Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Low-GWP Alternative Refrigerants Evaluation Program (Low-GWP AREP)

TEST REPORT #59

Compressor Calorimeter Test of Refrigerants L41-1, DR-5A, ARM-71a, D2Y-60 and R-32 in a R-410A Reciprocating Piston Compressor

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List of Tested Refrigerants' Composition (Mass %)

R-410A	R-32/R-125 (50/50)
L41-1	R-32/R-1234ze/R-600 (68/29/3)
DR-5A	R-32/R-1234yf (68.9/31.1)
ARM-71a	R-32/R-1234yf/R1234ze (68/26/6)
D2Y-60	R-32/R-1234yf (40/60)
R-32	R-32 (100)

1. Introduction

   As a contribution to Phase II of the AHRI Low-GWP Alternative Refrigerants Evaluation Program (AREP), this report presents the results of performance tests of five Low-GWP refrigerants L41-1, DR-5A, ARM-71a, D2Y-60 and R-32, and compares the results with R-410A. Tests conditions spanned the air conditioning application envelope. Suction pressures ranged from a dew point of -10^{o}F to 55^{o}F. Discharge pressures ranged from a dew point of 80^{o}F to 150^{o}F. All tests were performed with 20^{o}F superheat and 15^{o}F subcooling.

   It should be noted that the test compressor used is a production compressor specifically designed for R-410A. The new refrigerants may give slightly better performance with compressors optimized for them. Also, the lubricant was changed from a standard 32 cSt POE to a 64 cSt POE specifically formulated for R32 and refrigerant blends with high concentrations of R32. Therefore the change in performance may be due in part to the different lubricant.

2. Test Setup:

   a. Description of Test Refrigerants

      The composition of the baseline R-410A and five Low-GWP refrigerants tested are shown in Table 1. Glide is for a 45 ^{o}F evaporator. GWP values use a 100 year integration time horizon and data from IPPC AR4.

Table 1: All Refrigerants Tested

	Composition (Mass %)	GWP	Glide	Manufacturer
R-410A	R-32/R-125 (50/50)	2088	0.2 ^{o}F	various
L41-1	R-32/R-1234ze/R-600 (68/29/3)	461	8.4 ^{o}F	Honeywell
DR-5A	R-32/R-1234yf (68.9/31.1)	466	2.9 ^{o}F	Chemours
ARM-71a	R-32/R-1234yf/R1234ze (68/26/6)	482	3.5 ^{o}F	Arkema
D2Y-60	R-32/R-1234yf (40/60)	272	8.6 ^{o}F	Daikin
R-32	R-32 (100)	675	0 ^{o}F	various

   b. Description of Lubricants

      The lubricant used for the R-410A testing is 32BCE, an ISO 32 Polyolester oil (POE). This is the original lubricant shipped with the production compressor. The compressor was charged with 30 oz. of oil.

The Low-GWP refrigerants were tested with HXL-8849, a special ISO 64 POE made by Chemtura for use with R32 and refrigerant blends with high R-32 concentrations. The compressor was charged with 30 oz. of this oil.

c. Description of Compressor

The compressor used for this test was a high-efficiency reciprocating piston compressor made by Bristol Compressors International, Inc. The compressor specification are presented in Table 2.

Table 2: Test Compressor Specification

Model No.	H84B223ABC
Capacity	22,220 BTU/hr @ AHRI 45/130 Rating Point
Motor Input	2150 watts
EER	10.3 BTU/W-hr
RLA	9.5 amps
Displacement	1.862 cu.in/rev
Voltage	230/208-1-60hz

No modifications were made to the compressor other than to change oil from the standard POE after baseline testing with R-410A to the special POE used for the Low-GWP blends. The compressor was "run-in" for 72 hours on R-410A before testing.

d. Description of Calorimeter Test Facilities

The performance testing was done on the 36,000 BTU/hr calorimeter located at the Heat Exchanger Advanced Testing Facility at Oak Ridge National Laboratory. These tests were conducted from April through June of 2015.

The calorimeter test loop consists of a compressor, a condenser, a sub-cooler, three electronic expansion valves, and an evaporator. Suction pressure, suction temperature, liquid temperature, compressor chamber air temperature, and discharge pressure are controlled independently by controlling the electronic expansion valve, evaporator heater, secondary glycol temperature, heating or cooling the air within the compressor chamber, and temperature of the condenser, respectively.

The compressor chamber air temperature was maintained between 94^{o}F and 96^{o}F. The compressor was uninsulated and airflow over the compressor was provided by two small fans with a total airflow rate of 750 CFM.

Figure 1 shows the schematic of the test loop and location of various sensors. Table 3 lists the accuracy of the test instruments used in the calorimeter.

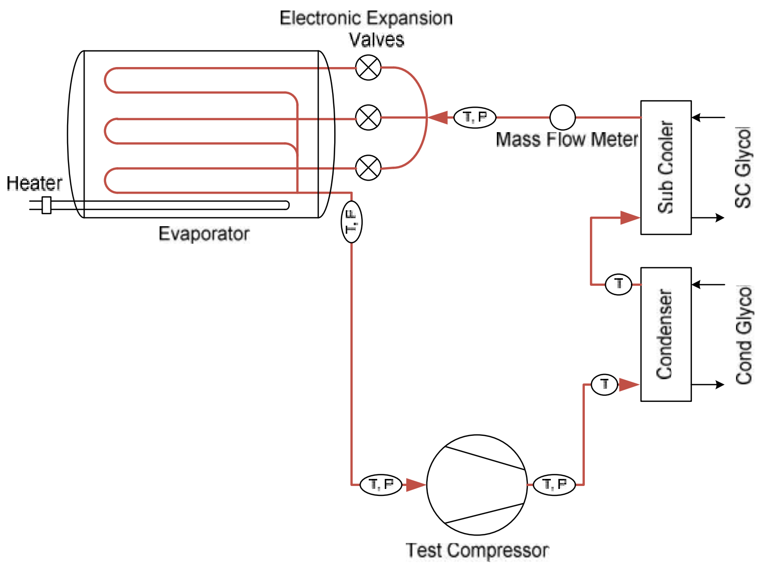

Figure 1: Location of various sensors in the test loop.

Table 3: Accuracy of test instruments

Instrument	Measured Parameter	Measurement Range	Accuracy
RTDs (tolerance class A)	Temperature	-58 ^{o}F to 572 ^{o}F	±0.40 ^{o}F
Micro Motion Elite CMF025 Coriolis mass flow meter	Refrigerant mass flow rate	25 lbm/min	0.10%
Honeywell Pressure Transmitter 060-F444-02	High side refrigerant pressure	750 psia	0.25% F.S.
Omega Pressure Transmitter PX409-250-AI	Low side refrigerant pressure	250 psia	0.08% B.S.L
Yokogawa Power and Energy Meter PR300	Compressor power	26000 watts	0.50% F.S.
Yokogawa Power and Energy Meter PR300	Compressor capacity	7500 watts	0.50% F. S.

3. Results

All compressor tests are performed at a refrigerant's dew point temperature for suction and discharge pressure conditions, per AHRI Standard 540 requirements. This does not have an impact on comparing compressor performance between two or more refrigerants that do not exhibit temperature glide. However, when refrigerants exhibit temperature glide, it is important to note that actual systems operate closer to the mid-point condition.
When comparing compressor performance of one refrigerant with glide to another refrigerant without glide, or comparing two refrigerants with significantly different glides, comparison at pressures corresponding to the mid-point of the temperature glide rather than the dew point will yield results that are more representative of actual operation in a system. The typical temperature glides of the tested refrigerants are listed in Table 1.

Test results and the coefficients for the AHRI 10-Coefficient Polynomial Equation are presented in the Appendices. The polynomial equation is of the form:

$$X = C_1 + C_2 S + C_3 D + C_4 S^2 + C_5 S\,D + C_6 D^2 + C_7 S^3 + C_8 S^2 D + C_9 S D^2 + C_{10} D^3$$

Where:

C_N = Equation coefficient
S = Suction dew point temperature, ^oF
D = Discharge dew point temperature, ^oF

X can represent any of the following variables:

- Compressor Capacity, BTU/hr
- Power Input, W
- Current, A
- Mass flow rate, lbm/hr
- Isentropic efficiency, dimensionless
- Discharge Gas Temperature, ^oF

The following sections compare the performance of the Low-GWP blends with R-410A. In the following discussion, the 50 ^oF Evaporator / 110 ^oF Condenser condition (50/110) is chosen to represent a typical high efficiency air conditioning operating point

a. Honeywell L41-1

Figure 2 shows compressor capacity ratios with L41-1 relative to R-410A. At 50/110, the capacity ratio of L41-1 over R-410A is 0.84.

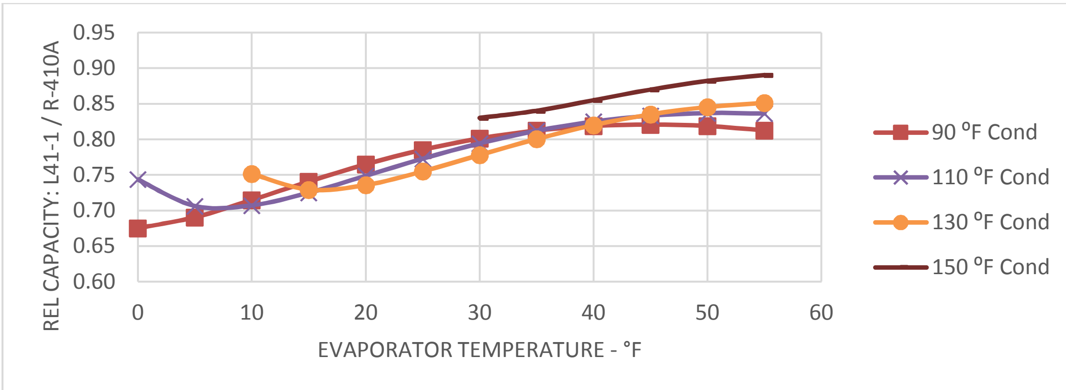

Figure 2: Compressor capacity ratios with L41-1 relative to R-410A

Figure 3 shows compressor energy efficiency ratios (EER) with L41-1 relative to R-410A. At 50/110 the EER ratio of L41-1 over R-410A is 0.97.

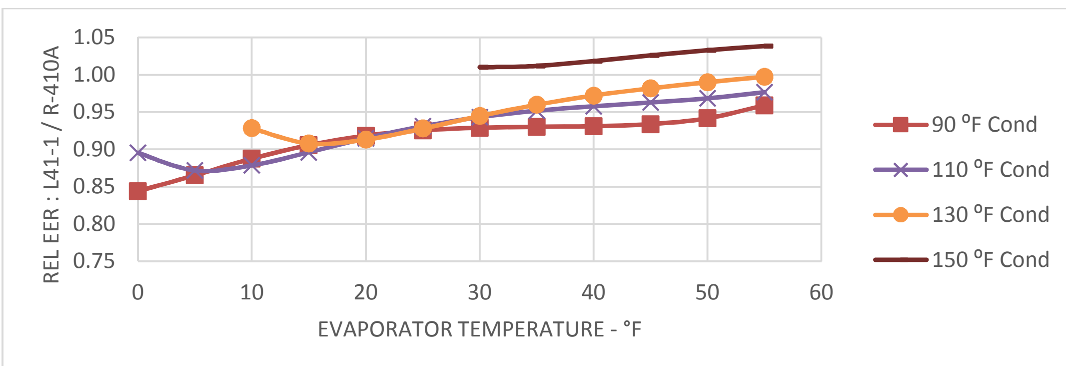

Figure 3: Compressor EER's with L41-1 relative to R-410A

Figure 4 shows compressor discharge gas temperatures with L41-1 relative to R-410A. At 50/110 the discharge gas with L41-1 is about 11 °F hotter than with R-410A.

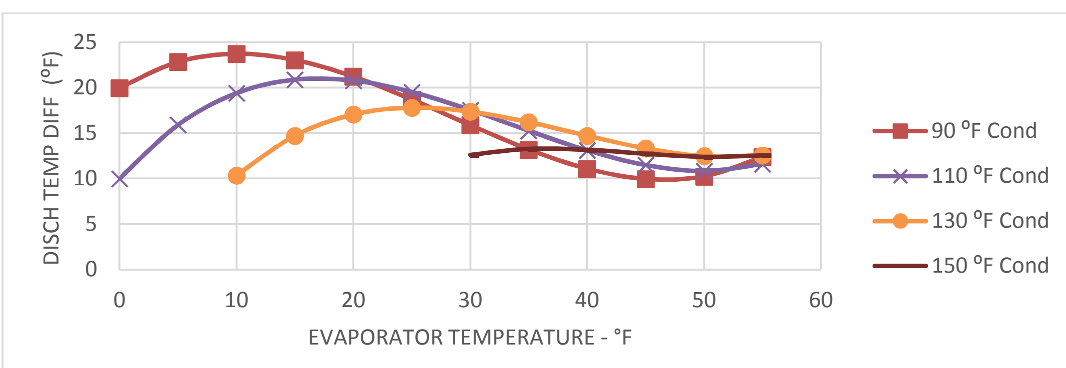

Figure 4: Compressor discharge gas temperatures with L41-1 relative to R-410A

b. Chemours DR-5A

Figure 5 shows compressor capacity ratios with DR-5A relative to R-410A. At 50/110 the capacity ratio of DR-5A over R-410A is 0.93.

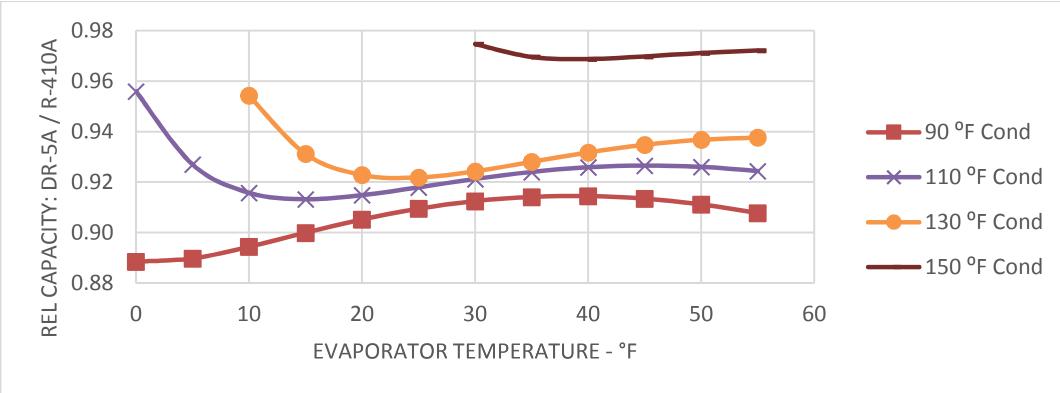

Figure 5: Compressor capacity ratios with DR-5A relative to R-410A

Figure 6 shows compressor energy efficiency ratios (EER) with DR-5A relative to R-410A. At 50/110 the EER ratio of DR-5A over R-410A is 0.98.

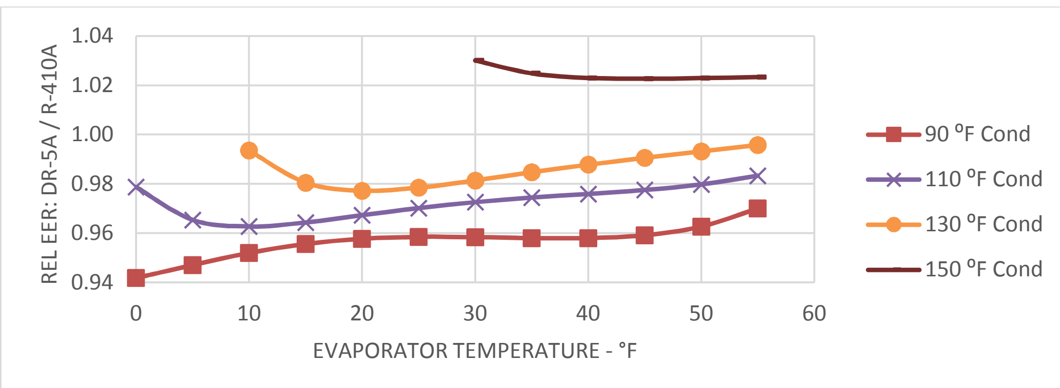

Figure 6: Compressor EER's with DR-5A relative to R-410A

Figure 7 shows discharge gas temperatures with DR-5A relative to R-410A. At 50/110 the discharge gas with DR-5A is about 8 ^{o}F hotter than with R-410A.

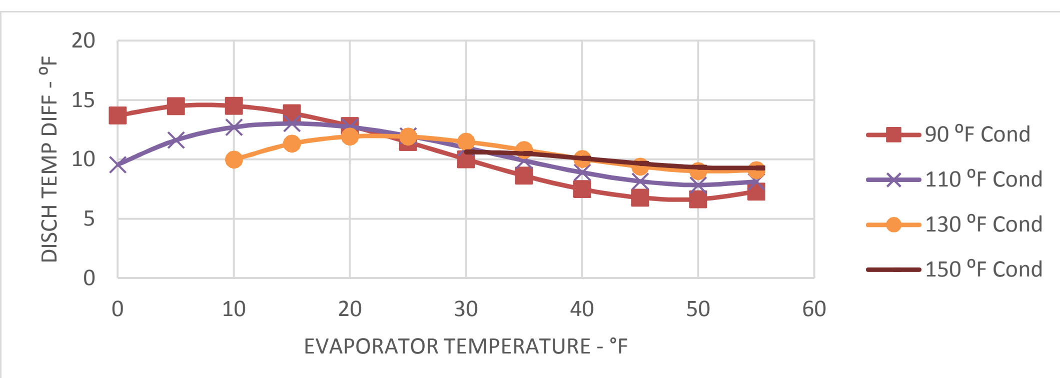

Figure 7: Compressor discharge gas temperatures with DR-5A relative to R-410A

c. Arkema ARM-71a

Figure 8 shows compressor capacity ratios with ARM-71a relative to R-410A. At 50/110 the capacity ratio of ARM-71a over R-410A is 0.91.

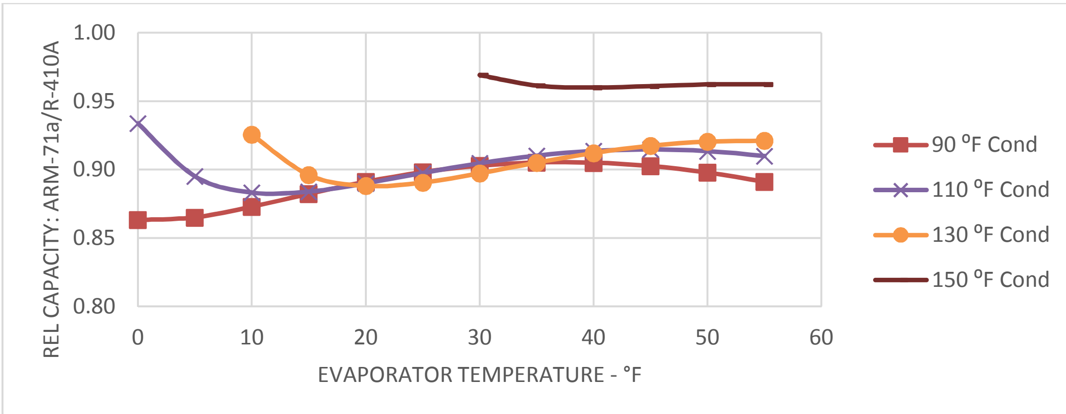

Figure 8: Compressor capacity ratios with ARM-71a relative to R-410A

Figure 9 shows compressor energy efficiency ratios (EER) with ARM-71a relative to R-410A. At 50/110 the EER ratio of ARM-71a over R-410A is 0.99.

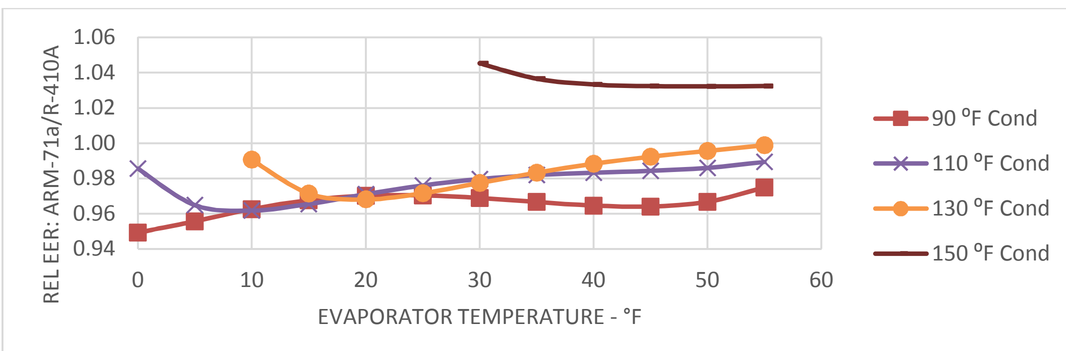

Figure 9: Compressor EER's with ARM-71a relative to R-410A

Figure 10 shows compressor discharge gas temperatures with ARM-71a relative to R-410A. At 50/110 the discharge gas with ARM-71a is about 8 ^{o}F hotter than with R-410A.

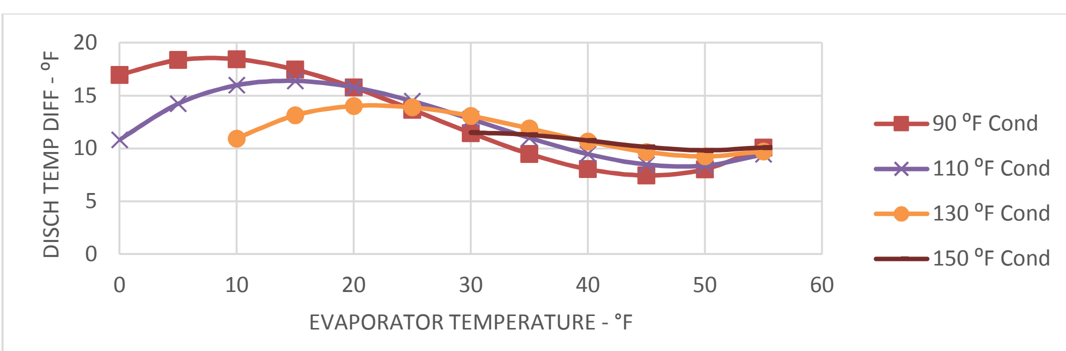

Figure 10: Compressor discharge gas temperatures with ARM-71a relative to R-410A

d. Daikin D2Y-60

Figure 11 shows compressor capacity ratios with D2Y-60 relative to R-410A. At 50/110 the capacity ratio with D2Y-60 is about 0.76.

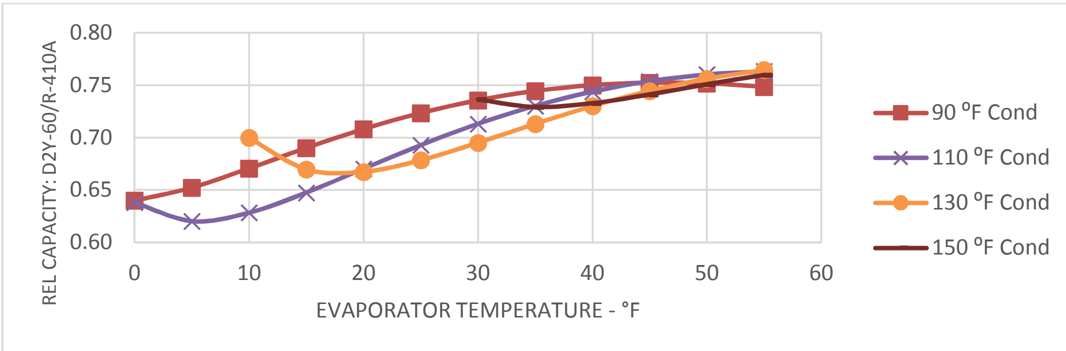

Figure 11: Compressor capacity ratios with D2Y-60 relative to R-410A

Figure 12 shows compressor energy efficiency ratios (EER) with D2Y-60 relative to R-410A. At 50/110 the EER ratio with D2Y-60 is about 0.98.

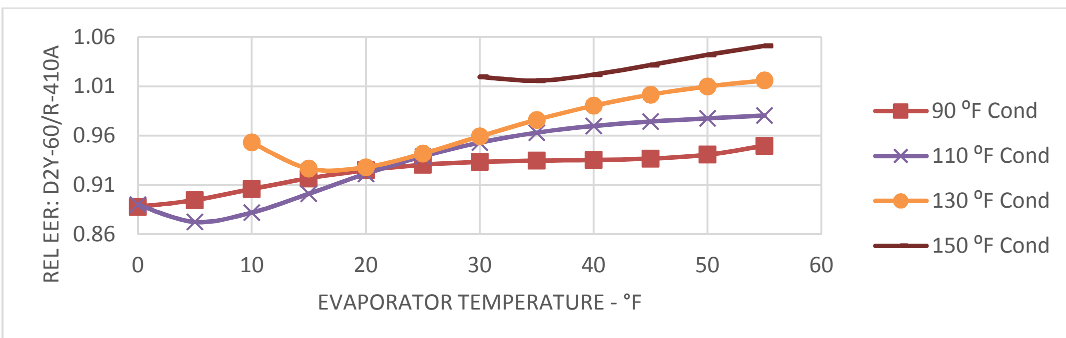

Figure 12: Compressor EER's with D2Y-60 relative to R-410A

Figure 13 shows compressor discharge gas temperatures with D2Y-60 relative to R-410A. At 50/110 the discharge gas with D2Y-60 is about 6 ^{o}F cooler than with R-410A.

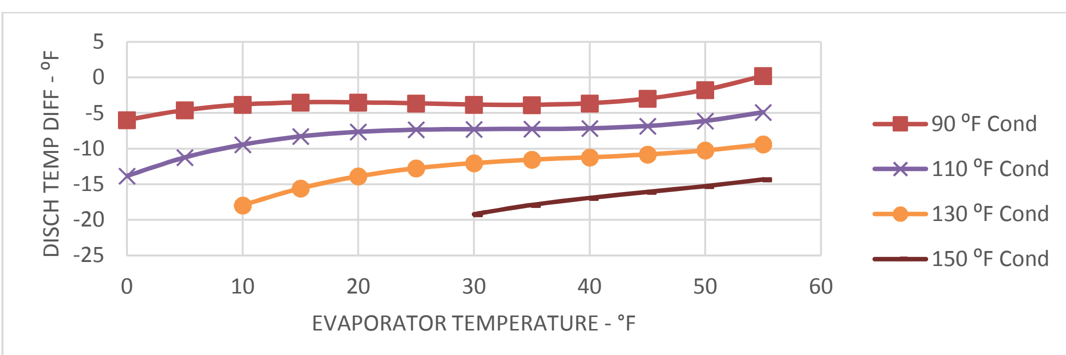

Figure 13: Compressor discharge gas temperatures with D2Y-60 relative to R-410A

e. R-32

Figure 14 shows compressor capacity ratios with R-32 relative to R-410A. At 50/110 the capacity ratio with R-32 is about 1.1.

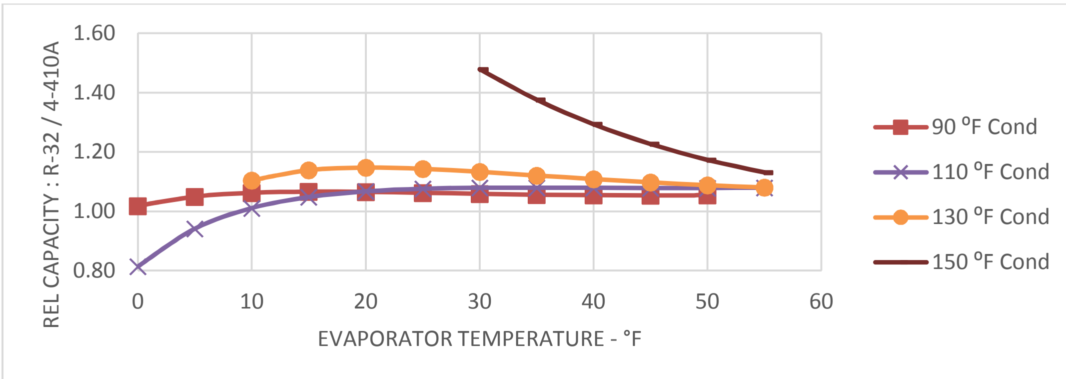

Figure 14: Compressor capacity ratios with R-32 relative to R-410A

Figure 15 shows compressor energy efficiency ratios (EER) with R-32 relative to R-410A. At 50/110 the EER ratio with R-32 is about 0.96.

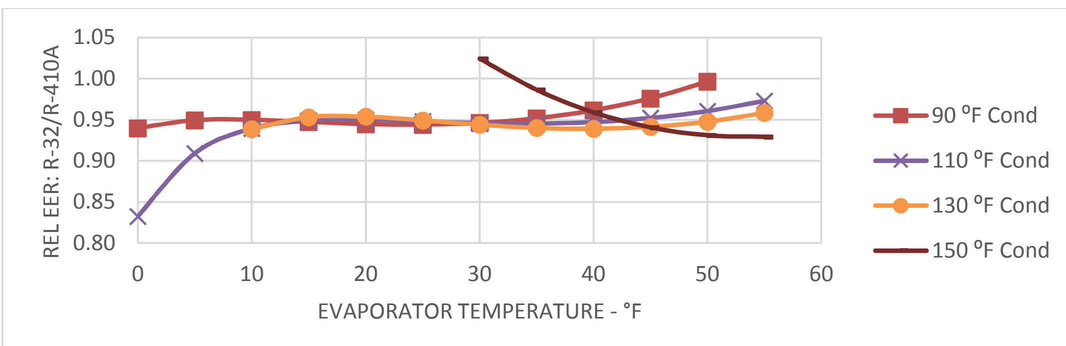

Figure 15: Compressor EER's with R-32 relative to R-410A

Figure 16 shows compressor discharge gas temperatures with R-32 relative to R-410A. At 50/110 the discharge gas with R-32 is about 27 °F hotter than with R-410A.

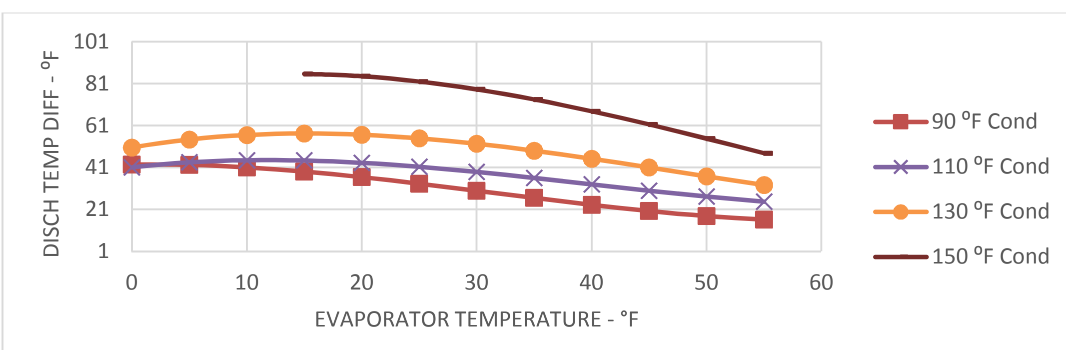

Figure 16: Compressor discharge gas temperatures with R-32 relative to R-410A

4. Conclusions

Calorimeter testing was done to establish ARI standard polynomial curve fits. The graphs in Section 3 above are taken from the resulting curves. Coefficients for the polynomial equations are presented in the appendix for each refrigerant. From the curve fit data we conclude that:

- All refrigerants tested slightly lower in EER than with R-410A, with a relative EER of 0.96 to 0.99 at 50/110 ^oF. R-32 tested lowest. ARM-71a tested highest.
- DR-5A gives the relative capacity that is closest to R-410A at 50/110 ^oF
- R-32 gives the highest relative capacity with value of 1.09 at 50/110 ^oF.
- Discharge temperature with R-32 were higher by 27 ^oF at 50/110 ^oF. Discharge temperatures with L41-1, DR-5A, and ARM-71a are 5 to 10F higher than with R410A at 50/110 ^oF. Discharge temperatures were 6 ^oF lower with D2Y-60.

Note that the polynomial curves evaluated at 50/110 ^oF differ slightly from the experimental data at this point. The above conclusions are based on the curves, not the experimental data.

It should also be noted that an ISO 64 viscosity oil was used with R-32 and the Low-GWP blends, while an ISO 32 oil was used with R-410A. This is because R-32 dilutes POE oil more than R-410A, reducing the working viscosity of the oil-refrigerant mixture. The higher viscosity oil chosen for the Low-GWP refrigerants was an attempt to ensure, across the various operating conditions, that the working viscosity was not reduced. If a lower viscosity oil were to be used, the viscous friction losses would be expected to be reduced and EER might improve somewhat. However extensive testing would be required to ensure that bearing wear is not adversely effected.

Acknowledgements

The authors would like to thank Ed Hessell of Chemtura Corporation for his technical support in lubrication and selecting the lubricant used for the R32 blends tested in this work.

APPENDIX A

H84B223ABC at 60 Hz with R-410A

R-410A Calorimeter Data

Evaporator Dew Point (°F)	Condenser Dew Point (°F)	Return Gas Temp (°F)	Cooling Capacity (BTU/hr)	Input Power (watts)	Cooling EER (BTU/W-hr)	Discharge Temp (°F)	Input Current (amps)	Mass Flow Rate (lbm/hr)
0	80	20.0	10525.2	1118.3	9.4	179.3	4.88	124.0
30	80	50.0	27077.6	1376.7	19.7	139.1	6.01	308.0
45	80	65.0	38647.7	1313.0	29.4	126.1	5.73	433.1
-10	90	10.0	5371.9	918.4	5.8	211.0	4.03	67.4
10	100	30.0	11273.7	1331.1	8.5	194.2	5.80	144.7
45	100	65.0	31620.0	1706.2	18.5	154.9	7.45	389.4
50	100	70.0	35356.1	1705.2	20.7	150.9	7.44	432.9
0	110	20.0	5993.7	1094.3	5.5	223.3	4.78	82.3
30	110	50.0	19245.2	1737.4	11.1	183.8	7.58	253.8
50	115	70.0	30199.0	1990.1	15.2	173.3	8.69	400.3
10	130	30.0	6786.6	1349.2	5.0	238.0	5.89	104.3
45	130	65.0	21922.5	2151.8	10.2	200.4	9.41	320.2
55	130	75.0	28275.3	2291.1	12.3	192.2	10.03	408.3
30	150	50.0	9405.1	1837.9	5.1	247.6	8.03	162.7
55	150	75.0	20766.7	2551.7	8.1	223.8	11.19	346.8

R-410A Polynomial Coefficients

	Capacity	Power	Line Current	Mass Flow	Efficiency	Discharge T
C1	3.98262E+04	1.59705E+03	7.27427E+00	4.53207E+02	9.86492E+01	4.28249E+01
C2	6.73112E+02	-1.04420E+01	-4.29370E-02	5.29081E+00	-3.85037E-01	-1.64740E+00
C3	-6.13930E+02	-1.98426E+01	-9.51098E-02	-7.58900E+00	-1.09876E+00	1.99877E+00
C4	5.56190E+00	-4.33685E-01	-1.89414E-03	3.69081E-02	-6.11332E-03	1.92469E-02
C5	-2.82264E+00	3.62324E-01	1.52440E-03	5.32846E-03	1.11781E-02	-4.23851E-03
C6	3.89156E+00	2.59366E-01	1.20854E-03	5.68501E-02	1.10514E-02	-4.57047E-03
C7	7.98980E-03	-1.13274E-03	-5.46298E-06	7.36835E-05	1.43876E-04	2.53057E-05
C8	-1.84008E-02	2.70266E-03	1.23588E-05	5.22869E-05	-1.14911E-04	-1.26519E-04
C9	-3.64562E-03	-3.31445E-04	-1.29636E-06	-1.35845E-04	5.23849E-06	5.27383E-05
C10	-9.95855E-03	-1.07994E-03	-4.92867E-06	-1.66813E-04	-4.42210E-05	1.17218E-05

R-410A Performance Table

Condenser Dew Point - °F		Evaporator Dew Point - °F 0	5	10	15	20	25	30	35	40	45	50	55
80	Capacity [Btu/hr]	10519	12742	15176	17826	20698	23799	27135	30711	34533	38608	42941	47538
	Power [W]	1117	1193	1258	1310	1349	1374	1383	1376	1353	1312	1253	1174
	Current [A]	4.9	5.2	5.5	5.7	5.9	6.0	6.0	6.0	5.9	5.7	5.5	5.1
	Mass Flow [lb/hr]	124.5	149.8	177.2	206.7	238.5	272.5	308.9	347.7	388.9	432.6	478.8	527.7
	EER [Btu/W-hr]	9.42	10.68	12.06	13.60	15.34	17.33	19.62	22.31	25.52	29.43	34.28	40.51
	Efficiency [%]	58.8	61.2	62.9	64.0	64.7	65.1	65.2	65.3	65.3	65.4	65.7	66.3
	Discharge Temp [°F]	179.5	171.5	163.9	156.9	150.4	144.4	138.9	134.0	129.7	126.1	123.0	120.6
90	Capacity [Btu/hr]	8834	10881	13128	15583	18252	21139	24252	27596	31177	35001	39075	43404
	Power [W]	1125	1217	1299	1370	1429	1475	1507	1525	1527	1513	1481	1432
	Current [A]	4.9	5.3	5.7	6.0	6.2	6.4	6.6	6.7	6.7	6.6	6.5	6.2
	Mass Flow [lb/hr]	109.1	133.5	160.0	188.7	219.7	253.0	288.6	326.7	367.2	410.2	455.8	504.1
	EER [Btu/W-hr]	7.85	8.94	10.10	11.37	12.77	14.33	16.09	18.10	20.42	23.14	26.38	30.31
	Efficiency [%]	57.0	60.0	62.2	63.8	64.9	65.6	66.0	66.3	66.5	66.7	67.1	67.7
	Discharge Temp [°F]	194.2	186.4	179.0	172.1	165.6	159.5	153.9	148.9	144.4	140.4	137.0	134.1
100	Capacity [Btu/hr]	7390	9256	11314	13571	16031	18701	21587	24696	28032	31603	35413	39470
	Power [W]	1127	1235	1334	1423	1502	1569	1623	1664	1692	1704	1700	1680
	Current [A]	4.9	5.4	5.8	6.2	6.5	6.8	7.1	7.3	7.4	7.4	7.4	7.3
	Mass Flow [lb/hr]	96.0	119.4	144.9	172.7	202.7	235.1	269.9	307.1	346.7	389.0	433.8	481.3
	EER [Btu/W-hr]	6.56	7.50	8.48	9.54	10.68	11.92	13.30	14.84	16.57	18.55	20.83	23.50
	Efficiency [%]	55.1	58.6	61.3	63.4	64.9	65.9	66.7	67.1	67.5	67.9	68.3	68.9
	Discharge Temp [°F]	208.7	201.2	194.0	187.1	180.7	174.6	169.0	163.8	159.1	154.9	151.2	148.0
110	Capacity [Btu/hr]	6127	7809	9674	11728	13976	16426	19082	21951	25039	28352	31896	35676
	Power [W]	1115	1239	1355	1462	1560	1647	1724	1789	1841	1879	1903	1911
	Current [A]	4.9	5.4	5.9	6.4	6.8	7.2	7.5	7.8	8.0	8.2	8.3	8.3
	Mass Flow [lb/hr]	84.3	106.5	130.9	157.6	186.6	217.9	251.7	287.9	326.6	367.9	411.8	458.4
	EER [Btu/W-hr]	5.49	6.30	7.14	8.02	8.96	9.97	11.07	12.27	13.60	15.09	16.76	18.66
	Efficiency [%]	52.6	56.7	60.0	62.5	64.5	65.9	66.9	67.6	68.2	68.6	69.1	69.8
	Discharge Temp [°F]	223.0	215.7	208.8	202.1	195.8	189.8	184.2	179.0	174.1	169.7	165.7	162.2
120	Capacity [Btu/hr]		6479	8147	9995	12028	14253	16676	19302	22138	25190	28463	31964
	Power [W]		1223	1355	1480	1597	1705	1804	1891	1968	2032	2083	2120
	Current [A]		5.3	5.9	6.5	7.0	7.4	7.9	8.3	8.6	8.9	9.1	9.3
	Mass Flow [lb/hr]		93.9	117.0	142.5	170.3	200.4	233.0	268.1	305.7	345.9	388.8	434.4
	EER [Btu/W-hr]		5.30	6.01	6.75	7.53	8.36	9.25	10.21	11.25	12.40	13.67	15.08
	Efficiency [%]		54.2	58.0	61.0	63.3	65.1	66.4	67.4	68.2	68.8	69.3	70.0
	Discharge Temp [°F]		230.2	223.6	217.2	211.0	205.1	199.6	194.3	189.4	184.8	180.6	176.8
130	Capacity [Btu/hr]			6674	8312	10127	12124	14309	16689	19269	22056	25055	28272
	Power [W]			1329	1472	1607	1735	1855	1966	2066	2156	2234	2299
	Current [A]			5.8	6.4	7.0	7.6	8.1	8.6	9.0	9.4	9.8	10.1
	Mass Flow [lb/hr]			102.2	126.3	152.7	181.6	212.9	246.7	283.1	322.1	363.8	408.2
	EER [Btu/W-hr]			5.02	5.65	6.30	6.99	7.71	8.49	9.33	10.23	11.22	12.30
	Efficiency [%]			55.0	58.5	61.3	63.4	65.1	66.3	67.2	68.0	68.6	69.3
	Discharge Temp [°F]			238.4	232.3	226.4	220.6	215.2	209.9	205.0	200.3	196.0	192.0
140	Capacity [Btu/hr]					8212	9978	11922	14052	16373	18891	21612	24543
	Power [W]					1584	1732	1873	2006	2130	2244	2349	2442
	Current [A]					6.9	7.6	8.2	8.8	9.3	9.8	10.3	10.7
	Mass Flow [lb/hr]					133.0	160.4	190.3	222.7	257.7	295.4	335.8	378.9
	EER [Btu/W-hr]					5.19	5.76	6.37	7.01	7.69	8.42	9.20	10.05
	Efficiency [%]					58.0	60.5	62.5	64.0	65.1	66.0	66.7	67.4
	Discharge Temp [°F]					241.9	236.4	231.1	226.0	221.0	216.3	211.9	207.7
150	Capacity [Btu/hr]							9455	11331	13389	15634	18074	20714
	Power [W]							1849	2004	2152	2291	2422	2542
	Current [A]							8.1	8.8	9.4	10.0	10.6	11.1
	Mass Flow [lb/hr]							164.3	195.1	228.7	264.8	303.8	345.5
	EER [Btu/W-hr]							5.11	5.65	6.22	6.82	7.46	8.15
	Efficiency [%]							58.4	60.1	61.5	62.5	63.3	64.1
	Discharge Temp [°F]							247.4	242.4	237.6	232.9	228.4	224.1

APPENDIX B

H84B223ABC at 60 Hz with L41-1

L41-1 Calorimeter Data

Evaporator Dew Point (ºF)	Condenser Dew Point (ºF)	Return Gas Temp (ºF)	Cooling Capacity (BTU/hr)	Input Power (watts)	Cooling EER (BTU/W-hr)	Discharge Temp (ºF)	Input Current (amps)	Mass Flow Rate (lbm/hr)
0	80	20.0	6827.5	871.2	7.8	203.2	3.83	62.5
30	80	50.0	21600.2	1201.2	18.0	153.9	5.24	191.9
45	80	65.0	31070.1	1150.0	27.0	136.2	5.02	272.2
-10	90	10.0	3947.7	778.7	5.1	217.4	3.42	38.1
10	100	30.0	8049.0	1069.5	7.5	216.2	4.68	79.1
45	100	65.0	26078.1	1482.5	17.6	166.2	6.48	246.9
50	100	70.0	29446.5	1477.5	19.9	161.2	6.45	277.6
0	110	20.0	4729.8	941.8	5.0	233.0	4.13	49.3
30	110	50.0	15145.6	1455.3	10.4	200.9	6.35	152.1
50	115	70.1	25308.7	1719.9	14.7	184.5	7.51	254.6
10	130	30.0	4830.7	1062.9	4.5	248.9	4.65	54.9
45	130	65.0	18396.1	1829.5	10.1	214.3	7.99	200.1
55	130	75.0	24207.0	1970.5	12.3	203.8	8.61	260.7
30	150	50.0	7962.9	1527.1	5.2	259.8	6.67	99.4
55	150	75.0	18342.2	2173.4	8.4	236.8	9.50	221.5

L41-1 Polynomial Coefficients

	Capacity	Power	Line Current	Mass Flow	Efficiency	Discharge T
C1	1.08976E+04	3.95520E+02	1.59095E+00	5.05537E+01	-1.26373E+02	1.05335E+02
C2	5.35249E+02	3.87105E-02	-2.62128E-03	2.66181E+00	1.27156E+00	-2.00404E+00
C3	5.93433E+01	7.39877E+00	3.72655E-02	2.02306E+00	4.09555E+00	9.79299E-01
C4	3.11738E+00	-3.98304E-01	-1.73602E-03	-6.37916E-03	2.19867E-02	1.07354E-02
C5	-2.57192E-01	2.53550E-01	1.13896E-03	4.62925E-02	-3.18594E-02	-7.55616E-03
C6	-2.18980E+00	-4.39018E-03	-7.02834E-05	-3.53967E-02	-2.80872E-02	6.66706E-03
C7	-4.43332E-02	-5.32245E-03	-2.28458E-05	-5.45149E-04	2.17180E-04	5.91888E-04
C8	4.45411E-02	6.05738E-03	2.63207E-05	8.42911E-04	-3.52766E-04	-5.67905E-04
C9	-2.92717E-02	-1.12826E-03	-5.04382E-06	-5.20874E-04	2.22191E-04	2.32496E-04
C10	1.02389E-02	-1.72810E-04	-5.85927E-07	1.51663E-04	5.43633E-05	-4.56391E-05

L41-1 Compressor Performance Table

Evaporator Dew Point- ºF

Condensor Dew Point - ºF		0	5	10	15	20	25	30	35	40	45	50	55
	Capacity [Btu/hr]	6873	8671	10770	13136	15737	18539	21508	24612	27818	31091	34399	37709
	Power [W]	871	938	1005	1069	1125	1169	1198	1207	1192	1150	1076	967
	Current [A]	3.8	4.1	4.4	4.7	4.9	5.1	5.2	5.3	5.2	5.0	4.7	4.2
80	Mass Flow [lb/hr]	63.5	80.1	99.4	120.9	144.2	168.9	194.7	221.0	247.6	273.9	299.6	324.2
	EER [Btu/W-hr]	7.89	9.25	10.71	12.29	13.99	15.86	17.96	20.39	23.33	27.03	31.96	39.00
	Efficiency [%]	49.3	49.9	50.4	50.9	51.5	52.5	53.9	56.1	59.1	63.0	68.2	74.6
	Discharge Temp [°F]	203.0	196.6	188.9	180.4	171.4	162.5	154.1	146.6	140.5	136.2	134.2	134.9
	Capacity [Btu/hr]	5965	7513	9384	11544	13961	16601	19432	22419	25530	28731	31989	35271
	Power [W]	900	971	1046	1121	1190	1251	1300	1332	1343	1330	1288	1213
	Current [A]	3.9	4.3	4.6	4.9	5.2	5.5	5.7	5.8	5.9	5.8	5.6	5.3
90	Mass Flow [lb/hr]	56.5	71.2	89.0	109.4	132.1	156.6	182.6	209.5	237.1	264.9	292.5	319.5
	EER [Btu/W-hr]	6.63	7.73	8.97	10.30	11.73	13.27	14.95	16.83	19.01	21.61	24.84	29.07
	Efficiency [%]	54.4	55.2	55.6	55.9	56.3	56.7	57.5	58.8	60.8	63.6	67.3	72.2
	Discharge Temp [°F]	214.2	209.3	202.7	195.1	186.8	178.2	169.8	162.1	155.4	150.3	147.2	146.5
	Capacity [Btu/hr]	5173	6441	8054	9979	12183	14633	17295	20136	23122	26222	29401	32625
	Power [W]	919	994	1075	1159	1241	1318	1385	1438	1474	1489	1478	1437
	Current [A]	4.0	4.4	4.7	5.1	5.4	5.8	6.0	6.3	6.4	6.5	6.5	6.3
100	Mass Flow [lb/hr]	50.6	62.8	78.6	97.5	119.0	142.8	168.4	195.5	223.6	252.4	281.3	310.1
	EER [Btu/W-hr]	5.63	6.48	7.49	8.61	9.81	11.10	12.49	14.00	15.68	17.61	19.90	22.71
	Efficiency [%]	56.7	57.9	58.6	59.0	59.2	59.4	59.8	60.5	61.6	63.4	66.0	69.5
	Discharge Temp [°F]	224.3	221.0	215.9	209.4	201.9	193.9	185.8	178.0	171.1	165.4	161.4	159.5
	Capacity [Btu/hr]	4557	5515	6842	8502	10464	12694	15158	17824	20657	23626	26696	29834
	Power [W]	926	1004	1091	1183	1276	1368	1452	1526	1586	1626	1645	1637
	Current [A]	4.1	4.4	4.8	5.2	5.6	6.0	6.3	6.7	6.9	7.1	7.2	7.2
110	Mass Flow [lb/hr]	46.7	56.0	69.3	86.0	105.9	128.4	153.2	179.8	208.0	237.1	266.9	297.0
	EER [Btu/W-hr]	4.92	5.50	6.27	7.19	8.20	9.28	10.44	11.68	13.03	14.53	16.23	18.23
	Efficiency [%]	56.6	58.5	59.7	60.4	60.8	60.9	61.0	61.3	61.9	62.9	64.5	67.0
	Discharge Temp [°F]	233.0	231.7	228.2	223.0	216.6	209.3	201.7	194.2	187.2	181.2	176.5	173.8
	Capacity [Btu/hr]		4799	5809	7176	8866	10847	13084	15545	18196	21004	23936	26959
	Power [W]		1000	1091	1191	1295	1399	1500	1593	1675	1742	1789	1812
	Current [A]		4.4	4.8	5.2	5.7	6.1	6.5	7.0	7.3	7.6	7.8	7.9
120	Mass Flow [lb/hr]		51.6	61.8	75.9	93.6	114.3	137.7	163.5	191.1	220.2	250.3	281.1
	EER [Btu/W-hr]		4.80	5.32	6.03	6.85	7.75	8.72	9.76	10.86	12.06	13.38	14.88
	Efficiency [%]		57.3	59.2	60.5	61.1	61.5	61.6	61.6	61.8	62.3	63.3	64.8
	Discharge Temp [°F]		240.8	239.2	235.6	230.5	224.3	217.4	210.3	203.5	197.3	192.3	188.8
	Capacity [Btu/hr]			5017	6061	7450	9152	11133	13360	15799	18418	21183	24061
	Power [W]			1076	1182	1295	1412	1528	1640	1743	1834	1908	1961
	Current [A]			4.7	5.2	5.7	6.2	6.7	7.2	7.6	8.0	8.3	8.6
130	Mass Flow [lb/hr]			57.1	68.1	83.0	101.5	123.0	147.3	173.9	202.3	232.3	263.3
	EER [Btu/W-hr]			4.66	5.13	5.75	6.48	7.29	8.15	9.07	10.05	11.10	12.27
	Efficiency [%]			57.5	59.4	60.7	61.4	61.7	61.8	61.9	62.1	62.5	63.4
	Discharge Temp [°F]			248.8	247.0	243.4	238.4	232.5	226.1	219.7	213.6	208.4	204.5
	Capacity [Btu/hr]					6278	7672	9367	11331	13530	15930	18498	21202
	Power [W]					1277	1405	1535	1664	1787	1901	2001	2084
	Current [A]					5.6	6.1	6.7	7.3	7.8	8.3	8.7	9.1
140	Mass Flow [lb/hr]					75.1	90.8	109.9	132.2	157.2	184.6	213.8	244.5
	EER [Btu/W-hr]					4.92	5.46	6.10	6.81	7.57	8.38	9.24	10.17
	Efficiency [%]					59.8	61.1	61.9	62.2	62.4	62.5	62.6	63.1
	Discharge Temp [°F]					255.0	251.5	246.8	241.3	235.5	229.8	224.7	220.5
	Capacity [Btu/hr]							7848	9519	11448	13600	15943	18443
	Power [W]							1519	1664	1807	1943	2068	2179
	Current [A]							6.6	7.3	7.9	8.5	9.0	9.5
150	Mass Flow [lb/hr]							99.4	119.2	142.1	167.8	195.8	225.7
	EER [Btu/W-hr]							5.17	5.72	6.34	7.00	7.71	8.46
	Efficiency [%]							62.3	63.1	63.6	63.8	63.9	64.1
	Discharge Temp [°F]							260.0	255.7	250.7	245.6	240.8	236.6

APPENDIX C
H84B223ABC at 60 Hz with DR-5A

DR-5A Calorimeter Data

Evaporator Dew Point (°F)	Condenser Dew Point (°F)	Return Gas Temp (°F)	Cooling Capacity (BTU/hr)	Input Power (watts)	Cooling EER (BTU/W-hr)	Discharge Temp (°F)	Input Current (amps)	Mass Flow Rate (lbm/hr)
0	80	20.0	8985.65	1031.44	8.71	195.3	4.51	88.53
30	80	50.0	24472.85	1311.69	18.66	148.3	5.72	233.56
45	80	65.0	34765.60	1245.54	27.91	132.4	5.44	328.07
-10	90	10.0	4875.20	884.14	5.51	219.8	3.88	50.78
10	100	30.0	10223.18	1255.12	8.15	207.6	5.48	108.41
45	100	65.0	29040.24	1620.27	17.92	163.0	7.07	297.30
50	100	70.0	32667.22	1613.28	20.25	158.1	7.05	332.45
0	110	20.0	5956.80	1096.19	5.43	232.7	4.79	67.16
30	110	50.0	17583.84	1636.86	10.74	194.8	7.15	191.42
50	115	70.0	27963.08	1881.22	14.86	181.4	8.22	305.58
10	130	30.0	6288.86	1274.53	4.93	248.5	5.56	78.01
45	130	65.0	20646.20	2036.10	10.14	210.1	8.91	245.43
55	130	75.0	26544.19	2162.26	12.28	200.6	9.46	312.51
30	150	50.0	9252.49	1749.19	5.29	257.9	7.64	127.10
55	150	75.0	20103.45	2416.01	8.32	233.5	10.58	268.09

DR-5A Polynomial Coefficients

	Capacity	Power	Line Current	Mass Flow	Efficiency	Discharge T
C1	1.89666E+04	7.32874E+02	3.44567E+00	1.48559E+02	1.35335E+02	8.31969E+01
C2	6.30486E+02	2.54725E-01	2.44781E-03	4.07400E+00	1.32834E+00	-2.30010E+00
C3	-1.12821E+02	-3.16471E-01	-8.84466E-03	-3.55390E-01	-2.69215E+00	1.45295E+00
C4	3.86866E+00	-4.52039E-01	-1.90731E-03	1.03150E-02	-1.08098E-02	1.41277E-02
C5	-2.08811E+00	2.09683E-01	8.47864E-04	1.74904E-02	-1.47210E-02	3.18192E-03
C6	-3.93979E-01	9.67397E-02	4.99554E-04	-8.25075E-03	2.79656E-02	-2.04163E-04
C7	-9.62912E-03	-2.68460E-03	-1.20354E-05	-1.54018E-04	8.87571E-05	2.57124E-04
C8	9.49813E-03	4.27065E-03	1.83195E-05	3.94778E-04	2.79701E-05	-2.85826E-04
C9	-1.22974E-02	-2.73611E-04	-7.51698E-07	-2.72095E-04	5.42387E-05	8.20430E-05
C10	3.05629E-03	-5.85542E-04	-2.82281E-06	4.19043E-05	-9.18432E-05	-6.00897E-06

DR-5A Performance Table

Condenser Dew Point - °F		Evaporator Dew Point - °F											
		0	5	10	15	20	25	30	35	40	45	50	55
80	Capacity [Btu/hr]	8984	11022	13285	15764	18453	21345	24432	27707	31163	34793	38589	42544
	Power [W]	1027	1100	1166	1222	1267	1298	1313	1311	1290	1246	1179	1087
	Current [A]	4.5	4.8	5.1	5.3	5.5	5.7	5.7	5.7	5.6	5.4	5.2	4.8
	Mass Flow [lb/hr]	88.8	108.5	130.1	153.7	178.9	205.9	234.3	264.1	295.2	327.5	360.9	395.1
	EER [Btu/W-hr]	8.75	10.02	11.39	12.90	14.57	16.45	18.60	21.13	24.17	27.92	32.72	39.15
	Efficiency [%]	51.9	54.2	56.1	57.8	59.2	60.4	61.5	62.6	63.8	65.0	66.5	68.1
	Discharge Temp [°F]	195.0	187.3	179.2	171.1	163.2	155.6	148.5	142.2	136.7	132.4	129.3	127.8
90	Capacity [Btu/hr]	7850	9681	11742	14024	16521	19225	22129	25226	28509	31970	35602	39398
	Power [W]	1061	1144	1221	1290	1351	1400	1435	1455	1457	1440	1402	1340
	Current [A]	4.6	5.0	5.3	5.6	5.9	6.1	6.3	6.3	6.4	6.3	6.1	5.9
	Mass Flow [lb/hr]	80.3	98.6	119.2	141.7	166.3	192.6	220.7	250.4	281.6	314.1	347.9	382.8
	EER [Btu/W-hr]	7.40	8.47	9.62	10.87	12.23	13.74	15.42	17.34	19.56	22.20	25.40	29.41
	Efficiency [%]	52.6	54.6	56.3	57.7	58.9	59.9	60.8	61.8	62.7	63.8	65.1	66.6
	Discharge Temp [°F]	207.9	200.9	193.5	185.9	178.4	171.0	164.0	157.5	151.9	147.2	143.6	141.4
100	Capacity [Btu/hr]	6801	8414	10260	12333	14625	17130	19839	22745	25842	29122	32579	36203
	Power [W]	1083	1175	1263	1346	1421	1488	1543	1584	1611	1620	1609	1578
	Current [A]	4.7	5.1	5.5	5.9	6.2	6.5	6.7	6.9	7.0	7.1	7.0	6.9
	Mass Flow [lb/hr]	72.4	89.2	108.3	129.6	153.1	178.7	206.1	235.4	266.3	298.8	332.8	368.0
	EER [Btu/W-hr]	6.28	7.16	8.13	9.16	10.29	11.51	12.86	14.36	16.04	17.98	20.24	22.95
	Efficiency [%]	53.9	55.7	57.2	58.4	59.4	60.3	61.1	61.9	62.7	63.7	64.9	66.4
	Discharge Temp [°F]	220.4	214.3	207.6	200.6	193.5	186.4	179.5	173.1	167.3	162.3	158.4	155.6
110	Capacity [Btu/hr]	5857	7239	8859	10710	12785	15077	17579	20283	23182	26269	29537	32978
	Power [W]	1089	1189	1288	1384	1475	1559	1633	1696	1746	1781	1798	1797
	Current [A]	4.8	5.2	5.6	6.0	6.4	6.8	7.1	7.4	7.6	7.8	7.9	7.8
	Mass Flow [lb/hr]	65.4	80.3	97.7	117.6	139.8	164.2	190.8	219.3	249.8	281.9	315.8	351.2
	EER [Btu/W-hr]	5.38	6.09	6.88	7.74	8.67	9.67	10.76	11.96	13.28	14.75	16.42	18.35
	Efficiency [%]	55.3	57.0	58.3	59.4	60.3	61.0	61.7	62.5	63.3	64.2	65.4	66.8
	Discharge Temp [°F]	232.6	227.4	221.5	215.2	208.5	201.8	195.2	188.9	183.0	177.8	173.5	170.3
120	Capacity [Btu/hr]		6174	7556	9173	11019	13087	15369	17858	20546	23428	26495	29740
	Power [W]		1185	1294	1403	1508	1609	1702	1787	1860	1920	1965	1994
	Current [A]		5.2	5.7	6.1	6.6	7.0	7.4	7.8	8.1	8.4	8.6	8.7
	Mass Flow [lb/hr]		72.2	87.7	105.8	126.4	149.5	174.9	202.5	232.1	263.8	297.2	332.4
	EER [Btu/W-hr]		5.21	5.84	6.54	7.31	8.13	9.03	9.99	11.05	12.20	13.48	14.92
	Efficiency [%]		57.8	59.0	60.0	60.9	61.6	62.3	63.0	63.7	64.7	65.9	67.4
	Discharge Temp [°F]		240.1	235.1	229.5	223.5	217.2	210.9	204.8	198.9	193.7	189.1	185.5
130	Capacity [Btu/hr]			6369	7740	9345	11176	13226	15487	17954	20617	23471	26508
	Power [W]			1277	1398	1518	1635	1747	1853	1949	2034	2107	2164
	Current [A]			5.6	6.1	6.6	7.1	7.6	8.1	8.5	8.9	9.2	9.5
	Mass Flow [lb/hr]			78.5	94.6	113.4	134.8	158.8	185.1	213.7	244.5	277.3	312.0
	EER [Btu/W-hr]			4.99	5.54	6.16	6.84	7.57	8.36	9.21	10.13	11.14	12.25
	Efficiency [%]			58.9	59.8	60.7	61.4	62.1	62.8	63.6	64.7	65.9	67.5
	Discharge Temp [°F]			248.4	243.6	238.3	232.6	226.6	220.7	215.0	209.7	205.0	201.0
140	Capacity [Btu/hr]					7781	9363	11168	13191	15422	17856	20484	23301
	Power [W]					1500	1633	1764	1890	2009	2120	2219	2306
	Current [A]					6.5	7.1	7.7	8.3	8.8	9.3	9.7	10.1
	Mass Flow [lb/hr]					100.9	120.4	142.6	167.4	194.7	224.4	256.3	290.3
	EER [Btu/W-hr]					5.19	5.73	6.33	6.98	7.68	8.42	9.23	10.10
	Efficiency [%]					59.1	59.9	60.6	61.5	62.4	63.5	64.9	66.6
	Discharge Temp [°F]					252.9	247.8	242.4	236.8	231.3	226.0	221.2	217.0
150	Capacity [Btu/hr]							9215	10986	12970	15161	17553	20136
	Power [W]							1750	1896	2038	2173	2299	2415
	Current [A]							7.6	8.3	8.9	9.5	10.1	10.6
	Mass Flow [lb/hr]							126.7	149.7	175.4	203.7	234.4	267.4
	EER [Btu/W-hr]							5.27	5.79	6.36	6.98	7.63	8.34
	Efficiency [%]							57.4	58.4	59.5	60.8	62.4	64.3
	Discharge Temp [°F]							258.0	252.9	247.7	242.5	237.7	233.4

APPENDIX D
H84B223ABC at 60 Hz with ARM-71a

ARM-71a Calorimeter Data

Evaporator Dew Point (^oF)	Condenser Dew Point (^oF)	Return Gas Temp (^oF)	Cooling Capacity (BTU/hr)	Input Power (watts)	Cooling EER (BTU/W-hr)	Discharge Temp (^oF)	Input Current (amps)	Mass Flow Rate (lbm/hr)
0	80	20.1	8671.47	992.67	8.74	198.5	4.36	84.46
30	80	50.0	24181.74	1288.07	18.77	149.5	5.63	227.97
45	80	64.7	34205.71	1227.08	27.88	133.3	5.37	319.63
-10	90	9.9	4897.10	866.04	5.65	219.8	3.82	50.35
10	100	30.1	9911.68	1211.70	8.18	212.1	5.31	103.53
45	100	65.0	28615.28	1588.99	18.01	163.7	6.94	289.98
50	100	70.0	32302.76	1582.25	20.42	158.7	6.91	324.41
0	110	20.0	5794.43	1059.30	5.47	233.5	4.64	64.57
30	110	50.0	17331.06	1598.74	10.84	195.8	6.98	186.46
50	115	70.0	27596.89	1843.42	14.97	182.0	8.06	298.22
10	130	30.0	6116.41	1242.34	4.92	249.6	5.44	74.80
45	130	65.0	20226.67	1991.56	10.16	210.7	8.69	237.40
55	130	75.0	26058.07	2119.66	12.29	201.1	9.28	302.92
30	150	50.0	9191.96	1713.31	5.37	258.7	7.49	124.40
55	150	75.0	19917.68	2371.20	8.40	234.3	10.38	261.78

ARM-71a Polynomial Coefficients

	Capacity	Power	Line Current	Mass Flow	Efficiency	Discharge T
C1	1.07249E+04	7.30363E+02	3.19532E+00	4.24926E+01	9.59292E+01	6.88821E+01
C2	5.97682E+02	3.47029E-01	2.70651E-03	3.43709E+00	2.90662E+00	-2.16024E+00
C3	1.25935E+02	-3.64231E-01	-8.90955E-04	2.83547E+00	-2.28510E+00	1.88803E+00
C4	3.28275E+00	-4.37716E-01	-1.93030E-03	1.47790E-05	1.06517E-02	1.25983E-02
C5	-1.06341E+00	2.24145E-01	9.46776E-04	3.61013E-02	-5.58159E-02	-2.42134E-03
C6	-2.78734E+00	8.46144E-02	3.62020E-04	-4.13207E-02	3.17968E-02	-2.85214E-03
C7	-2.35535E-02	-3.54449E-03	-1.50101E-05	-3.22208E-04	1.26556E-04	4.45227E-04
C8	2.52878E-02	4.86724E-03	2.12692E-05	6.15342E-04	-2.00663E-04	-4.23352E-04
C9	-2.12175E-02	-5.70170E-04	-2.34773E-06	-4.17934E-04	2.95349E-04	1.50186E-04
C10	1.11725E-02	-4.93935E-04	-2.13365E-06	1.56679E-04	-1.27657E-04	-6.19144E-06

ARM-71a Performance Table

Condenser Dew Point - °F		Evaporator Dew Point -°F											
		0	5	10	15	20	25	30	35	40	45	50	55
80	Capacity [Btu/hr]	8681	10695	12956	15448	18151	21050	24125	27359	30736	34236	37842	41537
	Power [W]	990	1061	1128	1186	1235	1270	1290	1291	1271	1227	1157	1059
	Current [A]	4.3	4.7	4.9	5.2	5.4	5.6	5.6	5.6	5.6	5.4	5.1	4.6
	Mass Flow [lb/hr]	85.1	104.5	126.2	149.8	175.2	202.1	230.2	259.4	289.3	319.7	350.4	381.2
	EER [Btu/W-hr]	8.77	10.08	11.49	13.02	14.70	16.57	18.71	21.20	24.18	27.89	32.69	39.24
	Efficiency [%]	51.3	52.8	54.2	55.4	56.7	58.2	59.8	61.7	64.0	66.8	70.2	74.2
	Discharge Temp [°F]	198.5	191.1	182.9	174.3	165.7	157.3	149.6	142.8	137.3	133.3	131.3	131.6
90	Capacity [Btu/hr]	7626	9413	11460	13749	16264	18985	21897	24980	28217	31591	35084	38679
	Power [W]	1023	1102	1178	1250	1313	1365	1405	1428	1433	1416	1376	1309
	Current [A]	4.5	4.8	5.2	5.5	5.7	6.0	6.1	6.2	6.3	6.2	6.0	5.7
	Mass Flow [lb/hr]	77.2	95.1	115.4	138.1	162.8	189.3	217.4	246.8	277.3	308.6	340.5	372.7
	EER [Btu/W-hr]	7.46	8.54	9.72	11.00	12.39	13.91	15.59	17.49	19.70	22.31	25.50	29.55
	Efficiency [%]	54.8	56.0	56.9	57.7	58.3	59.0	59.8	60.8	62.0	63.7	65.8	68.6
	Discharge Temp [°F]	211.2	204.8	197.5	189.5	181.3	173.2	165.4	158.4	152.4	147.8	145.0	144.2
100	Capacity [Btu/hr]	6617	8156	9967	12033	14337	16861	19587	22498	25575	28802	32160	35633
	Power [W]	1046	1132	1218	1301	1379	1448	1506	1551	1580	1590	1579	1543
	Current [A]	4.6	5.0	5.3	5.7	6.0	6.3	6.6	6.8	6.9	6.9	6.9	6.8
	Mass Flow [lb/hr]	69.5	85.3	104.0	125.3	148.9	174.6	202.2	231.5	262.1	293.8	326.5	359.8
	EER [Btu/W-hr]	6.33	7.20	8.18	9.25	10.40	11.65	13.00	14.50	16.19	18.11	20.37	23.09
	Efficiency [%]	57.7	58.9	59.7	60.2	60.5	60.8	61.0	61.4	61.9	62.7	63.9	65.6
	Discharge Temp [°F]	223.0	217.8	211.4	204.3	196.6	188.8	181.2	174.1	167.9	162.8	159.3	157.6
110	Capacity [Btu/hr]	5722	6990	8544	10366	12438	14743	17263	19980	22876	25934	29137	32466
	Power [W]	1057	1149	1244	1338	1430	1515	1592	1658	1710	1746	1763	1758
	Current [A]	4.6	5.0	5.4	5.9	6.3	6.6	7.0	7.2	7.5	7.6	7.7	7.7
	Mass Flow [lb/hr]	63.0	76.4	92.9	112.4	134.5	159.0	185.7	214.4	244.7	276.5	309.5	343.5
	EER [Btu/W-hr]	5.41	6.08	6.87	7.75	8.70	9.73	10.84	12.05	13.38	14.85	16.53	18.47
	Efficiency [%]	59.4	60.8	61.8	62.4	62.7	62.8	62.8	62.8	62.8	63.1	63.7	64.6
	Discharge Temp [°F]	233.8	230.0	224.8	218.5	211.6	204.3	197.0	190.0	183.6	178.2	174.1	171.6
120	Capacity [Btu/hr]		5983	7259	8815	10635	12699	14991	17493	20187	23056	26081	29246
	Power [W]		1150	1253	1358	1462	1564	1659	1745	1820	1881	1926	1951
	Current [A]		5.0	5.5	5.9	6.4	6.8	7.2	7.6	7.9	8.2	8.4	8.5
	Mass Flow [lb/hr]		69.0	83.0	100.3	120.5	143.4	168.8	196.4	226.1	257.5	290.4	324.6
	EER [Btu/W-hr]		5.20	5.79	6.49	7.27	8.12	9.04	10.02	11.09	12.25	13.54	14.99
	Efficiency [%]		61.0	62.4	63.3	63.9	64.1	64.2	64.1	64.1	64.1	64.3	64.8
	Discharge Temp [°F]		241.3	237.4	232.3	226.2	219.6	212.7	205.9	199.5	193.9	189.4	186.3
130	Capacity [Btu/hr]			6178	7448	8993	10796	12839	15105	17576	20233	23061	26040
	Power [W]			1242	1357	1474	1591	1703	1810	1907	1993	2065	2120
	Current [A]			5.4	5.9	6.4	6.9	7.4	7.9	8.3	8.7	9.0	9.3
	Mass Flow [lb/hr]			75.4	89.9	107.8	128.7	152.3	178.6	207.1	237.7	270.1	304.1
	EER [Btu/W-hr]			4.97	5.49	6.10	6.79	7.54	8.35	9.22	10.15	11.17	12.28
	Efficiency [%]			60.8	62.4	63.4	64.1	64.6	64.8	64.9	64.9	65.1	65.4
	Discharge Temp [°F]			249.4	245.4	240.4	234.5	228.2	221.8	215.6	210.0	205.2	201.7
140	Capacity [Btu/hr]					7581	9101	10874	12883	15108	17534	20142	22914
	Power [W]					1463	1593	1723	1848	1968	2078	2176	2260
	Current [A]					6.4	7.0	7.5	8.1	8.6	9.1	9.5	9.9
	Mass Flow [lb/hr]					97.4	115.8	137.3	161.7	188.7	218.1	249.6	283.0
	EER [Btu/W-hr]					5.18	5.71	6.31	6.97	7.68	8.44	9.26	10.14
	Efficiency [%]					60.6	62.0	63.1	63.8	64.4	64.8	65.2	65.7
	Discharge Temp [°F]					254.1	249.2	243.7	237.8	231.9	226.4	221.5	217.7
150	Capacity [Btu/hr]							9163	10892	12852	15024	17392	19936
	Power [W]							1714	1859	1999	2133	2257	2370
	Current [A]							7.5	8.1	8.7	9.3	9.9	10.4
	Mass Flow [lb/hr]							124.7	146.9	171.9	199.7	229.8	262.2
	EER [Btu/W-hr]							5.35	5.86	6.43	7.04	7.70	8.41
	Efficiency [%]							59.1	60.6	61.9	63.0	63.9	64.9
	Discharge Temp [°F]							258.9	253.7	248.3	243.0	238.2	234.2

APPENDIX E
H84B223ABC at 60 Hz with D2Y-60

D2Y-60 Calorimeter Data

Evaporator Dew Point (^oF)	Condenser Dew Point (^oF)	Return Gas Temp (^oF)	Cooling Capacity (BTU/hr)	Input Power (watts)	Cooling EER (BTU/W-hr)	Discharge Temp (^oF)	Input Current (amps)	Mass Flow Rate (lbm/hr)
10	80	30.0	10662.7	974.4	10.9	161.5	4.27	124.9
30	80	50.0	20118.4	1114.9	18.0	137.2	4.87	228.6
45	80	65.0	28798.9	1070.2	26.9	125.2	4.68	321.0
0	90	20.0	5580.4	808.1	6.9	189.1	3.55	69.7
10	100	30.0	7193.7	950.1	7.6	188.5	4.17	92.6
45	100	65.0	23788.5	1344.2	17.7	150.3	5.88	290.2
50	100	70.0	26866.5	1342.3	20.0	146.7	5.88	324.8
0	110	20.0	4053.3	816.2	5.0	207.9	3.60	56.2
30	110	50.0	13706.6	1301.3	10.5	176.4	5.68	180.0
50	115	70.0	22893.0	1537.5	14.9	166.3	6.73	299.4
10	130	30.0	4569.2	970.1	4.7	221.1	4.25	70.1
45	130	65.0	16357.8	1596.8	10.2	189.5	6.99	234.6
55	130	75.0	21705.0	1732.7	12.5	182.6	7.59	306.9
30	150	50.0	7016.5	1337.5	5.2	228.0	5.84	120.1
55	150	75.0	15701.6	1838.0	8.5	209.8	8.04	255.7
0	100	20.0	4546.8	787.4	5.8	199.6	3.46	59.6
10	90	30.0	8863.3	969.8	9.1	174.5	4.24	108.9

D2Y-60 Polynomial Coefficients

	Capacity	Power	Line Current	Mass Flow	Efficiency	Discharge T
C1	3.16414E+04	1.72117E+03	7.50528E+00	2.87557E+02	7.92238E+01	5.59285E+01
C2	2.75625E+02	-2.02426E+01	-9.07118E-02	-9.39471E-01	8.94477E-01	-1.53167E+00
C3	-4.32196E+02	-2.11181E+01	-9.12925E-02	-2.23774E+00	-1.51525E+00	1.71245E+00
C4	2.26181E+00	-5.33215E-01	-2.29977E-03	-2.54038E-02	2.96180E-02	2.18856E-02
C5	4.03922E+00	7.12435E-01	3.12678E-03	1.36608E-01	-2.99449E-02	-1.04884E-02
C6	1.39755E+00	1.51004E-01	6.50720E-04	-1.55503E-02	2.21893E-02	-1.70786E-03
C7	-2.87529E-02	-3.22384E-03	-1.41770E-05	-5.31116E-04	1.33858E-04	2.20493E-04
C8	3.83108E-02	5.94698E-03	2.60763E-05	1.06938E-03	-3.75398E-04	-3.21926E-04
C9	-4.67049E-02	-3.51315E-03	-1.54575E-05	-1.00667E-03	2.31795E-04	1.50366E-04
C10	2.17919E-03	-3.19654E-04	-1.36346E-06	1.49273E-04	-9.42617E-05	-1.08842E-05

D2Y-60 Performance Table

Condenser Dew Point - °F		Evaporator Dew Point [°F]											
		0	5	10	15	20	25	30	35	40	45	50	55
	Capacity [Btu/hr]	7126	8755	10628	12725	15023	17502	20139	22913	25802	28785	31841	34947
	Power [W]	834	904	968	1025	1071	1105	1124	1125	1107	1066	1001	909
	Current [A]	3.7	4.0	4.2	4.5	4.7	4.8	4.9	4.9	4.8	4.7	4.4	4.0
80	Mass Flow [lb/hr]	85.4	104.6	126.4	150.4	176.2	203.4	231.6	260.5	289.5	318.4	346.7	374.1
	EER [Btu/W-hr]	8.54	9.68	10.98	12.42	14.03	15.84	17.92	20.36	23.31	26.99	31.80	38.44
	Efficiency [%]	51.8	51.7	51.7	51.8	52.3	53.1	54.5	56.4	59.0	62.3	66.6	71.8
	Discharge Temp [°F]	176.4	169.3	162.2	155.2	148.5	142.2	136.6	131.8	128.0	125.3	123.9	123.9
	Capacity [Btu/hr]	5653	7096	8803	10753	12923	15293	17840	20544	23382	26333	29375	32487
	Power [W]	811	887	962	1032	1094	1147	1188	1215	1224	1215	1184	1128
	Current [A]	3.6	3.9	4.2	4.5	4.8	5.0	5.2	5.3	5.4	5.3	5.2	5.0
90	Mass Flow [lb/hr]	69.0	86.7	107.6	131.2	157.1	185.0	214.5	245.1	276.4	308.1	339.8	371.0
	EER [Btu/W-hr]	6.97	8.00	9.15	10.42	11.81	13.33	15.02	16.91	19.10	21.68	24.82	28.79
	Efficiency [%]	53.9	54.2	54.4	54.5	54.8	55.3	56.0	57.2	58.8	61.1	64.0	67.8
	Discharge Temp [°F]	188.3	181.8	175.2	168.6	162.1	155.9	150.1	145.0	140.7	137.4	135.2	134.4
	Capacity [Btu/hr]	4576	5788	7282	9038	11034	13248	15659	18245	20985	23857	26839	29911
	Power [W]	800	880	961	1041	1116	1185	1244	1292	1327	1345	1344	1322
	Current [A]	3.5	3.9	4.2	4.6	4.9	5.2	5.4	5.6	5.8	5.9	5.9	5.8
100	Mass Flow [lb/hr]	57.6	72.8	91.7	113.9	139.0	166.6	196.2	227.6	260.2	293.7	327.7	361.8
	EER [Btu/W-hr]	5.72	6.58	7.57	8.68	9.89	11.18	12.59	14.12	15.82	17.74	19.97	22.62
	Efficiency [%]	55.3	56.2	56.9	57.3	57.6	57.9	58.4	59.0	59.9	61.3	63.2	65.6
	Discharge Temp [°F]	199.2	193.6	187.6	181.5	175.3	169.3	163.6	158.3	153.8	150.0	147.2	145.5
	Capacity [Btu/hr]	3911	4843	6078	7593	9367	11379	13607	16029	18624	21371	24247	27231
	Power [W]	800	881	965	1050	1135	1216	1290	1356	1412	1454	1480	1488
	Current [A]	3.5	3.9	4.2	4.6	5.0	5.3	5.6	5.9	6.2	6.4	6.5	6.5
110	Mass Flow [lb/hr]	51.9	63.7	79.7	99.5	122.7	148.9	177.8	208.9	241.8	276.1	311.4	347.4
	EER [Btu/W-hr]	4.89	5.50	6.30	7.23	8.25	9.36	10.55	11.82	13.19	14.70	16.38	18.30
	Efficiency [%]	55.6	57.3	58.6	59.5	60.1	60.5	60.8	61.2	61.7	62.4	63.4	64.8
	Discharge Temp [°F]	209.1	204.5	199.4	193.9	188.2	182.5	176.9	171.7	167.0	162.9	159.6	157.3
	Capacity [Btu/hr]	3668	4275	5203	6431	7937	9700	11698	13910	16314	18888	21611	24461
	Power [W]	809	887	971	1059	1149	1238	1324	1405	1478	1540	1590	1625
	Current [A]	3.6	3.9	4.3	4.6	5.0	5.4	5.8	6.1	6.5	6.7	7.0	7.1
120	Mass Flow [lb/hr]	53.0	60.3	72.4	88.8	109.1	133.0	160.1	189.9	222.0	256.2	291.8	328.7
	EER [Btu/W-hr]	4.53	4.82	5.36	6.07	6.91	7.84	8.83	9.90	11.04	12.26	13.59	15.05
	Efficiency [%]	54.0	56.9	59.0	60.6	61.7	62.5	62.9	63.2	63.5	63.7	64.1	64.8
	Discharge Temp [°F]	218.0	214.5	210.3	205.6	200.6	195.4	190.2	185.1	180.3	176.1	172.5	169.7
	Capacity [Btu/hr]	3862	4097	4672	5566	6757	8225	9946	11900	14066	16421	18944	21614
	Power [W]	826	896	976	1064	1156	1250	1344	1436	1523	1603	1672	1730
	Current [A]	3.6	3.9	4.3	4.7	5.1	5.5	5.9	6.3	6.7	7.0	7.3	7.6
130	Mass Flow [lb/hr]	61.8	63.6	70.7	82.7	99.1	119.7	143.9	171.4	201.9	234.8	269.8	306.5
	EER [Btu/W-hr]	4.68	4.57	4.79	5.23	5.85	6.58	7.40	8.29	9.24	10.25	11.33	12.49
	Efficiency [%]	50.1	54.3	57.6	60.1	61.9	63.2	64.1	64.6	64.8	64.9	64.9	64.9
	Discharge Temp [°F]	225.8	223.5	220.5	216.7	212.5	207.9	203.1	198.4	193.8	189.5	185.7	182.6
	Capacity [Btu/hr]	4506	4321	4496	5010	5840	6965	8363	10013	11894	13983	16260	18702
	Power [W]	847	907	980	1063	1154	1250	1349	1448	1545	1638	1725	1802
	Current [A]	3.7	4.0	4.3	4.7	5.0	5.5	5.9	6.3	6.8	7.2	7.5	7.9
140	Mass Flow [lb/hr]	79.1	74.4	75.5	82.1	93.7	109.9	130.3	154.5	182.2	212.9	246.2	281.8
	EER [Btu/W-hr]	5.32	4.76	4.59	4.71	5.06	5.57	6.20	6.91	7.70	8.53	9.43	10.38
	Efficiency [%]	43.3	49.0	53.6	57.3	60.1	62.2	63.7	64.6	65.0	65.1	65.0	64.7
	Discharge Temp [°F]	232.3	231.5	229.7	227.1	223.8	220.0	215.8	211.5	207.2	203.1	199.3	196.0
	Capacity [Btu/hr]			4690	4776	5198	5934	6962	8262	9811	11588	13571	15739
	Power [W]			981	1056	1142	1236	1335	1439	1543	1646	1745	1838
	Current [A]			4.3	4.6	5.0	5.4	5.8	6.3	6.7	7.2	7.6	8.0
150	Mass Flow [lb/hr]			87.8	87.9	93.6	104.4	120.0	140.0	163.9	191.4	222.0	255.4
	EER [Btu/W-hr]			4.78	4.52	4.55	4.80	5.21	5.74	6.36	7.04	7.78	8.56
	Efficiency [%]			46.7	51.8	55.8	58.9	61.2	62.7	63.6	64.0	64.0	63.6
	Discharge Temp [°F]			238.0	236.6	234.4	231.5	228.2	224.5	220.6	216.8	213.1	209.8

APPENDIX F
H84B223ABC at 60 Hz with R-32

R-32 Calorimeter Data

Evaporator Temp (°F)	Condenser Temp (°F)	Return Gas Temp (°F)	Cooling Capacity (BTU/hr)	Input Power (watts)	Cooling EER (BTU/W-hr)	Discharge Temp (°F)	Input Current (amps)	Mass Flow Rate (lbm/hr)
0	80	20.0	11180.7	1257.3	8.9	224.9	5.50	89.7
30	80	50.0	28259.2	1502.6	18.8	164.7	6.57	222.5
-10	90	9.8	4666.9	946.3	4.9	250.0	4.15	39.2
10	100	30.0	12238.3	1513.0	8.1	238.1	6.62	105.1
45	100	65.0	33681.9	1892.0	17.8	180.0	8.28	283.2
50	100	70.0	37863.9	1874.5	20.2	173.1	8.19	317.6
0	110	20.0	4413.3	1023.2	4.3	262.1	4.48	39.9
30	110	50.0	20491.5	1958.3	10.5	223.1	8.56	181.2
50	115	70.0	32570.9	2239.9	14.5	201.9	9.80	291.1
10	130	30.0	7604.9	1592.8	4.8	295.7	6.97	74.8
45	130	65.0	24085.7	2499.7	9.6	240.5	10.96	231.0
55	130	75.0	30837.1	2629.8	11.7	225.5	11.53	294.8
55	150	75.0	23338.9	3082.7	7.6	271.4	13.57	248.1
10	80	30.0	16045.1	1397.5	11.5	201.1	6.12	127.9
10	90	30.0	14030.3	1466.2	9.6	220.0	6.41	116.2
20	120	40.0	12969.0	1816.6	7.1	258.6	7.94	120.5

R-32 Polynomial Coefficients

	Capacity	Power	Line Current	Mass Flow	Efficiency	Discharge T
C1	1.67054E+04	-1.60762E+03	-7.52909E+00	-8.51495E+00	8.22013E+01	1.07418E+01
C2	-1.48840E+02	-1.07185E+02	-4.68919E-01	-4.12413E+00	-4.03942E+00	-6.51966E+00
C3	3.05508E+02	1.04004E+02	4.70924E-01	6.44120E+00	8.59642E-01	5.18780E+00
C4	6.14355E+00	-4.31747E-01	-1.93741E-03	4.28250E-02	-1.89501E-02	2.40077E-02
C5	1.28606E+01	2.17736E+00	9.54155E-03	1.49438E-01	9.09065E-02	7.39904E-02
C6	-7.04845E+00	-1.18541E+00	-5.35421E-03	-9.29621E-02	-2.28527E-02	-4.57028E-02
C7	3.38215E-02	-9.74890E-04	-4.87420E-06	3.21310E-04	2.94168E-04	2.83908E-04
C8	-4.94973E-02	8.66847E-04	4.75769E-06	-3.73754E-04	-1.28180E-04	-4.51279E-04
C9	-6.58719E-02	-7.61564E-03	-3.35757E-05	-6.67872E-04	-3.65768E-04	-2.04395E-04
C10	3.00254E-02	4.20852E-03	1.89978E-05	3.52804E-04	1.03352E-04	1.76925E-04

R-32 Performance Table

Evaporator Temperature - ºF

Condenser Temperature - ºF		0	5	10	15	20	25	30	35	40	45	50	55
80	Capacity [Btu/hr]	11409	13760	16245	18891	21722	24763	28040	31579	35405	39542	44017	48855
	Power [W]	1281	1363	1426	1470	1493	1496	1476	1434	1369	1280	1166	1027
	Current [A]	5.6	6.0	6.2	6.4	6.5	6.5	6.5	6.3	6.0	5.6	5.1	4.5
	Mass Flow [lb/hr]	92.5	110.6	129.6	149.8	171.3	194.5	219.5	246.5	276.0	308.0	342.8	380.6
	EER [Btu/W-hr]	8.91	10.10	11.39	12.85	14.55	16.56	18.99	22.02	25.86	30.89	37.74	47.58
	Efficiency [%]	57.6	61.4	63.9	65.4	66.1	66.3	66.1	65.7	65.4	65.4	66.0	67.3
	Discharge Temp [°F]	223.9	214.0	203.8	193.5	183.1	173.0	163.4	154.4	146.3	139.3	133.7	129.5
90	Capacity [Btu/hr]	8997	11419	13950	16617	19444	22457	25682	29143	32866	36876	41199	45861
	Power [W]	1219	1345	1454	1542	1611	1660	1687	1692	1674	1633	1567	1477
	Current [A]	5.3	5.9	6.4	6.7	7.0	7.3	7.4	7.4	7.3	7.1	6.8	6.4
	Mass Flow [lb/hr]	75.4	95.2	115.8	137.3	159.9	184.0	209.8	237.5	267.3	299.5	334.3	372.0
	EER [Btu/W-hr]	7.38	8.49	9.60	10.77	12.07	13.53	15.22	17.22	19.63	22.58	26.29	31.06
	Efficiency [%]	49.8	55.0	58.8	61.6	63.6	64.8	65.7	66.4	67.0	68.0	69.3	71.4
	Discharge Temp [°F]	236.4	228.5	219.9	210.9	201.7	192.6	183.7	175.2	167.4	160.4	154.6	150.0
100	Capacity [Btu/hr]	6797	9224	11735	14357	17115	20034	23140	26457	30012	33829	37934	42353
	Power [W]	1147	1310	1456	1582	1689	1776	1842	1887	1909	1907	1882	1833
	Current [A]	5.0	5.7	6.4	6.9	7.4	7.8	8.1	8.3	8.3	8.3	8.2	8.0
	Mass Flow [lb/hr]	58.8	79.7	101.1	123.2	146.4	170.7	196.6	224.2	253.7	285.4	319.6	356.5
	EER [Btu/W-hr]	5.92	7.04	8.06	9.07	10.13	11.28	12.56	14.02	15.73	17.74	20.15	23.11
	Efficiency [%]	43.0	49.2	54.0	57.7	60.5	62.6	64.1	65.5	66.7	68.2	70.0	72.5
	Discharge Temp [°F]	249.4	243.1	235.9	228.2	220.0	211.5	203.1	195.0	187.2	180.1	173.9	168.7
110	Capacity [Btu/hr]	4989	7354	9780	12292	14914	17673	20594	23702	27023	30581	34402	38513
	Power [W]	1091	1283	1458	1615	1752	1870	1967	2043	2097	2129	2137	2121
	Current [A]	4.8	5.6	6.4	7.1	7.7	8.2	8.6	8.9	9.2	9.3	9.3	9.3
	Mass Flow [lb/hr]	44.8	66.0	87.6	109.7	132.7	156.7	182.0	208.8	237.4	268.0	300.8	336.2
	EER [Btu/W-hr]	4.57	5.73	6.71	7.61	8.51	9.45	10.47	11.60	12.88	14.37	16.10	18.16
	Efficiency [%]	37.8	44.7	50.1	54.4	57.6	60.1	62.0	63.6	65.1	66.7	68.7	71.2
	Discharge Temp [°F]	263.9	259.0	253.1	246.3	238.8	231.0	222.9	214.8	206.9	199.4	192.6	186.6
120	Capacity [Btu/hr]	3753	5991	8266	10601	13022	15555	18226	21058	24078	27312	30784	34520
	Power [W]	1075	1289	1486	1665	1825	1966	2087	2187	2266	2322	2356	2366
	Current [A]	4.7	5.6	6.5	7.3	8.0	8.6	9.1	9.6	9.9	10.2	10.3	10.4
	Mass Flow [lb/hr]	35.4	56.4	77.4	98.9	121.0	144.0	168.0	193.4	220.4	249.2	280.1	313.3
	EER [Btu/W-hr]	3.49	4.65	5.56	6.37	7.14	7.91	8.73	9.63	10.63	11.76	13.07	14.59
	Efficiency [%]	34.9	42.1	47.8	52.2	55.5	58.1	60.0	61.5	62.9	64.3	65.9	68.1
	Discharge Temp [°F]	280.9	277.2	272.3	266.3	259.4	251.9	243.9	235.7	227.5	219.4	211.8	204.8
130	Capacity [Btu/hr]	3268	5314	7371	9464	11619	13860	16214	18705	21359	24202	27259	30554
	Power [W]	1126	1353	1564	1758	1934	2090	2227	2344	2439	2513	2564	2592
	Current [A]	4.9	5.9	6.8	7.7	8.5	9.1	9.7	10.3	10.7	11.0	11.2	11.4
	Mass Flow [lb/hr]	32.9	52.9	72.8	92.9	113.5	134.7	156.9	180.2	204.9	231.2	259.4	289.8
	EER [Btu/W-hr]	2.90	3.93	4.71	5.38	6.01	6.63	7.28	7.98	8.76	9.63	10.63	11.79
	Efficiency [%]	34.8	41.9	47.5	51.7	54.9	57.1	58.6	59.7	60.5	61.4	62.4	63.9
	Discharge Temp [°F]	301.5	298.9	294.7	289.3	282.8	275.4	267.3	258.8	250.0	241.2	232.6	224.3
140	Capacity [Btu/hr]	3717	5504	7277	9062	10884	12768	14739	16823	19046	21432	24007	26796
	Power [W]	1267	1501	1719	1920	2103	2267	2413	2538	2643	2727	2788	2827
	Current [A]	5.6	6.6	7.5	8.4	9.2	9.9	10.6	11.1	11.6	12.0	12.2	12.4
	Mass Flow [lb/hr]	39.3	57.6	75.7	93.8	112.2	131.0	150.6	171.2	192.9	216.1	241.0	267.9
	EER [Btu/W-hr]	2.93	3.67	4.23	4.72	5.18	5.63	6.11	6.63	7.21	7.86	8.61	9.48
	Efficiency [%]	38.2	44.9	50.0	53.7	56.2	57.7	58.5	58.8	58.8	58.7	58.7	59.1
	Discharge Temp [°F]	326.7	325.0	321.4	316.4	310.0	302.5	294.1	285.1	275.6	265.8	255.9	246.3
150	Capacity [Btu/hr]			8164	9575	10998	12458	13981	15593	17317	19181	21209	23426
	Power [W]			1975	2175	2358	2523	2669	2796	2903	2988	3052	3094
	Current [A]			8.7	9.6	10.4	11.1	11.7	12.3	12.8	13.1	13.4	13.6
	Mass Flow [lb/hr]			88.4	103.8	119.3	135.1	151.4	168.5	186.7	206.1	227.0	249.7
	EER [Btu/W-hr]			4.13	4.40	4.66	4.94	5.24	5.58	5.97	6.42	6.95	7.57
	Efficiency [%]			55.9	58.7	60.2	60.7	60.4	59.5	58.2	56.8	55.4	54.4
	Discharge Temp [°F]			353.4	348.6	342.1	334.4	325.5	315.7	305.2	294.2	283.0	271.7