67	36,18	549,15	46,14	760,64	54,30

No	Frekuensi	Qloss	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>	<i>Qheater</i>	<i>Voltase</i>
	<i>inverter</i>		(x_0,6)		(x_0,7)		(x_0,8)		(x_0,9)	
	Hz	Watt	Watt	Volt	Watt	Volt	Watt	Volt	Watt	Volt
1	14	35,19	844,66	57,22	1020,13	62,88	1195,59	68,07	1371,06	72,90
2	16		879,74	58,39	1063,52	64,20	1247,29	69,53	1431,07	74,48
3	18		857,69	57,66	1045,46	63,66	1233,23	69,14	1421,00	74,21
4	20		926,40	59,92	1130,26	66,19	1334,11	71,91	1537,96	77,21
5	22		972,12	61,38	1183,60	67,73	1395,09	73,53	1606,57	78,91

LAMPIRAN 19. Tabel perhitungan isolasi *heater* dengan material *glasswool*
($h=1,9 \text{ w/m}^2 \cdot \text{K}$)

No	r_i	r	$r-r_i$	R Kond	R konv	R Total
	mm	mm	mm	m.K/Watt	m.K/Watt	m.K/Watt
1	25,25	25,25	0	0,000	3,319	3,319
2	25,25	27,25	2	0,319	3,076	3,395
3	25,25	29,25	4	0,616	2,865	3,481
4	25,25	31,25	6	0,893	2,682	3,575
5	25,25	33,25	8	1,153	2,521	3,674
6	25,25	35,25	10	1,398	2,378	3,776
7	25,25	37,25	12	1,629	2,250	3,879
8	25,25	39,25	14	1,848	2,135	3,984
9	25,25	41,25	16	2,057	2,032	4,088
10	25,25	43,25	18	2,255	1,938	4,193
11	25,25	45,25	20	2,445	1,852	4,297
12	25,25	47,25	22	2,626	1,774	4,400
13	25,25	49,25	24	2,800	1,702	4,501
14	25,25	51,25	26	2,966	1,635	4,602
15	25,25	53,25	28	3,127	1,574	4,701
16	25,25	55,25	30	3,281	1,517	4,798
17	25,25	57,25	32	3,430	1,464	4,894
18	25,25	59,25	34	3,574	1,414	4,989
19	25,25	61,25	36	3,713	1,368	5,082
20	25,25	63,25	38	3,848	1,325	5,173
21	25,25	65,25	40	3,978	1,284	5,263
22	25,25	67,25	42	4,105	1,246	5,351
23	25,25	69,25	44	4,228	1,210	5,438
24	25,25	71,25	46	4,347	1,176	5,523
25	25,25	73,25	48	4,463	1,144	5,607
26	25,25	75,25	50	4,576	1,114	5,690
27	25,25	77,25	52	4,686	1,085	5,771
28	25,25	79,25	54	4,793	1,058	5,850
29	25,25	81,25	56	4,897	1,031	5,929
30	25,25	83,25	58	4,999	1,007	6,006
31	25,25	85,25	60	5,099	0,983	6,082
32	25,25	87,25	62	5,196	0,961	6,156
33	25,25	89,25	64	5,291	0,939	6,230
34	25,25	91,25	66	5,384	0,918	6,302
35	25,25	93,25	68	5,475	0,899	6,373
36	25,25	95,25	70	5,564	0,880	6,443
37	25,25	97,25	72	5,651	0,862	6,512
38	25,25	99,25	74	5,736	0,844	6,580

LAMPIRAN 20. Tabel perhitungan isolasi *heater* dengan material *glasswool*
($h=2,7 \text{ w/m}^2 \cdot \text{K}$)

No	r_i	r	$r-r_i$	R Konduksi	R konveksi	R Total
	mm	mm	mm	m.K/Watt	m.K/Watt	m.K/Watt
1	25,25	25,25	0	0,000	2,336	2,336
2	25,25	27,25	2	0,319	2,164	2,484
3	25,25	29,25	4	0,616	2,016	2,632
4	25,25	31,25	6	0,893	1,887	2,781
5	25,25	33,25	8	1,153	1,774	2,927
6	25,25	35,25	10	1,398	1,673	3,071
7	25,25	37,25	12	1,629	1,583	3,213
8	25,25	39,25	14	1,848	1,503	3,351
9	25,25	41,25	16	2,057	1,430	3,486
10	25,25	43,25	18	2,255	1,364	3,619
11	25,25	45,25	20	2,445	1,303	3,748
12	25,25	47,25	22	2,626	1,248	3,874
13	25,25	49,25	24	2,800	1,197	3,997
14	25,25	51,25	26	2,966	1,151	4,117
15	25,25	53,25	28	3,127	1,108	4,234
16	25,25	55,25	30	3,281	1,067	4,349
17	25,25	57,25	32	3,430	1,030	4,460
18	25,25	59,25	34	3,574	0,995	4,570
19	25,25	61,25	36	3,713	0,963	4,676
20	25,25	63,25	38	3,848	0,932	4,780
21	25,25	65,25	40	3,978	0,904	4,882
22	25,25	67,25	42	4,105	0,877	4,982
23	25,25	69,25	44	4,228	0,852	5,079
24	25,25	71,25	46	4,347	0,828	5,175
25	25,25	73,25	48	4,463	0,805	5,268
26	25,25	75,25	50	4,576	0,784	5,360
27	25,25	77,25	52	4,686	0,763	5,449
28	25,25	79,25	54	4,793	0,744	5,537
29	25,25	81,25	56	4,897	0,726	5,623
30	25,25	83,25	58	4,999	0,708	5,708
31	25,25	85,25	60	5,099	0,692	5,791
32	25,25	87,25	62	5,196	0,676	5,872
33	25,25	89,25	64	5,291	0,661	5,952
34	25,25	91,25	66	5,384	0,646	6,030
35	25,25	93,25	68	5,475	0,632	6,107
36	25,25	95,25	70	5,564	0,619	6,183
37	25,25	97,25	72	5,651	0,606	6,257
38	25,25	99,25	74	5,736	0,594	6,330

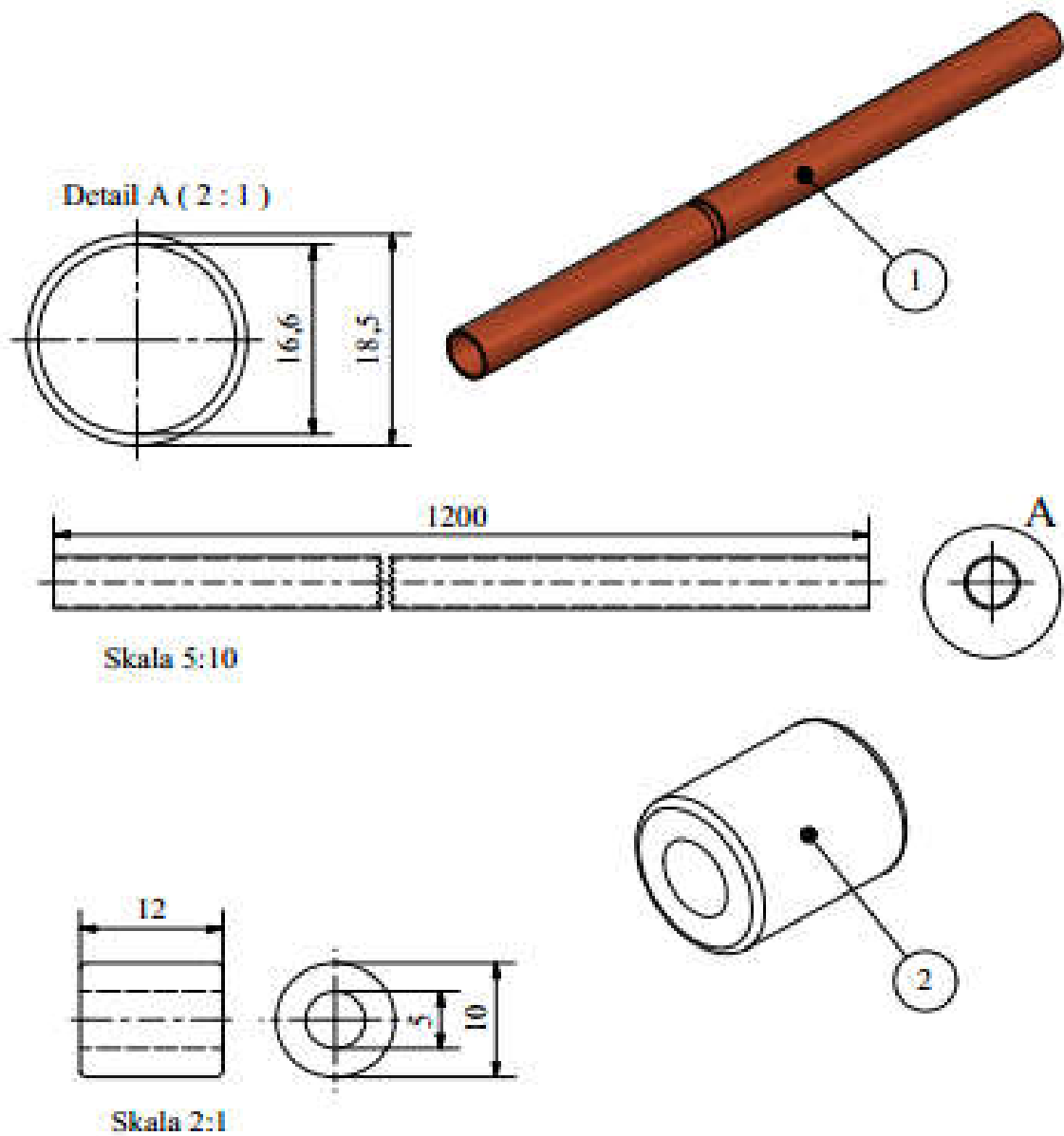
LAMPIRAN 21. Tabel perhitungan isolasi *heater* dengan material *glasswool*
($h=3,2 \text{ w/m}^2.\text{K}$)

No	r_i	r	$r-r_i$	R Konduksi	R konveksi	R Total
	mm	mm	mm	m.K/Watt	m.K/Watt	m.K/Watt
1	25,25	25,25	0	0,000	1,971	1,971
2	25,25	27,25	2	0,319	1,826	2,146
3	25,25	29,25	4	0,616	1,701	2,317
4	25,25	31,25	6	0,893	1,592	2,486
5	25,25	33,25	8	1,153	1,497	2,650
6	25,25	35,25	10	1,398	1,412	2,810
7	25,25	37,25	12	1,629	1,336	2,965
8	25,25	39,25	14	1,848	1,268	3,116
9	25,25	41,25	16	2,057	1,206	3,263
10	25,25	43,25	18	2,255	1,151	3,406
11	25,25	45,25	20	2,445	1,100	3,544
12	25,25	47,25	22	2,626	1,053	3,679
13	25,25	49,25	24	2,800	1,010	3,810
14	25,25	51,25	26	2,966	0,971	3,937
15	25,25	53,25	28	3,127	0,934	4,061
16	25,25	55,25	30	3,281	0,901	4,182
17	25,25	57,25	32	3,430	0,869	4,299
18	25,25	59,25	34	3,574	0,840	4,414
19	25,25	61,25	36	3,713	0,812	4,526
20	25,25	63,25	38	3,848	0,787	4,635
21	25,25	65,25	40	3,978	0,763	4,741
22	25,25	67,25	42	4,105	0,740	4,845
23	25,25	69,25	44	4,228	0,719	4,946
24	25,25	71,25	46	4,347	0,698	5,045
25	25,25	73,25	48	4,463	0,679	5,142
26	25,25	75,25	50	4,576	0,661	5,237
27	25,25	77,25	52	4,686	0,644	5,330
28	25,25	79,25	54	4,793	0,628	5,421
29	25,25	81,25	56	4,897	0,612	5,510
30	25,25	83,25	58	4,999	0,598	5,597
31	25,25	85,25	60	5,099	0,584	5,682
32	25,25	87,25	62	5,196	0,570	5,766
33	25,25	89,25	64	5,291	0,558	5,848
34	25,25	91,25	66	5,384	0,545	5,929
35	25,25	93,25	68	5,475	0,534	6,008
36	25,25	95,25	70	5,564	0,522	6,086
37	25,25	97,25	72	5,651	0,512	6,162
38	25,25	99,25	74	5,736	0,501	6,237

LAMPIRAN 22. Tabel perhitungan isolasi *heater* dengan material *glasswool*
($h=3,6 \text{ w/m}^2 \cdot \text{K}$)

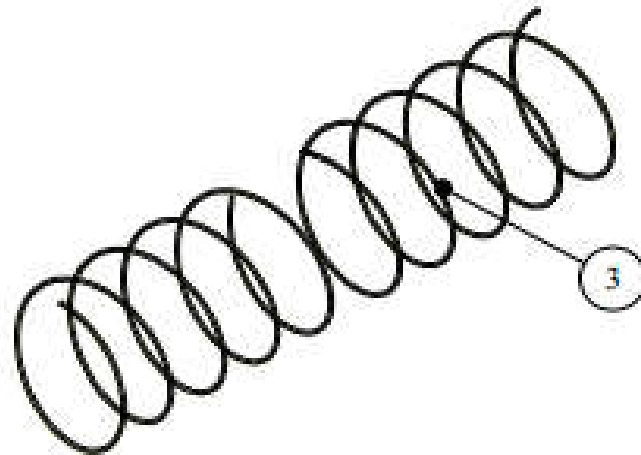
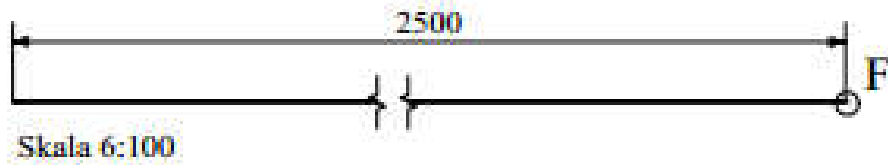
No	r_i	r	$r-r_i$	R Konduksi	R konveksi	R Total
	mm	mm	mm	m.K/Watt	m.K/Watt	m.K/Watt
1	25,25	25,25	0	0,000	1,752	1,752
2	25,25	27,25	2	0,319	1,623	1,943
3	25,25	29,25	4	0,616	1,512	2,128
4	25,25	31,25	6	0,893	1,415	2,309
5	25,25	33,25	8	1,153	1,330	2,484
6	25,25	35,25	10	1,398	1,255	2,653
7	25,25	37,25	12	1,629	1,187	2,817
8	25,25	39,25	14	1,848	1,127	2,975
9	25,25	41,25	16	2,057	1,072	3,129
10	25,25	43,25	18	2,255	1,023	3,278
11	25,25	45,25	20	2,445	0,978	3,422
12	25,25	47,25	22	2,626	0,936	3,562
13	25,25	49,25	24	2,800	0,898	3,698
14	25,25	51,25	26	2,966	0,863	3,829
15	25,25	53,25	28	3,127	0,831	3,957
16	25,25	55,25	30	3,281	0,801	4,082
17	25,25	57,25	32	3,430	0,773	4,203
18	25,25	59,25	34	3,574	0,747	4,321
19	25,25	61,25	36	3,713	0,722	4,435
20	25,25	63,25	38	3,848	0,699	4,547
21	25,25	65,25	40	3,978	0,678	4,656
22	25,25	67,25	42	4,105	0,658	4,763
23	25,25	69,25	44	4,228	0,639	4,866
24	25,25	71,25	46	4,347	0,621	4,968
25	25,25	73,25	48	4,463	0,604	5,067
26	25,25	75,25	50	4,576	0,588	5,164
27	25,25	77,25	52	4,686	0,573	5,258
28	25,25	79,25	54	4,793	0,558	5,351
29	25,25	81,25	56	4,897	0,544	5,442
30	25,25	83,25	58	4,999	0,531	5,531
31	25,25	85,25	60	5,099	0,519	5,618
32	25,25	87,25	62	5,196	0,507	5,703
33	25,25	89,25	64	5,291	0,496	5,786
34	25,25	91,25	66	5,384	0,485	5,868
35	25,25	93,25	68	5,475	0,474	5,949
36	25,25	95,25	70	5,564	0,464	6,028
37	25,25	97,25	72	5,651	0,455	6,105
38	25,25	99,25	74	5,736	0,446	6,182

LAMPIRAN 23. Komponen-komponen heater

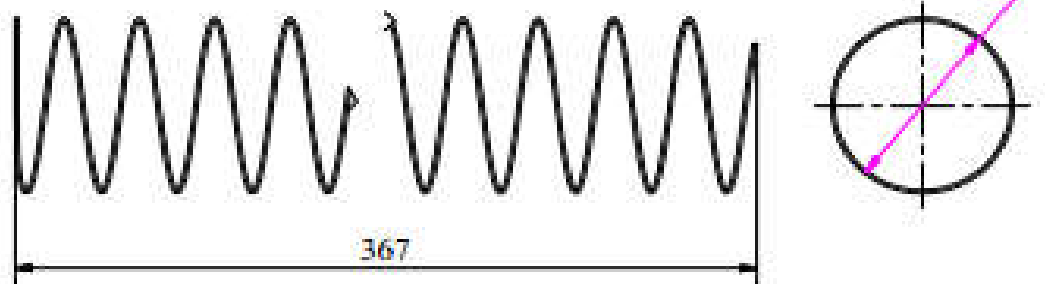


PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Pipa tembaga	
2	600	Cincin gypsum	
	Satuan : mm	Nama: Arif Burhamadin Luthfi	Peringatan :
	Skala :	NIM : 20130130202	
	Tanggal : 13/12/2017	Ditahat :	
TEKNIK MESIN UMY		KOMPONEN HEATER	A4

LAMPIRAN 23. Komponen-komponen *heater* (lanjutan)



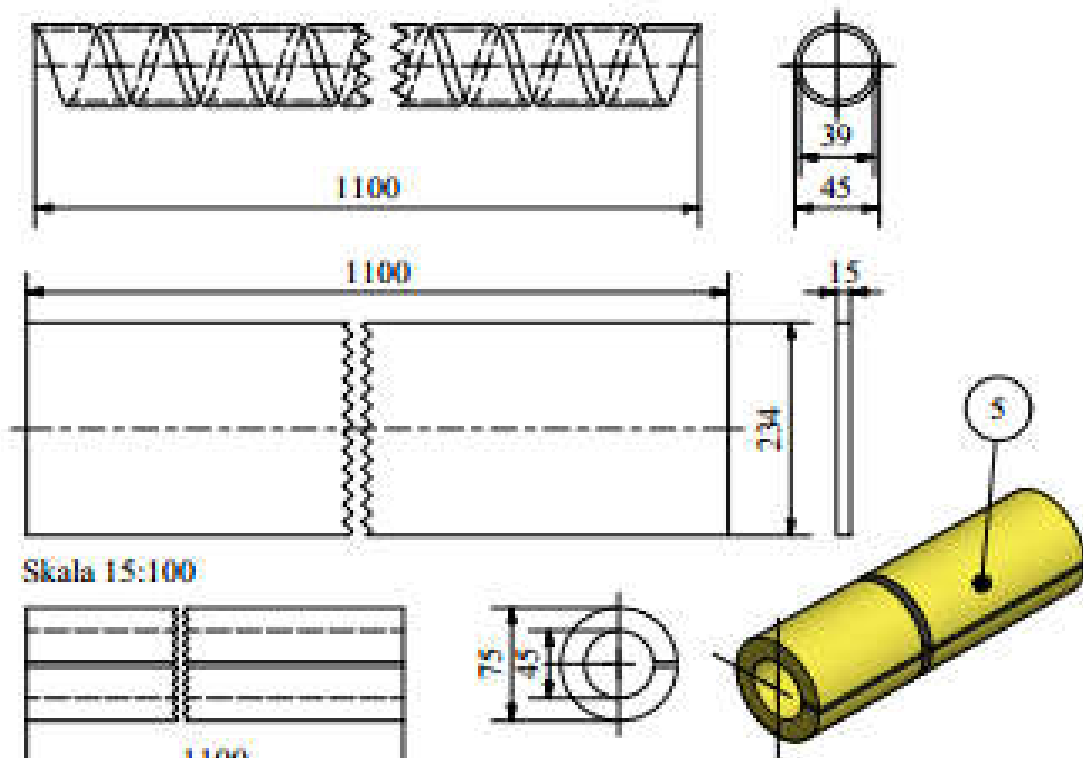
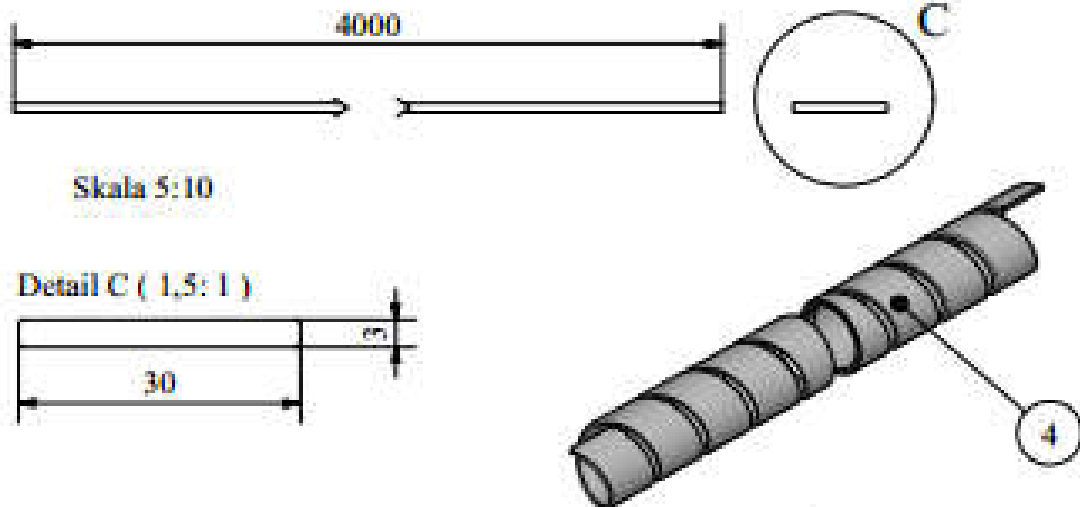
Skala 1:1



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
3	1	Kawat pemanas	
	Satuan : mm	Nama: Arif Burhamudin Luthfi	Peringatan :
	Skala :	NIM : 20130130202	
	Tanggal : 13/12/2017	Dilihat :	
TEKNIK MESIN UMY	KOMPONEN <i>HEATER</i>		146 A4

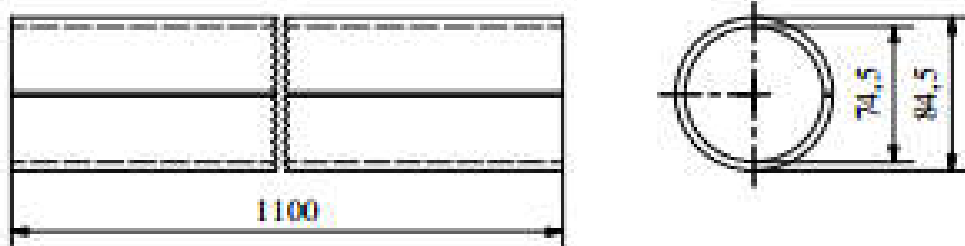
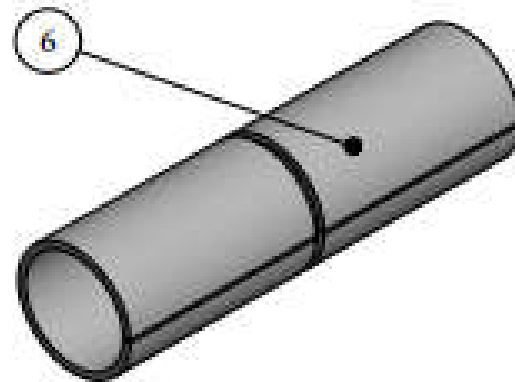
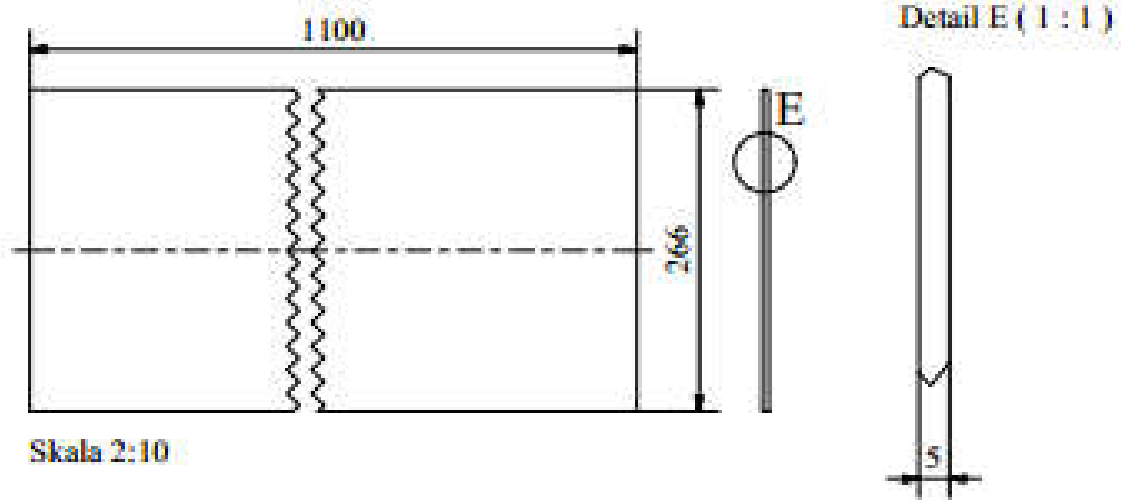
LAMPIRAN 23. Komponen-komponen heater (lanjutan)




PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
4	1	Pita Asbes	
5	1	Glasswool	
	Satuan : mm	Nama: Arif Buchanudin Luthfi	Peringatan :
	Skala :	NIM : 20130130202	
	Tanggal : 13/12/2017	Dilihat :	
TEKNIK MESIN UMY		KOMPONEN HEATER	A4

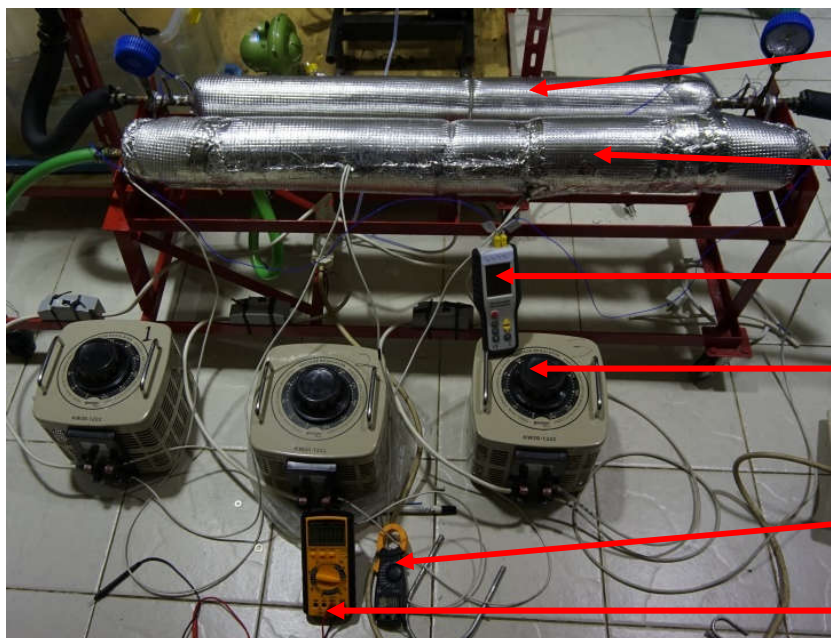
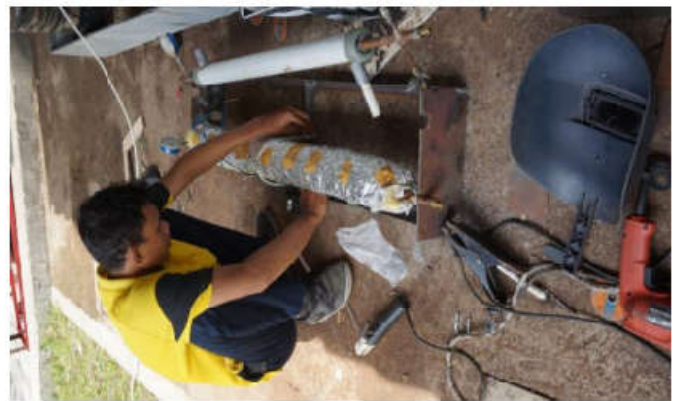
LAMPIRAN 23. Komponen-komponen *heater* (lanjutan)



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
6	1	Aluminium foil	
	Satuan : mm	Nama: Arif Barhanudin Luthfi	Peringatan :
	Skala :	NIM : 20130130202	
	Tanggal : 13/12/2017	Dilihat :	
TEKNIK MESIN UMY	KOMPONEN HEATER		A4

LAMPIRAN 24. Gambar pembuatan *heater*



Seksi uji

Heater

Termocouple

Voltage Regulator

Tang Ampere

Multimeter