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LAMPIRAN

Lampiran 1. Hasil pengambilan data

Data temperatur pendinginan tanpa menggunakan pompa vakum

Menit	T _{in} Kompresor	T _{out} kompresor	T _{in} Kondensor	T _{out} Kondensor	T _{in} Katup Ekspansi	T _{out} Katup Ekspansi	T _{in} Evaporator	T _{out} Evaporator
0	28,510	28,610	28,520	28,500	28,500	28,460	26,000	26,810
10	8,575	32,652	33,113	30,668	29,806	3,113	1,425	0,021
20	-2,127	35,562	34,055	31,278	28,745	-11,725	-12,621	-13,511
30	-3,524	39,946	36,510	32,141	29,266	-12,824	-13,938	-15,178
40	1,468	41,841	36,598	32,471	29,945	-17,542	-19,313	-10,277
50	4,783	44,766	37,746	25,217	24,894	-18,386	-18,475	-8,011
60	8,203	46,212	37,112	24,618	23,704	-19,867	-19,950	-7,545
70	9,144	47,758	37,538	25,300	23,812	-19,243	-19,649	-8,373
80	11,047	49,364	38,480	25,991	24,220	-18,815	-19,573	-9,465
90	12,930	50,383	39,065	26,614	24,555	-18,123	-18,993	-9,724
100	13,432	51,086	39,276	27,196	25,142	-18,968	-19,774	-9,599
110	14,015	52,207	40,060	27,793	25,521	-19,170	-19,757	-9,501
120	14,777	52,540	40,117	28,292	26,531	-20,425	-21,406	-8,547
130	13,975	53,519	40,496	28,774	26,257	-16,758	-17,581	-8,370
140	22,771	38,609	29,277	28,641	23,929	-0,283	0,354	8,875
150	26,607	30,828	28,385	28,542	19,100	12,797	12,780	15,204
160	27,786	28,278	28,350	28,444	25,267	24,190	20,103	18,240
170	27,294	28,319	28,293	28,433	22,923	20,999	17,596	15,522
180	27,414	28,081	28,280	28,420	24,131	22,325	18,722	17,021

Siklus Kompresi Uap							
Menit	h1	h2	h3	h4	Q out (kJ/kg)	Q in (kJ/kg)	COP
0	0	0 TAMPAK ATAS	0	0	0	0	0
10	403,4600	431,8827	241,5097	241,5097	0,8252	161,9504	5,6979
20	398,0478	434,0254	239,9180	239,9180	194,1074	158,1298	4,3952
30	396,6855	436,2355	240,6993	240,6993	195,5362	155,9862	3,9440
40	364,8953	437,3755	241,7173	241,7173	195,6583	123,1781	1,6995
50	402,0202	436,8096	234,4407	234,4407	202,3690	167,5795	4,8170
60	403,1886	437,3271	232,6045	232,6045	204,7225	170,5840	4,9968
70	403,8751	438,7075	232,7710	232,7710	205,9365	171,1041	4,9122
80	405,1425	438,2061	233,4299	233,4299	204,7762	171,7127	5,1934
90	405,9346	450,2414	233,9318	233,9318	216,3097	172,0028	3,8821
100	406,0346	448,4271	234,8986	234,8986	213,5286	171,1360	4,0369
110	406,0981	448,4200	235,4297	235,4297	212,9903	170,6684	4,0326
120	407,0274	449,7000	236,8437	236,8437	212,8563	170,1837	3,9881
130	406,7848	450,9741	238,2222	238,2222	212,7519	168,5626	3,8146
140	411,4623	436,8873	236,4991	236,4991	200,3882	174,9632	6,8816
150	413,4035	429,9828	232,9498	232,9498	197,0330	180,4537	10,8843
160	413,9932	427,6223	237,2972	237,2972	190,3251	176,6960	12,9647
170	413,7470	427,6550	235,6169	235,6169	192,0381	178,1301	12,8078
180	413,8068	427,4649	236,4855	236,4855	190,9794	177,3213	12,9829

Data temperatur pendinginan menggunakan pompa vakum

Menit	T _{in} Kompresor	T _{out} kompresor	T _{in} Kondensor	T _{out} Kondensor	T _{in} Katup Ekspansi	T _{out} Katup Ekspansi	T _{in} Evaporator	T _{out} Evaporator
0	28,530	28,600	28,600	28,450	28,620	28,720	28,530	28,540
10	11,357	35,549	36,127	31,114	31,785	0,931	-0,696	2,308
20	4,496	38,822	37,008	31,802	27,905	-15,835	-17,429	-4,986
30	5,780	42,746	37,741	31,467	28,121	-17,504	-18,803	-7,733
40	7,947	45,697	38,912	31,976	28,548	-19,751	-21,678	-6,894
50	8,053	48,062	40,014	32,605	29,114	-18,251	-20,414	-9,345
60	9,831	50,027	40,331	33,120	29,151	-18,662	-21,479	-10,380
70	10,967	50,583	41,693	33,263	27,731	-18,430	-21,036	-9,285
80	11,832	51,831	41,825	33,774	27,927	-17,313	-19,957	-8,978
90	13,861	52,004	41,281	28,614	26,130	-19,122	-20,757	-8,362
100	15,288	52,312	40,265	25,279	23,382	-18,860	-20,378	-8,680
110	16,751	52,554	38,897	25,896	23,754	-19,006	-21,875	-7,756
120	17,508	52,592	39,446	26,740	23,537	-19,781	-21,861	-9,800
130	18,105	52,674	39,538	27,423	24,695	-19,777	-22,085	-7,963
140	18,293	53,093	39,728	28,028	24,625	-19,489	-21,756	-8,611
150	18,746	53,730	40,240	28,624	25,920	-19,598	-22,236	-8,505
160	17,558	54,356	40,848	29,835	25,252	-17,105	-19,593	-9,273
170	18,351	53,927	40,411	29,839	25,521	-17,404	-21,715	-9,017
180	15,885	54,465	41,025	30,376	24,232	-14,690	-22,415	-9,881

Siklus Kompresi Uap							
Menit	h1	h2	h3	h4	Q out (kj/kg)	Q in (kj/kg)	COP
0	0	0	0	0	0	0	0
10	405,4211	434,6945	244,4781	244,4781	0,8005	160,9430	5,4979
20	401,6503	436,3318	238,8673	238,8673	197,4645	162,7830	4,6937
30	402,0894	438,1950	239,1699	239,1699	199,0251	162,9194	4,5123
40	402,2928	441,1828	239,6224	239,6224	201,5604	162,6704	4,1828
50	403,0789	440,6526	240,4710	240,4710	200,1816	162,6079	4,3277
60	404,3767	450,1731	240,5260	240,5260	209,6471	163,8507	3,5778
70	405,0805	450,0293	238,3970	238,3970	211,6323	166,6835	3,7083
80	405,8485	448,6743	238,6904	238,6904	209,9839	167,1581	3,9032
90	406,0689	446,4853	236,2813	236,2813	210,2040	169,7875	4,2010
100	407,2366	446,2730	232,1084	232,1084	214,1646	175,1282	4,4863
110	407,2452	448,3588	232,6810	232,6810	215,6779	174,5643	4,2459
120	408,6539	449,7000	232,4053	232,4053	217,2947	176,2485	4,2939
130	408,9632	450,1042	236,1830	236,1830	213,9212	172,7802	4,1997
140	409,0761	450,4215	236,5573	236,5573	213,8641	172,5188	4,1726
150	409,3477	451,2487	237,8808	237,8808	213,3679	171,4669	4,0922
160	408,6789	452,4193	238,2607	238,2607	214,1586	170,4182	3,8961
170	409,1106	451,5045	238,4518	238,4518	213,0527	170,6588	4,0255
180	407,7427	452,6691	237,9259	237,9259	214,7432	169,8169	3,7799

Data rata-rata tekanan dan temperatur pengering beku lalu vakum

Menit	Tekanan	Temperatur
0	760	27,529
10	760	21,459
20	760	15,250
30	760	11,611
40	760	9,140
50	760	7,152
60	760	5,757
70	760	4,502
80	760	3,164
90	760	1,833
100	760	0,725
110	760	-0,291
120	760	-1,576
130	25	0,191
140	24	4,164
150	23	6,963
160	23	8,059
170	22	9,089
180	21	9,744
190	21	9,880
200	20	10,075
210	20	10,059
220	20	10,361
230	20	10,421
240	20	10,879
250	20	11,199
260	20	11,239
270	20	11,798
280	20	12,224
290	20	12,608
300	20	12,983
310	21	13,180
320	21	13,636
330	21	13,848
340	21	14,491
350	21	14,973

360	21	15,870
370	22	16,030
380	22	16,039
390	22	16,208
400	22	16,332
410	22	16,403
420	22	16,459
430	23,5	16,627
440	23,5	16,661
450	23,5	16,675
460	24	16,736
470	24	16,756
480	24	16,859
490	24	16,974
500	24,5	17,034
510	24,5	17,138
520	24,5	17,262
530	24,5	17,666
540	24,5	17,724
550	24	17,727
560	24	17,734
570	24	17,739
580	24	17,740
590	24	17,799
600	25	17,858
610	25	17,918
620	25	17,982
630	25	18,048
640	25	18,111
650	25	18,166
660	25	18,215
670	26	18,268
680	26	18,323
690	26	18,379
700	26	18,443
710	26	18,505

720	26	18,596
730	26	18,642
740	26	18,642
750	26	18,685
760	26	18,729
770	26	18,774
780	26	18,810
790	26	18,859
800	26	18,903
810	26	18,776
820	27	18,773
830	27	18,997
840	27	19,075
850	27	19,211
860	27	19,122
870	27	19,148
880	27	19,226
890	27	19,190
900	28	19,215
910	28	19,243
920	28	19,267
930	28	19,287
940	28	19,320
950	28	19,563
960	28	19,374
970	28	19,402
980	28	19,418
990	29	19,439
1000	29	19,462
1010	29	19,485
1020	29	19,506
1030	29	19,531
1040	29	19,555
1050	29	19,567
1060	29	19,594
1070	29	19,618

1080	29	19,636
1090	29	19,672
1100	29	19,703
1110	29	19,722
1120	29	19,732
1130	30	19,748
1140	30	19,771
1150	30	19,809
1160	30	19,845
1170	30	19,869
1180	30	19,883
1190	30	19,895
1200	30	19,909
1210	30	19,930
1220	30	19,951
1230	31	19,966
1240	31	19,990
1250	31	20,040
1260	31	20,054
1270	31	20,083
1280	31	20,104
1290	31	20,083
1300	31	20,105
1310	31	20,147
1320	31	20,167
1330	31	20,181
1340	31	20,202
1350	31	20,220
1360	31	20,308
1370	31	20,741
1380	31	21,135
1390	32	21,448
1400	32	21,683
1410	32	21,874
1420	32	22,028
1430	32	22,168

1440	32	22,309
1450	32	22,433
1460	32	22,537
1470	32	22,631
1480	32	22,729
1490	32	22,800
1500	32	22,866
1510	32	22,934
1520	33	23,001
1530	33	23,081
1540	33	23,141
1550	33	23,203
1560	33	23,257
1570	33	23,289
1580	33	23,285
1590	33	23,281
1600	33	23,282
1610	33	23,268
1620	34	23,260
1630	34	23,252
1640	34	23,247
1650	34	23,250
1660	34	23,265
1670	34	23,266
1680	34	23,287
1690	34	23,285
1700	34	23,310
1710	34	23,338
1720	34	23,352
1730	35	23,376
1740	35	23,382
1750	35	23,392
1760	35	23,416
1770	35	23,431
1780	35	23,465
1790	35	23,495

1800	35	23,584
1810	35	23,607
1820	36	23,697
1830	36	23,868
1840	36	23,947
1850	36	24,283
1860	36	24,377
1870	36	24,430
1880	36	24,467
1890	36	24,490
1900	37	24,503
1910	37	24,530
1920	37	24,574
1930	37	24,580
1940	37	24,584
1950	37	24,613
1960	38	24,629
1970	38	24,644
1980	38	24,669
1990	38	24,690
2000	38	24,707
2010	39	24,744
2020	39	24,778
2030	39	24,797
2040	39	24,847
2050	40	24,879
2060	40	24,895
2070	40	24,897
2080	40	24,938
2090	41	24,985
2100	41	25,018
2110	41	25,039
2120	41	25,085
2130	41	25,113
2140	41	25,152
2150	42	25,184

2160	42	25,217
2170	42	25,272
2180	42	25,276
2190	43	25,296
2200	43	25,312
2210	43	25,318
2220	43	25,346
2230	43	25,387
2240	44	25,392
2250	44	25,423
2260	44	25,439
2270	45	25,430
2280	45	25,466
2290	45	25,483
2300	45	25,505
2310	45	25,513
2320	45	25,540
2330	46	25,556
2340	46	25,573
2350	46	25,602
2360	46	25,623
2370	46	25,663
2380	46	25,660
2390	46	25,693
2400	47	25,707
2410	47	25,719
2420	47	25,752
2430	47	25,782
2440	47	25,782
2450	47	25,795
2460	47	25,818
2470	47	25,834
2480	47	25,849
2490	47	25,882
2500	47	25,881
2510	48	25,913

2520	48	25,924
2530	48	25,931
2540	48	25,950
2550	48	25,961
2560	48	25,989
2570	48	26,005
2580	48	26,050
2590	48	26,084
2600	48	26,075
2610	48	26,103
2620	49	26,126
2630	49	26,158
2640	49	26,234
2650	49	26,284
2660	49	26,337
2670	49	26,348
2680	49	26,375
2690	49	26,387
2700	49	26,403
2710	50	26,416
2720	50	26,438
2730	50	26,411
2740	50	26,416
2750	50	26,423
2760	50	26,456
2770	51	26,480
2780	51	26,499
2790	51	26,542
2800	51	26,567
2810	51	26,605
2820	51	26,654
2830	52	26,706
2840	52	26,789
2850	52	26,845
2860	52	26,872
2870	52	26,926

2880	52	26,995
2890	54	27,008
2900	54	27,043
2910	54	27,068
2920	54	27,168
2930	54	27,186
2940	55	27,228
2950	55	27,450
2960	55	27,618
2970	55	27,484
2980	55	27,635
2990	55	27,700
3000	55	27,696

1440	33	27,182
1450	33	27,204
1460	33	27,232
1470	33	27,237
1480	33	27,252
1490	33	27,254
1500	34	27,252
1510	34	27,274
1520	34	27,282
1530	34	27,282
1540	34	27,263
1550	34	27,261
1560	34	27,258
1570	34	27,244
1580	34	27,224
1590	34	27,192
1600	34	27,189
1610	35	27,195
1620	35	27,226
1630	35	27,214
1640	35	27,180
1650	35	27,097
1660	35	27,079
1670	35	27,089
1680	35	27,143
1690	35	27,134
1700	36	27,153
1710	36	27,151
1720	36	27,135
1730	36	27,160
1740	36	27,170
1750	36	27,184
1760	36	27,186
1770	36	27,185
1780	37	27,200
1790	37	27,209

1800	37	27,207
1810	37	27,222
1820	37	27,235
1830	37	27,241
1840	38	27,208
1850	38	27,211
1860	38	27,202
1870	38	27,192
1880	38	27,172
1890	39	27,157
1900	39	27,184
1910	39	27,212
1920	39	27,195
1930	40	27,213
1940	40	27,213
1950	40	27,226
1960	40	27,227
1970	41	27,228
1980	41	27,222
1990	41	27,225
2000	41	27,233
2010	41	27,253
2020	41	27,273
2030	42	27,239
2040	42	27,308
2050	42	27,317
2060	42	27,320
2070	43	27,318
2080	43	27,305
2090	43	27,288
2100	43	27,293
2110	43	27,284
2120	44	27,271
2130	44	27,264
2140	44	27,263
2150	45	27,248

2160	45	27,252
2170	45	27,267
2180	45	27,247
2190	45	27,246
2200	45	27,242
2210	46	27,233
2220	46	27,224
2230	46	27,202
2240	46	27,235
2250	46	27,269
2260	46	27,261
2270	46	27,253
2280	47	27,239
2290	47	27,238
2300	47	27,258
2310	47	27,279
2320	47	27,253
2330	47	27,246
2340	47	27,238
2350	47	27,255
2360	47	27,242
2370	47	27,236
2380	47	27,230
2390	48	27,232
2400	48	27,229
2410	48	27,243
2420	48	27,254
2430	48	27,224
2440	48	27,246
2450	48	27,239
2460	48	27,240
2470	48	27,242
2480	48	27,266
2490	48	27,243
2500	49	27,231
2510	49	27,243

2520	49	27,259
2530	49	27,257
2540	49	27,266
2550	49	27,286
2560	49	27,297
2570	49	27,333
2580	49	27,308
2590	50	27,309
2600	50	27,307
2610	50	27,324
2620	50	27,583
2630	50	27,408
2640	50	27,491
2650	51	27,490
2660	51	27,858
2670	51	27,869
2680	51	27,879
2690	51	27,905
2700	51	27,921
2710	52	27,933
2720	52	27,946
2730	52	27,971
2740	52	27,971
2750	52	27,963
2760	52	27,996
2770	54	27,802
2780	54	27,824
2790	54	27,737
2800	54	27,875
2810	54	27,689
2820	55	27,733
2830	55	27,834
2840	55	27,691
2850	55	27,741
2860	55	27,671
2870	55	27,867
2880	55	27,997

1800	12	-13,232
1810	12	-13,244
1820	12	-13,256
1830	12	-13,268
1840	12	-13,280
1850	12	-13,292
1860	12	-13,305
1870	12	-13,317
1880	12	-13,329
1890	12	-13,341
1900	12	-13,353
1910	12	-13,365
1920	12	-13,377
1930	12	-13,389
1940	12	-13,401
1950	12	-13,413
1960	12	-13,426
1970	12	-13,438
1980	12	-13,450
1990	12	-13,462
2000	12	-13,474
2010	12	-13,486
2020	12	-13,498
2030	12	-13,510
2040	12	-13,522
2050	12	-13,534
2060	12	-13,547
2070	12	-13,559
2080	12	-13,571
2090	12	-13,583
2100	12	-13,595
2110	12	-13,607
2120	12	-13,619
2130	12	-13,631
2140	12	-13,643
2150	12	-13,655

2160	12	-13,668
2170	12	-13,680
2180	12	-13,692
2190	12	-13,704
2200	12	-13,716
2210	12	-13,728
2220	12	-13,740
2230	12	-13,752
2240	12	-13,764
2250	12	-13,776
2260	12	-13,789
2270	12	-13,801
2280	12	-13,813
2290	12	-13,825
2300	12	-13,837
2310	12	-13,849
2320	12	-13,861
2330	12	-13,873
2340	12	-13,885
2350	12	-13,897
2360	12	-13,910
2370	12	-13,922
2380	12	-13,934
2390	12	-13,946
2400	12	-13,958
2410	12	-13,970
2420	12	-13,982
2430	12	-13,994
2440	12	-14,006
2450	12	-14,018
2460	12	-14,031
2470	12	-14,043
2480	12	-14,055
2490	12	-14,067
2500	12	-14,079
2510	12	-14,091

2520	12	-14,103
2530	12	-14,115
2540	12	-14,127
2550	12	-14,139
2560	12	-14,152
2570	12	-14,164
2580	12	-14,176
2590	12	-14,188
2600	12	-14,200
2610	12	-14,212
2620	12	-14,224
2630	12	-14,236
2640	12	-14,248
2650	12	-14,260
2660	12	-14,273
2670	12	-14,285
2680	12	-14,297
2690	12	-14,309
2700	12	-14,321
2710	12	-14,333
2720	12	-14,345
2730	12	-14,357
2740	12	-14,369
2750	12	-14,381
2760	12	-14,394
2770	12	-14,406
2780	12	-14,418
2790	12	-14,430
2800	12	-14,442
2810	12	-14,454
2820	12	-14,466
2830	12	-14,478
2840	12	-14,490
2850	12	-14,502
2860	12	-14,515
2870	12	-14,527

2880	12	-14,539
2890	12	-14,554
2900	12	-14,580
2910	12	-14,615
2920	12	-14,661
2930	12	-14,726
2940	12	-14,772
2950	12	-14,817
2960	12	-14,883
2970	12	-14,928
2980	12	-14,994
2990	12	-15,039
3000	12	-15,085
3010	12	-15,150
3020	12	-15,196
3030	12	-15,261
3040	12	-15,307
3050	12	-15,352
3060	12	-15,418
3070	12	-15,463
3080	12	-15,529
3090	12	-15,574
3100	12	-15,620
3110	12	-15,685
3120	12	-15,731
3130	12	-15,756
3140	12	-15,794
3150	12	-15,838
3160	12	-15,865
3170	12	-15,929
3180	12	-15,965

Data rata-rata tekanan dan temperatur pengering vakum

Menit	Tekanan	Temperatur
0	0	760
10	10	30
20	20	26
30	30	25
40	40	25
50	50	24
60	60	23
70	70	23
80	80	22
90	90	22
100	100	22
110	110	22
120	120	22
130	130	21
140	140	21
150	150	21
160	160	21
170	170	21
180	180	21
190	190	21
200	200	21
210	210	21
220	220	21
230	230	21
240	240	21
250	250	21
260	260	21
270	270	21
280	280	21
290	290	21
300	300	21
310	310	21
320	320	21
330	330	21
340	340	21
350	350	21

360	20,5	19,605
370	20,5	19,593
380	20,5	19,587
390	20	19,568
400	20	19,536
410	20	19,506
420	20	19,753
430	20	19,860
440	20	19,856
450	20	19,866
460	20	19,865
470	20	19,867
480	20	19,879
490	21	20,555
500	21	20,759
510	21	20,877
520	21	20,888
530	21	20,886
540	21	20,901
550	22	20,911
560	22	20,896
570	22	20,910
580	22	20,939
590	22	20,941
600	22	20,961
610	22	20,986
620	22	20,995
630	23	20,996
640	23	20,986
650	23	20,990
660	23	20,992
670	23	21,988
680	23	21,977
690	23	21,992
700	23	21,977
710	23	21,977

720	23	21,965
730	23	21,950
740	24	21,950
750	24	21,939
760	24	21,914
770	24	21,903
780	24	21,908
790	24	21,917
800	24	21,906
810	24	21,804
820	24	21,804
830	24	21,896
840	24	21,887
850	24	22,813
860	26	22,888
870	26	22,880
880	26	22,827
890	26	22,859
900	26	22,846
910	26	22,840
920	28	22,839
930	28	22,830
940	28	22,806
950	28	22,852
960	28	22,804
970	28	22,811
980	28	22,824
990	30	23,229
1000	30	23,377
1010	30	23,371
1020	30	23,366
1030	30	23,372
1040	30	23,385
1050	31	23,398
1060	31	23,422
1070	31	23,427

1080	31	23,457
1090	31	23,516
1100	31	23,557
1110	31	23,579
1120	31	23,595
1130	32	23,625
1140	32	23,639
1150	32	23,648
1160	32	23,673
1170	32	23,674
1180	32	23,688
1190	32	23,728
1200	32	23,759
1210	32	23,793
1220	32	23,823
1230	32	23,837
1240	32	23,863
1250	32	23,910
1260	32	23,921
1270	32	23,948
1280	32	23,984
1290	33	23,948
1300	33	23,985
1310	33	24,081
1320	33	24,105
1330	33	24,118
1340	33	24,139
1350	33	24,146
1360	33	24,160
1370	33	24,178
1380	33	24,190
1390	33	24,197
1400	33	24,207
1410	34	24,230
1420	34	24,271
1430	34	24,308

1440	34	24,343		1800	38	24,814		2160	45	24,964		2520	49	24,964
1450	34	24,399		1810	38	24,827		2170	45	24,950		2530	50	24,894
1460	34	24,464		1820	38	24,822		2180	45	24,938		2540	50	24,868
1470	34	24,517		1830	38	24,810		2190	45	24,913		2550	50	24,885
1480	34	24,553		1840	39	24,808		2200	45	24,904		2560	50	24,897
1490	34	24,580		1850	39	24,833		2210	46	24,908		2570	50	24,906
1500	34	24,581		1860	39	24,860		2220	46	24,916		2580	50	24,945
1510	35	24,592		1870	39	24,855		2230	46	24,905		2590	50	24,978
1520	35	24,573		1880	39	24,868		2240	46	24,897		2600	50	24,993
1530	35	24,571		1890	40	24,865		2250	46	24,897		2610	51	25,007
1540	35	24,561		1900	40	24,867		2260	46	24,895		2620	51	25,021
1550	35	24,569		1910	40	24,879		2270	46	24,894		2630	51	25,035
1560	35	24,590		1920	40	24,855		2280	47	24,888		2640	51	25,050
1570	35	24,598		1930	40	24,860		2290	47	24,884		2650	51	25,064
1580	35	24,598		1940	40	24,879		2300	47	24,888		2660	51	25,078
1590	35	24,599		1950	41	24,887		2310	47	24,881		2670	51	25,092
1600	35	24,597		1960	41	24,887		2320	47	24,910		2680	52	25,106
1610	35	24,597		1970	41	24,902		2330	47	24,859		2690	52	25,121
1620	36	24,606		1980	41	24,911		2340	47	24,845		2700	52	25,135
1630	36	24,645		1990	41	24,897		2350	48	24,840		2710	52	25,149
1640	36	24,671		2000	41	24,910		2360	48	24,838		2720	52	25,163
1650	36	24,694		2010	42	24,941		2370	48	24,830		2730	52	25,177
1660	36	24,717		2020	42	24,941		2380	48	24,806		2740	53	25,192
1670	36	24,808		2030	42	24,997		2390	48	24,795		2750	53	25,206
1680	36	24,830		2040	42	24,988		2400	48	24,805		2760	53	25,220
1690	36	24,823		2050	42	24,875		2410	48	24,810		2770	53	25,234
1700	36	24,801		2060	42	24,996		2420	48	24,826		2780	53	25,248
1710	37	24,809		2070	43	24,993		2430	48	24,844		2790	54	25,263
1720	37	24,802		2080	43	24,989		2440	49	24,858		2800	54	25,277
1730	37	24,790		2090	43	24,991		2450	49	24,846		2810	54	25,291
1740	37	24,803		2100	43	24,989		2460	49	24,865		2820	54	25,305
1750	37	24,792		2110	43	24,983		2470	49	24,891		2830	54	25,319
1760	37	24,814		2120	44	24,990		2480	49	24,905		2840	55	25,334
1770	37	24,804		2130	44	24,977		2490	49	24,921		2850	55	25,348
1780	37	24,790		2140	44	24,976		2500	49	24,941		2860	55	25,362
1790	38	24,798		2150	45	24,976		2510	49	24,954		2870	55	25,376
												2880	55	25,390

Data kadar air pada setiap metode pengeringan

PENGERINGAN BEKU LALU VAKUM	
Kadar Air setelah Pengeringan (%) (alat)	
Waktu (Jam)	Kadar Air
0	80,4
3	68,1
5	65,6
7	63,1
48	30,7

PENGERINGAN VAKUM	
Kadar Air setelah Pengeringan (%) (alat)	
Waktu (Jam)	Kadar Air
0	80,4
3	66,8
5	60,3
7	57,2
48	34,1

PENGERINGAN BEKU VAKUM HINGGA -1°C	
Kadar Air setelah Pengeringan (%) (alat)	
Waktu (Jam)	Kadar Air
0	80,4
3	62,5
5	50,7
7	48,7
48	33,9

PENGERINGAN BEKU VAKUM 53 JAM	
Kadar Air setelah Pengeringan (%) (alat)	
Waktu (Jam)	Kadar Air
0	80,4
3	72,2
5	66,9
7	62,4
48	42,2
53	35,0

Lampiran 2. Referensi Perhitungan

Table 1. Freon™ 134a Saturation Properties—Temperature Table

Temp [°C]	Pressure	Volume [m ³ /kg]		Density [kg/m ³]		Enthalpy [kJ/kg]			Entropy [kJ/(kg·K)]		Temp [°C]
	kPa (abs)	Liquid v_f	Vapor v_g	Liquid $1/v_f$	Vapor $1/v_g$	Liquid h_f	Latent h_{fg}	Vapor h_g	Liquid s_f	Vapor s_g	
-100	0.57	0.0006	25.0000	1580.5	0.040	77.3	259.9	337.2	0.4448	1.9460	-100
-99	0.63	0.0006	22.7273	1577.8	0.044	78.4	259.4	337.8	0.4514	1.9407	-99
-98	0.70	0.0006	20.4082	1575.0	0.049	79.6	258.8	338.4	0.4581	1.9356	-98
-97	0.77	0.0006	18.5185	1572.3	0.054	80.7	258.2	339.0	0.4646	1.9306	-97
-96	0.86	0.0006	16.9492	1569.5	0.059	81.9	257.7	339.6	0.4711	1.9257	-96
-95	0.95	0.0006	15.3846	1566.8	0.065	83.0	257.1	340.1	0.4776	1.9209	-95
-94	1.04	0.0006	13.8889	1564.1	0.072	84.2	256.6	340.7	0.4841	1.9161	-94
-93	1.15	0.0006	12.6582	1561.3	0.079	85.3	256.0	341.3	0.4905	1.9115	-93
-92	1.27	0.0006	11.6279	1558.6	0.086	86.5	255.4	341.9	0.4968	1.9070	-92
-91	1.40	0.0006	10.6383	1555.8	0.094	87.6	254.9	342.5	0.5032	1.9025	-91
-90	1.53	0.0006	9.7087	1553.1	0.103	88.8	254.3	343.1	0.5095	1.8982	-90
-89	1.68	0.0006	8.9286	1550.4	0.112	89.9	253.8	343.7	0.5158	1.8939	-89
-88	1.84	0.0006	8.1967	1547.6	0.122	91.1	253.2	344.3	0.5220	1.8898	-88
-87	2.02	0.0006	7.5188	1544.9	0.133	92.3	252.7	344.9	0.5282	1.8857	-87
-86	2.20	0.0006	6.8966	1542.1	0.145	93.4	252.1	345.5	0.5344	1.8817	-86
-85	2.41	0.0006	6.3291	1539.4	0.158	94.6	251.6	346.2	0.5406	1.8778	-85
-84	2.63	0.0007	5.8480	1536.7	0.171	95.7	251.0	346.8	0.5467	1.8739	-84
-83	2.86	0.0007	5.4054	1533.9	0.185	96.9	250.5	347.4	0.5528	1.8702	-83
-82	3.11	0.0007	4.9751	1531.2	0.201	98.0	249.9	348.0	0.5589	1.8665	-82
-81	3.39	0.0007	4.6083	1528.5	0.217	99.2	249.4	348.6	0.5650	1.8629	-81
-80	3.68	0.0007	4.2553	1525.7	0.235	100.4	248.8	349.2	0.5710	1.8594	-80
-79	3.99	0.0007	3.9526	1523.0	0.253	101.5	248.3	349.8	0.5770	1.8559	-79
-78	4.33	0.0007	3.6630	1520.2	0.273	102.7	247.7	350.4	0.5830	1.8525	-78
-77	4.69	0.0007	3.3898	1517.5	0.295	103.9	247.2	351.1	0.5890	1.8492	-77
-76	5.07	0.0007	3.1546	1514.8	0.317	105.0	246.6	351.7	0.5949	1.846	-76
-75	5.48	0.0007	2.9326	1512.0	0.341	106.2	246.1	352.3	0.6009	1.8428	-75
-74	5.92	0.0007	2.7248	1509.3	0.367	107.4	245.5	352.9	0.6068	1.8397	-74
-73	6.39	0.0007	2.5381	1506.5	0.394	108.6	245.0	353.5	0.6126	1.8366	-73
-72	6.89	0.0007	2.3641	1503.8	0.423	109.7	244.4	354.2	0.6185	1.8336	-72
-71	7.42	0.0007	2.2075	1501.0	0.453	110.9	243.9	354.8	0.6243	1.8307	-71
-70	7.98	0.0007	2.0576	1498.3	0.486	112.1	243.3	355.4	0.6302	1.8279	-70
-69	8.58	0.0007	1.9231	1495.5	0.520	113.3	242.8	356.0	0.6360	1.8251	-69
-68	9.22	0.0007	1.7986	1492.8	0.556	114.5	242.2	356.6	0.6417	1.8223	-68
-67	9.89	0.0007	1.6835	1490.0	0.594	115.6	241.6	357.3	0.6475	1.8196	-67
-66	10.61	0.0007	1.5773	1487.3	0.634	116.8	241.1	357.9	0.6532	1.817	-66
-65	11.37	0.0007	1.4771	1484.5	0.677	118.0	240.5	358.5	0.6590	1.8144	-65
-64	12.18	0.0007	1.3850	1481.8	0.722	119.2	239.9	359.2	0.6647	1.8119	-64
-63	13.03	0.0007	1.3004	1479.0	0.769	120.4	239.4	359.8	0.6704	1.8095	-63
-62	13.93	0.0007	1.2210	1476.3	0.819	121.6	238.8	360.4	0.6760	1.8071	-62
-61	14.88	0.0007	1.1481	1473.5	0.871	122.8	238.2	361.0	0.6817	1.8047	-61
-60	15.89	0.0007	1.0799	1470.7	0.926	124.0	237.7	361.7	0.6873	1.8024	-60
-59	16.95	0.0007	1.0163	1468.0	0.984	125.2	237.1	362.3	0.6929	1.8001	-59
-58	18.07	0.0007	0.9579	1465.2	1.044	126.4	236.5	362.9	0.6985	1.7979	-58
-57	19.25	0.0007	0.9025	1462.4	1.108	127.6	236.0	363.6	0.7041	1.7958	-57
-56	20.49	0.0007	0.8511	1459.6	1.175	128.8	235.4	364.2	0.7097	1.7937	-56
-55	21.80	0.0007	0.8032	1456.9	1.245	130.0	234.8	364.8	0.7152	1.7916	-55
-54	23.17	0.0007	0.7587	1454.1	1.318	131.2	234.2	365.4	0.7208	1.7896	-54
-53	24.62	0.0007	0.7168	1451.3	1.395	132.4	233.6	366.1	0.7263	1.7876	-53
-52	26.14	0.0007	0.6775	1448.5	1.476	133.7	233.1	366.7	0.7318	1.7857	-52
-51	27.73	0.0007	0.6410	1445.7	1.560	134.9	232.5	367.3	0.7373	1.7838	-51
-50	29.41	0.0007	0.6068	1442.9	1.648	136.1	231.9	368.0	0.7428	1.7819	-50
-49	31.16	0.0007	0.5747	1440.1	1.740	137.3	231.3	368.6	0.7482	1.7801	-49
-48	33.00	0.0007	0.5447	1437.3	1.836	138.5	230.7	369.2	0.7537	1.7783	-48
-47	34.93	0.0007	0.5165	1434.5	1.936	139.8	230.1	369.9	0.7591	1.7766	-47
-46	36.95	0.0007	0.4902	1431.6	2.040	141.0	229.5	370.5	0.7645	1.7749	-46
-45	39.06	0.0007	0.4653	1428.8	2.149	142.2	228.9	371.1	0.7699	1.7732	-45
-44	41.27	0.0007	0.4419	1426.0	2.263	143.5	228.3	371.8	0.7753	1.7716	-44
-43	43.58	0.0007	0.4198	1423.2	2.382	144.7	227.7	372.4	0.7806	1.77	-43
-42	45.99	0.0007	0.3992	1420.3	2.505	145.9	227.1	373.0	0.7860	1.7685	-42
-41	48.51	0.0007	0.3798	1417.5	2.633	147.2	226.5	373.7	0.7913	1.767	-41
-40	51.14	0.0007	0.3614	1414.6	2.767	148.4	225.9	374.3	0.7967	1.7655	-40

Table 1. Freon™ 134a Saturation Properties—Temperature Table (continued)

Temp [°C]	Pressure	Volume [m³/kg]		Density [kg/m³]		Enthalpy [kJ/kg]			Entropy [kJ/(kg·K)]		Temp [°C]
	kPa (abs)	Liquid v_f	Vapor v_g	Liquid ρ_f	Vapor ρ_g	Liquid h_f	Latent h_{fg}	Vapor h_g	Liquid s_f	Vapor s_g	
-39	53.88	0.0007	0.3441	1411.8	2.906	149.6	225.3	374.9	0.8020	1.7641	-39
-38	56.74	0.0007	0.3279	1408.9	3.050	150.9	224.7	375.5	0.8073	1.7627	-38
-37	59.72	0.0007	0.3125	1406.0	3.200	152.1	224.0	376.2	0.8126	1.7613	-37
-36	62.83	0.0007	0.2980	1403.1	3.356	153.4	223.4	376.8	0.8178	1.7599	-36
-35	66.07	0.0007	0.2843	1400.2	3.518	154.6	222.8	377.4	0.8231	1.7586	-35
-34	69.43	0.0007	0.2713	1397.4	3.686	155.9	222.2	378.1	0.8283	1.7573	-34
-33	72.93	0.0007	0.2590	1394.5	3.861	157.1	221.5	378.7	0.8336	1.7561	-33
-32	76.58	0.0007	0.2474	1391.5	4.042	158.4	220.9	379.3	0.8388	1.7548	-32
-31	80.36	0.0007	0.2365	1388.6	4.229	159.7	220.3	379.9	0.8440	1.7536	-31
-30	84.29	0.0007	0.2260	1385.7	4.424	160.9	219.6	380.6	0.8492	1.7525	-30
-29	88.37	0.0007	0.2162	1382.8	4.625	162.2	219.0	381.2	0.8544	1.7513	-29
-28	92.61	0.0007	0.2069	1379.8	4.833	163.5	218.3	381.8	0.8595	1.7502	-28
-27	97.02	0.0007	0.1981	1376.9	5.049	164.7	217.7	382.4	0.8647	1.7491	-27
-26	101.58	0.0007	0.1896	1373.9	5.273	166.0	217.1	383.1	0.8698	1.7481	-26
-25	106.32	0.0007	0.1817	1371.0	5.504	167.3	216.4	383.7	0.8750	1.747	-25
-24	111.22	0.0007	0.1741	1368.0	5.743	168.6	215.7	384.3	0.8801	1.746	-24
-23	116.31	0.0007	0.1669	1365.0	5.991	169.8	215.1	384.9	0.8852	1.745	-23
-22	121.57	0.0007	0.1601	1362.0	6.247	171.1	214.4	385.5	0.8903	1.744	-22
-21	127.02	0.0007	0.1536	1359.0	6.511	172.4	213.7	386.2	0.8954	1.7431	-21
-20	132.67	0.0007	0.1474	1356.0	6.784	173.7	213.1	386.8	0.9005	1.7422	-20
-19	138.50	0.0007	0.1415	1353.0	7.066	175.0	212.4	387.4	0.9055	1.7413	-19
-18	144.54	0.0007	0.1359	1349.9	7.357	176.3	211.7	388.0	0.9106	1.7404	-18
-17	150.78	0.0007	0.1306	1346.9	7.658	177.6	211.0	388.6	0.9157	1.7395	-17
-16	157.23	0.0007	0.1255	1343.8	7.968	178.9	210.4	389.2	0.9207	1.7387	-16
-15	163.90	0.0007	0.1207	1340.8	8.288	180.2	209.7	389.8	0.9257	1.7379	-15
-14	170.78	0.0007	0.1160	1337.7	8.618	181.5	209.0	390.4	0.9307	1.7371	-14
-13	177.89	0.0007	0.1116	1334.6	8.958	182.8	208.3	391.1	0.9357	1.7363	-13
-12	185.22	0.0008	0.1074	1331.5	9.309	184.1	207.6	391.7	0.9407	1.7356	-12
-11	192.79	0.0008	0.1034	1328.4	9.671	185.4	206.9	392.3	0.9457	1.7348	-11
-10	200.60	0.0008	0.0996	1325.3	10.044	186.7	206.2	392.9	0.9507	1.7341	-10
-9	208.65	0.0008	0.0959	1322.1	10.428	188.0	205.4	393.5	0.9557	1.7334	-9
-8	216.95	0.0008	0.0924	1319.0	10.823	189.3	204.7	394.1	0.9606	1.7327	-8
-7	225.50	0.0008	0.0890	1315.8	11.231	190.7	204.0	394.7	0.9656	1.7321	-7
-6	234.32	0.0008	0.0858	1312.6	11.650	192.0	203.3	395.3	0.9705	1.7314	-6
-5	243.39	0.0008	0.0828	1309.4	12.082	193.3	202.5	395.9	0.9755	1.7308	-5
-4	252.74	0.0008	0.0798	1306.2	12.526	194.6	201.8	396.4	0.9804	1.7302	-4
-3	262.36	0.0008	0.0770	1303.0	12.983	196.0	201.1	397.0	0.9853	1.7295	-3
-2	272.26	0.0008	0.0743	1299.8	13.454	197.3	200.3	397.6	0.9902	1.729	-2
-1	282.45	0.0008	0.0718	1296.5	13.937	198.7	199.6	398.2	0.9951	1.7284	-1
0	292.93	0.0008	0.0693	1293.3	14.435	200.0	198.8	398.8	1.0000	1.7278	0
1	303.70	0.0008	0.0669	1290.0	14.946	201.3	198.0	399.4	1.0049	1.7273	1
2	314.77	0.0008	0.0646	1286.7	15.472	202.7	197.3	400.0	1.0098	1.7267	2
3	326.16	0.0008	0.0624	1283.4	16.013	204.0	196.5	400.5	1.0146	1.7262	3
4	337.85	0.0008	0.0604	1280.1	16.569	205.4	195.7	401.1	1.0195	1.7257	4
5	349.87	0.0008	0.0583	1276.7	17.140	206.8	194.9	401.7	1.0244	1.7252	5
6	362.21	0.0008	0.0564	1273.4	17.726	208.1	194.2	402.3	1.0292	1.7247	6
7	374.88	0.0008	0.0546	1270.0	18.329	209.5	193.4	402.8	1.0340	1.7242	7
8	387.88	0.0008	0.0528	1266.6	18.948	210.8	192.6	403.4	1.0389	1.7238	8
9	401.23	0.0008	0.0511	1263.2	19.583	212.2	191.8	404.0	1.0437	1.7233	9
10	414.92	0.0008	0.0494	1259.8	20.236	213.6	190.9	404.5	1.0485	1.7229	10
11	428.97	0.0008	0.0478	1256.3	20.906	215.0	190.1	405.1	1.0533	1.7224	11
12	443.37	0.0008	0.0463	1252.9	21.594	216.4	189.3	405.6	1.0582	1.722	12
13	458.11	0.0008	0.0448	1249.4	22.301	217.7	188.5	406.2	1.0630	1.7216	13
14	473.25	0.0008	0.0434	1245.9	23.026	219.1	187.6	406.8	1.0678	1.7212	14
15	488.78	0.0008	0.0421	1242.3	23.770	220.5	186.8	407.3	1.0726	1.7208	15
16	504.68	0.0008	0.0408	1238.8	24.533	221.9	185.9	407.8	1.0773	1.7204	16
17	520.98	0.0008	0.0395	1235.2	25.317	223.3	185.1	408.4	1.0821	1.72	17
18	537.67	0.0008	0.0383	1231.6	26.121	224.7	184.2	408.9	1.0869	1.7196	18
19	554.76	0.0008	0.0371	1228.0	26.945	226.1	183.3	409.5	1.0917	1.7192	19
20	572.25	0.0008	0.0360	1224.4	27.791	227.5	182.5	410.0	1.0964	1.7189	20
21	590.16	0.0008	0.0349	1220.7	28.659	228.9	181.6	410.5	1.1012	1.7185	21

TABLE B.1.1 (continued)

Saturated Water

Temp. (°C)	Press. (kPa)	Enthalpy, kJ/kg			Entropy, kJ/kg-K		
		Sat. Liquid h_f	Evap. h_{fg}	Sat. Vapor h_g	Sat. Liquid s_f	Evap. s_{fg}	Sat. Vapor s_g
0.01	0.6113	0.00	2501.35	2501.35	0	9.1562	9.1562
5	0.8721	20.98	2489.57	2510.54	0.0761	8.9496	9.0257
10	1.2276	41.99	2477.75	2519.74	0.1510	8.7498	8.9007
15	1.705	62.98	2465.93	2528.91	0.2245	8.5569	8.7813
20	2.339	83.94	2454.12	2538.06	0.2966	8.3706	8.6671
25	3.169	104.87	2442.30	2547.17	0.3673	8.1905	8.5579
30	4.246	125.77	2430.48	2556.25	0.4369	8.0164	8.4533
35	5.628	146.66	2418.62	2565.28	0.5052	7.8478	8.3530
40	7.384	167.54	2406.72	2574.26	0.5724	7.6845	8.2569
45	9.593	188.42	2394.77	2583.19	0.6386	7.5261	8.1647
50	12.350	209.31	2382.75	2592.06	0.7037	7.3725	8.0762
55	15.758	230.20	2370.66	2600.86	0.7679	7.2234	7.9912
60	19.941	251.11	2358.48	2609.59	0.8311	7.0784	7.9095
65	25.03	272.03	2346.21	2618.24	0.8934	6.9375	7.8309
70	31.19	292.96	2333.85	2626.80	0.9548	6.8004	7.7552
75	38.58	313.91	2321.37	2635.28	1.0154	6.6670	7.6824
80	47.39	334.88	2308.77	2643.66	1.0752	6.5369	7.6121
85	57.83	355.88	2296.05	2651.93	1.1342	6.4102	7.5444
90	70.14	376.90	2283.19	2660.09	1.1924	6.2866	7.4790
95	84.55	397.94	2270.19	2668.13	1.2500	6.1659	7.4158
100	101.3	419.02	2257.03	2676.05	1.3068	6.0480	7.3548
105	120.8	440.13	2243.70	2683.83	1.3629	5.9328	7.2958
110	143.3	461.27	2230.20	2691.47	1.4184	5.8202	7.2386
115	169.1	482.46	2216.50	2698.96	1.4733	5.7100	7.1832
120	198.5	503.69	2202.61	2706.30	1.5275	5.6020	7.1295
125	232.1	524.96	2188.50	2713.46	1.5812	5.4962	7.0774
130	270.1	546.29	2174.16	2720.46	1.6343	5.3925	7.0269
135	313.0	567.67	2159.59	2727.26	1.6869	5.2907	6.9777
140	361.3	589.11	2144.75	2733.87	1.7390	5.1908	6.9298
145	415.4	610.61	2129.65	2740.26	1.7906	5.0926	6.8832
150	475.9	632.18	2114.26	2746.44	1.8417	4.9960	6.8378
155	543.1	653.82	2098.56	2752.39	1.8924	4.9010	6.7934
160	617.8	675.53	2082.55	2758.09	1.9426	4.8075	6.7501
165	700.5	697.32	2066.20	2763.53	1.9924	4.7153	6.7078
170	791.7	719.20	2049.50	2768.70	2.0418	4.6244	6.6663
175	892.0	741.16	2032.42	2773.58	2.0909	4.5347	6.6256
180	1002.2	763.21	2014.96	2778.16	2.1395	4.4461	6.5857
185	1122.7	785.36	1997.07	2782.43	2.1878	4.3586	6.5464
190	1254.4	807.61	1978.76	2786.37	2.2358	4.2720	6.5078

Lampiran 3. Dokumentasi Penelitian





