

KLEA® 407A



Engineers' Tables British Units

1. Introduction

This is the first edition of the Mexichem Fluor Engineers' Tables for KLEA[®] 407A. In these tables you'll find practical information to help you design or set up refrigeration systems using KLEA[®] 407A. We've tried to make the layout as easy as possible to use; where possible we've followed the existing conventions used in standard reference works. These tables are supplementary to the Physical Property Datasheet for KLEA[®] 407A and the booklets of Thermodynamic Property Data for KLEA[®] 407A.

2. Temperature-Pressure Tables for KLEA[®] 407A

2.1 Evaporator and Condenser Tables

The temperature glide need cause no problems as long as you know the correct relationship between pressure and temperature for the evaporator and the condenser. If you are unsure about the basic behavior of blended refrigerants, refer to the Mexichem Fluor KLEA technical note Introduction to Refrigerant Blends: Azeotropes and Zeotropes for further guidance. Bear in mind:

- When specifying the evaporating and condensing temperatures we set *mean* temperatures in these heat exchangers.
- When setting evaporator superheat we determine it from the saturated vapor or *dew point* temperature in the evaporator.
- When setting subcool we determine it from the saturated liquid or *bubble point* temperature in the condenser.

The following simple guidelines explain which tables to use to obtain the relationships between the saturated liquid and vapor pressures and temperatures. We have tabulated the following data for you:

Table 1: Evaporator pressure from condenser liquid temperature and evaporator mean temperature.

Table 2: Evaporator temperature from condenser liquid temperature and evaporator pressure.

Table 3: Evaporator saturated vapor temperature from pressure (dew point).

Table 4: Condenser pressure from mean temperature.

Tables 5-7: Maximum recommended suction line capacities for varying suction gas conditions.

Table 8: Discharge line capacities.

Table 9: Liquid line capacities.

Table 10: Recommended minimum capacities for oil entrainment in suction lines.

Table 11: Correction factors for use with the capacity tables at other conditions.

Refrigerant Flowrate: A graphical correlation of refrigerant flowrate per unit capacity.

2.2 Using the Tables

- In setting up a system to give a specified mean evaporating temperature, you simply look up the pressure you need in the evaporator using the temperature of liquid at the expansion valve and the mean temperature you want in Table 1.

- The liquid temperature at the valve has only a slight effect on the mean temperature but we have tabulated it nonetheless.
- For practical purposes the evaporator pressure will not vary significantly even if the liquid temperature at the valve changes.
- To set the mean temperature for the condenser just look up the mean condensing pressure in Table 2.
- To determine the superheat for a given pressure, use the table of saturated vapor temperatures (dew points.) to give you the saturation temperature for the vapor leaving the evaporator.
- To determine the subcooling for a given pressure, use the table of saturated liquid temperature (bubble point) as a function of pressure.
- You can also readily estimate the mean temperatures from pressure readings using these tables.
- The capacity tables follow the standard layouts used in other reference sources.

2.3 Worked Examples for Mean Pressure/Temperature Tables:

(i) *Setting the evaporator pressure*

Problem:

Liquid temperature at valve: 105°F.

Desired evaporating temperature: -20°F.

What is the evaporator pressure to use?

What is the effect of a liquid temperature of 85°F?

Solution:

For KLEA[®] 407A, with a liquid temperature at the valve of 105°F and a desired mean evaporating temperature of -20°F, read Table 1 to get an evaporator pressure of 25.3 psia. A liquid temperature of 85°F gives an evaporator pressure of 25.6 psia... a change of 1%.

(ii) *Finding the evaporator temperature from a gauge reading*

Problem:

Evaporator pressure gauge reads 34 psia.

Measured exit temperature (from thermometer) is 1°F.

What is the mean evaporator temperature?

What is the superheat in the evaporator?

Solution:

For KLEA[®] 407A, we have a measured evaporator pressure of 34 psia and a measured exit temperature of 1°F; we want to check superheat and evaporating temperature. The liquid temperature is 105°F. Table 2 shows that the mean evaporating temperature is -7.6°F. The superheat is determined from the dewpoint, given in Table 3 as -4.5°F; hence we have a working superheat of 5-5°F, obtained by subtracting the dew point temperature from the measured exit temperature.

(iii) *Setting up the condenser pressure and subcool*

Problem:

Target mean condenser temperature is 110°F.

The liquid temperature at the valve will be 85°F.

What is the condensing pressure?

What degree of subcooling will be required?

Solution:

Table 3 supplies the condenser pressure of 275 psia for a mean condenser of 110°F. Then the subcooling is obtained by subtracting the liquid temperature of 85°F from the bubble point of 106.1°F, giving a subcool of 21.1°F.

3. Refrigerant Line Capacity Tables

3.1 Methods Used to Generate the Tables

The tables presented here have been developed using the methodology described in the ASHRAE Handbook: Refrigeration Systems and Applications (1994). The physical property data used to generate these tables are correlated in the Mexichem Fluor KLEA® datasheets, thermodynamic tables, date of issue September 1, 1993. Pressure drop has been estimated using the Colebrook equation to obtain friction factors and the Darcy-Weisbach equation for pressure drop.

Gas Compressibility Effects

In calculating the maximum capacity (flowrate) it has been assumed that the gas is incompressible. This is in line with the tables published in the ASHRAE handbook and for most systems this is perfectly adequate.

The assumption of incompressibility may, however, overpredict capacity if the total pressure drop is appreciable compared to the static pressure. The likely overprediction will be in the region of 5-10% depending on the evaporator pressure and total line loss (including fittings loss).

Mexichem Fluor recommends that the pressure drop obtained for a line using these tables should be compared to the total pressure available; if it is greater than 5% of the static pressure then the compressibility may have some effect, and sizing should be made on that basis.

3.2 Suction Line Capacity Tables

These tables give capacities for cycles operating under the following conditions:

Condenser mean temperature 110°F.

Zero subcooling (i.e. liquid at bubble point).

Vapor leaving evaporator (i) saturated i.e. at dew point or (ii) superheated (superheat quoted in the table).

Evaporator temperatures quoted are true mean values.

The capacity for other liquid temperatures may be found using the tabulated correction factors given in Table 11. Note that the tables are referenced to a mean condenser of 110°F; the liquid temperature (bubble point) corresponding to this condition is quoted in the tables.

The tables quote capacity for pressure drops in the mean evaporating pressure equivalent to a drop in saturation temperature of 0.5, 1 and 2°F in 100 feet pipe length. Data are presented for copper tubing, Type L, and Schedule 40 steel pipe with dimensions as given in the ASHRAE Handbook HVAC Systems and Equipment (1992).

The mass flowrate of refrigerant is also presented graphically as the flow in lb/hr required for a duty of 1 ton refrigeration over a range of evaporating temperatures and liquid temperatures.

3.3 Discharge Line Capacity Tables

These have been calculated on the following basis:

Condenser mean temperature of 110°F.

Zero subcooling i.e. liquid at bubble point.

Vapor leaves evaporator at dew point i.e. zero useful superheat.

Superheat at compressor discharge is (i) 80 or (ii) 110°F.

Evaporator temperatures are true mean values,

3.4 Liquid Line Capacity Tables

These are quoted for conditions of (i) 1.5 fps maximum velocity or (ii) 1 Fahrenheit drop in saturation temperature in 100 feet of pipe run. Use the velocity criterion for sizing self-venting lines.

3.5 Correcting for Other Temperature Drops or Line Lengths

The suction capacity tables reference according to saturation temperature losses of 0.5, 1 and 2°F in 100 feet pipe length. In order to correct the capacities for different values of temperature drop or line length, use the following equation:

$$\text{Capacity} = \text{Table Capacity} \times \left(\frac{\text{Required } \Delta T_e \times \text{Table } L_e}{\text{Table } \Delta T_e \times \text{Required } L_e} \right)^{0.54}$$

where:

ΔT_e is the change in evaporating temperature

L_e is the length of suction line

To evaluate the change in saturation temperature for differing capacities or line lengths, use the equation :

$$\text{Actual } \Delta T_e = \text{Table } \Delta T_e \times \left(\frac{\text{Actual } L_e}{\text{Table } L_e} \right) \times \left(\frac{\text{Actual Capacity}}{\text{Table Capacity}} \right)^{1.8}$$

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Table 1: Evaporator Pressure from Liquid Temperature and Mean Evaporating Temperature

KLEA[®] 407A Pressure in psia

T mean °F	T liquid °F		
	85	105	125
38	87.6	86.8	86.0
36	84.4	83.6	82.9
34	81.3	80.6	79.8
32	78.3	77.6	76.8
30	75.4	74.7	74.0
28	72.5	71.9	71.2
26	69.8	69.1	68.5
24	67.1	66.5	65.8
22	64.5	63.9	63.3
20	62.0	61.4	60.8
18	59.6	59.0	58.4
16	57.2	56.7	56.1
14	54.9	54.4	53.8
12	52.7	52.2	51.6
10	50.5	50.0	49.5
8	48.4	48.0	47.5
6	46.4	46.0	45.5
4	44.5	44.0	43.5
2	42.6	42.2	41.7
0	40.7	40.3	39.9
-2	39.0	38.6	38.2
-4	37.3	36.9	36.5
-6	35.6	35.3	34.9
-8	34.0	33.7	33.3
-10	32.5	32.2	31.8
-12	31.0	30.7	30.3
-14	29.6	29.3	28.9
-16	28.2	27.9	27.6
-18	26.9	26.6	26.3
-20	25.6	25.3	25.0
-22	24.4	24.1	23.8
-24	23.2	22.9	22.6
-26	22.1	21.8	21.5
-28	21.0	20.7	20.5
-30	19.9	19.7	19.4
-32	18.9	18.7	18.4
-34	17.9	17.7	17.5
-36	17.0	16.8	16.6
-38	16.1	15.9	15.7
-40	15.3	15.1	14.9

Note: Liquid temperature is temperature of liquid at expansion device

Table 2: Mean Evaporator Temperature from Pressure and Liquid Temperature – KLEA® 407A

Pressure psia	T liquid °F			T dew °F
	85	105	130	
14	-43.1	-42.7	-42.0	-39.8
16	-38.3	-37.8	-37.2	-34.9
18	-33.9	-33.4	-32.8	-30.5
20	-29.8	-29.4	-28.7	-26.4
22	-26.1	-25.6	-25.0	-22.7
24	-22.6	-22.2	-21.5	-19.2
26	-19.4	-18.9	-18.3	-15.9
28	-16.3	-15.9	-15.2	-12.8
30	-13.4	-13.0	-12.3	-9.9
32	-10.7	-10.2	-9.6	-7.1
34	-8.0	-7.6	-7.0	-4.5
36	-5.5	-5.1	-4.4	-1.9
38	-3.1	-2.7	-2.0	0.5
40	-0.8	-0.4	0.3	2.8
42	1.4	1.8	2.5	5.0
44	3.5	4.0	4.6	7.2
46	5.6	6.0	6.7	9.3
48	7.6	8.0	8.7	11.3
50	9.5	10.0	10.6	13.3
52	11.4	11.8	12.5	15.1
54	13.2	13.7	14.3	17.0
56	15.0	15.4	16.1	18.8
58	16.7	17.2	17.8	20.5
60	18.4	18.8	19.5	22.2
62	20.0	20.5	21.1	23.9
64	21.6	22.1	22.7	25.5
66	23.2	23.6	24.3	27.0
68	24.7	25.1	25.8	28.6
70	26.2	26.6	27.3	30.1
72	27.6	28.1	28.7	31.5
74	29.0	29.5	30.2	33.0
76	30.4	30.9	31.6	34.4
78	31.8	32.3	32.9	35.8
80	33.2	33.6	34.3	37.1
82	34.5	34.9	35.6	38.4
84	35.8	36.2	36.9	39.8
86	37.0	37.5	38.1	41.0
88	38.3	38.7	39.4	42.3
90	39.5	40.0	40.6	43.5
92	40.7	41.2	41.8	44.7
94	41.9	42.4	43.0	45.9
96	43.1	43.5	44.2	47.1
98	44.2	44.7	45.3	48.3
100	45.3	45.8	46.4	49.4
102	46.4	46.9	47.6	50.5
104	47.5	48.0	48.7	51.6
106	48.6	49.1	49.7	52.7
108	49.7	50.1	50.8	53.8
110	50.7	51.2	51.8	54.8
112	51.8	52.2	52.9	55.9
114	52.8	53.3	53.9	56.9

Pressure psia	T liquid °F			T dew °F
	85	105	130	
116	53.8	54.3	54.9	57.9
118	54.8	55.3	55.9	58.9
120	55.8	56.2	56.9	59.9
122	56.7	57.2	57.9	60.9
124	57.7	58.2	58.8	61.9
126	58.6	59.1	59.8	62.8
128	59.6	60.0	60.7	63.7
130	60.5	61.0	61.6	64.7
132	61.4	61.9	62.5	65.6
134	62.3	62.8	63.4	66.5
136	63.2	63.7	64.3	67.4
138	64.1	64.6	65.2	68.3
140	65.0	65.4	66.1	69.2
142	65.8	66.3	66.9	70.0
144	66.7	67.1	67.8	70.9
146	67.5	68.0	68.6	71.7
148	68.4	68.8	69.5	72.6
150	69.2	69.6	70.3	73.4
152	70.0	70.5	71.1	74.2
154	70.8	71.3	71.9	75.0
156	71.6	72.1	72.7	75.8
158	72.4	72.9	73.5	76.6
160	73.2	73.7	74.3	77.4
162	74.0	74.4	75.1	78.2
164	74.7	75.2	75.9	79.0
166	75.5	76.0	76.6	79.8
168	76.3	76.7	77.4	80.5
170	77.0	77.5	78.1	81.3
172	77.8	78.2	78.9	82.0
174	78.5	79.0	79.6	82.8
176	79.2	79.7	80.3	83.5
178	80.0	80.4	81.1	84.2
180	80.7	81.1	81.8	84.9
182	81.4	81.9	82.5	85.7
184	82.1	82.6	83.2	86.4
186	82.8	83.3	83.9	87.1
188	83.5	84.0	84.6	87.8
190	84.2	84.6	85.3	88.5
192	84.9	85.3	86.0	89.1
194	85.5	86.0	86.7	89.8

Note: Superheat should be set from the dew point

Note: Superheat should be set from the dew point

Table 3: Condenser Mean Pressure, Dew and Bubble Points, from Mean Temperature - KLEA® 407A

Mean temperature °F	Pressure psia	Bubble/Liquid temperature °F	Dew temperature °F
50	110.2	45.0	55.0
52	114.0	47.1	56.9
54	117.9	49.1	58.9
56	122.0	51.1	60.9
58	126.1	53.2	62.8
60	130.3	55.2	64.8
62	134.6	57.2	66.8
64	139.1	59.2	68.7
66	143.6	61.3	70.7
68	148.3	63.3	72.7
70	153.0	65.3	74.6
72	157.9	67.4	76.6
74	162.9	69.4	78.6
76	168.0	71.4	80.5
78	173.3	73.5	82.5
80	178.7	75.5	84.5
82	184.2	77.6	86.4
84	189.8	79.6	88.4
86	195.5	81.6	90.3
88	201.4	83.7	92.3
90	207.4	85.7	94.3
92	213.6	87.7	96.2
94	219.9	89.8	98.2
96	226.3	91.8	100.1
98	232.9	93.9	102.1
100	239.6	95.9	104.0
102	246.4	98.0	106.0
104	253.5	100.0	108.0
106	260.6	102.0	109.9
108	267.9	104.1	111.9
110	275.4	106.1	113.8
112	283.0	108.2	115.8
114	290.8	110.2	117.7
116	298.8	112.3	119.7
118	306.9	114.3	121.6
120	315.2	116.4	123.6
122	323.7	118.4	125.5
124	332.3	120.5	127.5
126	341.1	122.5	129.4
128	350.1	124.6	131.4
130	359.3	126.7	133.3
132	368.6	128.7	135.2
134	378.2	130.8	137.2
136	387.9	132.8	139.1
138	397.9	134.9	141.1
140	408.0	136.9	143.0

Note: Subcool is measured from bubble point

Table 4: Condenser Bubble, Dew and Mean Temperatures from Condenser Pressure - KLEA® 407A

Pressure psia	Temperature °F		
	Bubble/Liquid	Mean	Dew
145	61.9	66.6	71.3
148	63.2	67.9	72.6
151	64.5	69.1	73.8
154	65.7	70.4	75.0
157	67.0	71.6	76.2
160	68.2	72.8	77.4
163	69.4	74.0	78.6
166	70.6	75.2	79.8
169	71.8	76.4	80.9
172	73.0	77.5	82.0
175	74.1	78.6	83.1
178	75.3	79.7	84.2
181	76.4	80.8	85.3
184	77.5	81.9	86.4
187	78.6	83.0	87.4
190	79.7	84.1	88.5
193	80.7	85.1	89.5
196	81.8	86.1	90.5
199	82.8	87.2	91.5
202	83.9	88.2	92.5
205	84.9	89.2	93.5
208	85.9	90.2	94.4
211	86.9	91.2	95.4
214	87.9	92.1	96.4
217	88.9	93.1	97.3
220	89.8	94.0	98.2
223	90.8	95.0	99.1
226	91.7	95.9	100.0
229	92.7	96.8	100.9
232	93.6	97.7	101.8
235	94.5	98.6	102.7
238	95.4	99.5	103.6
241	96.3	100.4	104.5
244	97.2	101.3	105.3
247	98.1	102.1	106.2
250	99.0	103.0	107.0
253	99.9	103.8	107.8
256	100.7	104.7	108.6
259	101.6	105.5	109.5
262	102.4	106.4	110.3
265	103.3	107.2	111.1
268	104.1	108.0	111.9
271	104.9	108.8	112.7
274	105.8	109.6	113.4
277	106.6	110.4	114.2
280	107.4	111.2	115.0
283	108.2	112.0	115.7
286	109.0	112.7	116.5
289	109.8	113.5	117.3
292	110.5	114.3	118.0
295	111.3	115.0	118.7

Pressure psia	Temperature °F		
	Bubble/Liquid	Mean	Dew
298	112.1	115.8	119.5
301	112.8	116.5	120.2
304	113.6	117.3	120.9
307	114.4	118.0	121.6
310	115.1	118.7	122.3
313	115.8	119.4	123.0
316	116.6	120.2	123.7
319	117.3	120.9	124.4
322	118.0	121.6	125.1
325	118.8	122.3	125.8
328	119.5	123.0	126.5
331	120.2	123.7	127.2
334	120.9	124.4	127.8
337	121.6	125.0	128.5
340	122.3	125.7	129.2
343	123.0	126.4	129.8
346	123.7	127.1	130.5
349	124.3	127.7	131.1
352	125.0	128.4	131.8
355	125.7	129.0	132.4
358	126.4	129.7	133.0
361	127.0	130.3	133.7
364	127.7	131.0	134.3
367	128.3	131.6	134.9
370	129.0	132.3	135.5
373	129.7	132.9	136.1
376	130.3	133.5	136.7
379	130.9	134.1	137.4
382	131.6	134.8	138.0
385	132.2	135.4	138.6
388	132.8	136.0	139.2
391	133.5	136.6	139.7
394	134.1	137.2	140.3
397	134.7	137.8	140.9
400	135.3	138.4	141.5
403	135.9	139.0	142.1
406	136.5	139.6	142.6
409	137.1	140.2	143.2
412	137.8	140.8	143.8
415	138.4	141.4	144.4
418	138.9	141.9	144.9
421	139.5	142.5	145.5
424	140.1	143.1	146.0
427	140.7	143.6	146.6
430	141.3	144.2	147.1
433	141.9	144.8	147.7
436	142.5	145.3	148.2
439	143.0	145.9	148.8
442	143.6	146.4	149.3
445	144.2	147.0	149.8

Table 5a: Suction Line Capacities in Tons Refrigeration for KLEA® 407A Saturated Vapor Leaving Evaporator

Nominal line size inch	Saturation temperature change 0.5°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	dP/dL	0.21	0.26	0.31	0.38	0.45	0.53	0.62	0.72	0.83	0.95
Type L Copper											
1/4		0.017	0.023	0.030	0.039	0.050	0.063	0.078	0.097	0.118	0.144
3/8		0.040	0.054	0.070	0.091	0.116	0.145	0.181	0.223	0.273	0.331
1/2		0.076	0.102	0.133	0.172	0.219	0.275	0.342	0.421	0.514	0.623
5/8		0.132	0.175	0.229	0.295	0.375	0.471	0.585	0.720	0.879	1.06
3/4		0.205	0.272	0.356	0.458	0.582	0.730	0.907	1.12	1.36	1.65
1		0.420	0.557	0.726	0.934	1.19	1.49	1.85	2.27	2.77	3.34
1-1/4		0.737	0.976	1.27	1.64	2.07	2.60	3.23	3.96	4.83	5.83
1-1/2		1.17	1.55	2.02	2.60	3.29	4.12	5.11	6.28	7.64	9.23
2		2.45	3.24	4.22	5.42	6.86	8.58	10.6	13.0	15.9	19.1
2-1/2		4.36	5.76	7.49	9.61	12.2	15.2	18.8	23.1	28.1	33.9
3		6.99	9.23	12.0	15.4	19.4	24.3	30.1	36.9	44.8	54.0
3-1/2		10.4	13.8	17.9	22.9	29.0	36.2	44.8	54.8	66.6	80.3
4		14.8	19.5	25.3	32.4	40.9	51.1	63.2	77.4	93.9	113
Schedule 40 Steel											
3/8		0.052	0.069	0.089	0.113	0.142	0.177	0.217	0.265	0.32	0.384
1/2		0.098	0.128	0.166	0.211	0.265	0.329	0.404	0.492	0.594	0.713
3/4		0.208	0.272	0.351	0.446	0.56	0.695	0.853	1.04	1.25	1.50
1		0.396	0.518	0.667	0.847	1.06	1.32	1.62	1.97	2.37	2.84
1-1/4		0.821	1.07	1.38	1.75	2.19	2.72	3.34	4.06	4.89	5.86
1-1/2		1.24	1.61	2.08	2.63	3.3	4.08	5.01	6.09	7.34	8.79
2		2.39	3.12	4.02	5.09	6.37	7.89	9.67	11.7	14.2	17.0
2-1/2		3.83	4.99	6.41	8.13	10.17	12.6	15.4	18.7	22.6	27.0
3		6.79	8.85	11.4	14.4	18.0	22.3	27.3	33.1	39.9	47.8
4		13.9	18.1	23.2	29.3	36.7	45.4	55.6	67.5	81.3	97.3

Note : (i) capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110° F (no subcooling) ie liquid temperature of 106.1° F

Table 5b: Suction Line Capacities in Tons Refrigeration for KLEA® 407A Saturated Vapor Leaving Evaporator

Nominal line size inch	Saturation temperature change 1.0°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	dP/dL	0.42	0.52	0.63	0.75	0.89	1.05	1.23	1.43	1.65	1.90
Type L Copper											
1/4		0.026	0.034	0.045	0.058	0.074	0.093	0.116	0.142	0.174	0.211
3/8		0.060	0.079	0.104	0.134	0.170	0.214	0.266	0.328	0.400	0.485
1/2		0.113	0.150	0.196	0.253	0.322	0.404	0.502	0.617	0.753	0.911
5/8		0.194	0.258	0.337	0.433	0.550	0.691	0.857	1.05	1.28	1.55
3/4		0.302	0.401	0.523	0.672	0.853	1.07	1.33	1.63	1.99	2.40
1		0.618	0.818	1.07	1.37	1.74	2.17	2.70	3.31	4.03	4.86
1-1/4		1.08	1.43	1.86	2.39	3.03	3.80	4.70	5.77	7.02	8.47
1-1/2		1.72	2.27	2.96	3.80	4.81	6.01	7.44	9.13	11.1	13.4
2		3.59	4.74	6.16	7.90	9.99	12.5	15.4	18.9	23.0	27.7
2-1/2		6.38	8.41	10.9	14.0	17.7	22.1	27.3	33.5	40.6	49.0
3		10.2	13.5	17.5	22.4	28.3	35.3	43.6	53.4	64.8	78.0
3-1/2		15.2	20.1	26.0	33.3	42.0	52.5	64.8	79.3	96.2	116
4		21.5	28.3	36.8	47.0	59.3	74	91.4	112	136	163
Schedule 40 Steel											
3/8		0.076	0.099	0.128	0.163	0.204	0.253	0.311	0.378	0.457	0.547
1/2		0.141	0.185	0.238	0.302	0.379	0.470	0.577	0.702	0.847	1.01
3/4		0.299	0.391	0.503	0.639	0.800	0.991	1.22	1.48	1.78	2.14
1		0.568	0.742	0.954	1.21	1.52	1.88	2.30	2.80	3.37	4.04
1-1/4		1.18	1.54	1.97	2.50	3.13	3.87	4.75	5.77	6.95	8.32
1-1/2		1.77	2.31	2.96	3.75	4.70	5.81	7.12	8.65	10.4	12.5
2		3.42	4.46	5.73	7.25	9.07	11.2	13.7	16.7	20.1	24.1
2-1/2		5.47	7.12	9.14	11.6	14.5	17.9	21.9	26.6	32.0	38.3
3		9.69	12.6	16.2	20.5	25.6	31.6	38.7	47	56.6	67.7
4		19.8	25.7	33.000	41.7	52.1	64.4	78.9	95.7	115	138

Note : (i) capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110° F (no subcooling) ie liquid temperature of 106.1° F

Table 5c: Suction Line Capacities in Tons Refrigeration for KLEA® 407A Saturated Vapor Leaving Evaporator

Nominal line size inch	Saturation temperature change 2.0°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	dP/dL	0.84	1.03	1.25	1.51	1.79	2.11	2.46	2.86	3.3	3.79
	Type L Copper										
1/4	0.038	0.051	0.066	0.085	0.109	0.137	0.17	0.209	0.255	0.309	
3/8	0.088	0.117	0.153	0.197	0.25	0.314	0.39	0.48	0.585	0.708	
1/2	0.167	0.221	0.289	0.372	0.472	0.592	0.734	0.902	1.10	1.33	
5/8	0.286	0.379	0.495	0.636	0.806	1.01	1.25	1.54	1.87	2.26	
3/4	0.444	0.588	0.767	0.984	1.25	1.56	1.94	2.38	2.89	3.49	
1	0.906	1.20	1.56	2.00	2.53	3.17	3.92	4.81	5.85	7.06	
1-1/4	1.59	2.10	2.72	3.49	4.42	5.52	6.84	8.38	10.2	12.3	
1-1/2	2.52	3.32	4.32	5.53	7.00	8.74	10.8	13.2	16.1	19.4	
2	5.24	6.92	8.98	11.5	14.5	18.1	22.4	27.4	33.3	40.1	
2-1/2	9.30	12.3	15.9	20.3	25.7	32.0	39.5	48.4	58.7	70.6	
3	14.9	19.6	25.4	32.5	41.0	51.1	63.0	77.1	93.4	112	
3-1/2	22.2	29.2	37.8	48.3	60.9	75.9	93.6	114	139	167	
4	31.3	41.2	53.3	68.1	85.9	107	132	161	195	235	
	Schedule 40 Steel										
3/8	0.109	0.143	0.183	0.233	0.292	0.361	0.443	0.539	0.65	0.778	
1/2	0.203	0.265	0.341	0.432	0.541	0.67	0.822	0.999	1.20	1.44	
3/4	0.429	0.560	0.719	0.911	1.14	1.41	1.73	2.10	2.53	3.03	
1	0.814	1.06	1.36	1.73	2.16	2.67	3.27	3.97	4.79	5.73	
1-1/4	1.68	2.19	2.81	3.56	4.45	5.50	6.74	8.18	9.86	11.8	
1-1/2	2.53	3.29	4.22	5.34	6.68	8.26	10.1	12.3	14.8	17.7	
2	4.89	6.36	8.15	10.3	12.9	15.9	19.5	23.7	28.5	34.1	
2-1/2	7.80	10.1	13.0	16.4	20.5	25.4	31.1	37.7	45.4	54.3	
3	13.8	17.9	23.0	29.1	36.3	44.9	54.9	66.6	80.3	96.0	
4	28.1	36.6	46.8	59.2	73.9	91.3	112	136	163	195	

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 6a: Suction Line Capacities in Tons Refrigeration for KLEA® 407A
Suction Line Vapor with 10.0°F of Superheat

Nominal line size inch	Saturation temperature change 0.5°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	dP/dL	0.21	0.26	0.31	0.38	0.45	0.53	0.62	0.72	0.83	0.95
	Type L Copper										
1/4		0.017	0.023	0.031	0.040	0.051	0.064	0.080	0.098	0.120	0.146
3/8		0.041	0.054	0.071	0.092	0.117	0.148	0.184	0.227	0.277	0.336
1/2		0.078	0.103	0.135	0.175	0.222	0.279	0.347	0.428	0.522	0.633
5/8		0.134	0.178	0.233	0.300	0.381	0.479	0.595	0.732	0.893	1.08
3/4		0.208	0.277	0.361	0.465	0.591	0.742	0.922	1.13	1.38	1.67
1		0.427	0.566	0.739	0.950	1.21	1.51	1.88	2.31	2.81	3.40
1-1/4		0.749	0.993	1.29	1.66	2.11	2.65	3.28	4.03	4.91	5.93
1-1/2		1.19	1.58	2.06	2.64	3.35	4.20	5.20	6.38	7.77	9.38
2		2.49	3.30	4.29	5.51	6.98	8.73	10.8	13.3	16.1	19.5
2-1/2		4.44	5.86	7.63	9.78	12.4	15.5	19.2	23.5	28.5	34.4
3		7.11	9.40	12.2	15.6	19.8	24.7	30.6	37.5	45.6	54.9
3-1/2		10.6	14.0	18.2	23.3	29.5	36.8	45.5	55.8	67.8	81.7
4		15.0	19.8	25.7	32.9	41.6	52.0	64.3	78.7	95.6	115
	Schedule 40 Steel										
3/8		0.053	0.070	0.091	0.116	0.145	0.180	0.222	0.270	0.326	0.391
1/2		0.100	0.131	0.169	0.215	0.270	0.335	0.412	0.502	0.606	0.726
3/4		0.212	0.277	0.358	0.455	0.571	0.708	0.870	1.06	1.28	1.53
1		0.403	0.528	0.680	0.863	1.08	1.34	1.65	2.00	2.42	2.89
1-1/4		0.837	1.09	1.41	1.79	2.24	2.77	3.40	4.13	4.99	5.97
1-1/2		1.26	1.65	2.12	2.68	3.36	4.16	5.11	6.21	7.48	8.96
2		2.44	3.19	4.10	5.19	6.50	8.04	9.86	12.0	14.4	17.3
2-1/2		3.90	5.09	6.54	8.29	10.4	12.8	15.7	19.1	23.0	27.5

Note: (i) Capacity based on superheated vapor (superheat assumed useful)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 6b: Suction Line Capacities in Tons Refrigeration for KLEA® 407A
Suction Line Vapor with 10.0°F of Superheat

Nominal line size inch	Saturation temperature change 1.0°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	dP/dL	0.42	0.52	0.63	0.75	0.89	1.05	1.23	1.43	1.65	1.90
	Type L Copper										
1/4		0.026	0.035	0.046	0.059	0.075	0.094	0.117	0.145	0.177	0.214
3/8		0.061	0.081	0.106	0.136	0.173	0.218	0.271	0.333	0.407	0.492
1/2		0.115	0.153	0.2	0.257	0.327	0.411	0.51	0.627	0.765	0.925
5/8		0.198	0.262	0.342	0.441	0.56	0.702	0.872	1.07	1.31	1.58
3/4		0.307	0.407	0.532	0.684	0.867	1.09	1.35	1.66	2.02	2.44
1		0.628	0.832	1.08	1.39	1.77	2.21	2.74	3.37	4.10	4.94
1-1/4		1.10	1.46	1.90	2.44	3.08	3.86	4.78	5.87	7.14	8.61
1-1/2		1.75	2.31	3.01	3.86	4.89	6.12	7.57	9.29	11.3	13.6
2		3.65	4.82	6.27	8.04	10.2	12.7	15.7	19.3	23.4	28.2
2-1/2		6.49	8.56	11.1	14.2	18.0	22.5	27.8	34.0	41.3	49.8
3		10.4	13.7	17.8	22.8	28.8	35.9	44.4	54.3	65.9	79.4
3-1/2		15.5	20.4	26.5	33.9	42.8	53.4	66.0	80.7	97.9	118
4		21.9	28.9	37.4	47.9	60.4	75.4	93.1	114	138	166
	Schedule 40 Steel										
3/8		0.077	0.101	0.13	0.166	0.208	0.258	0.317	0.386	0.465	0.557
1/2		0.144	0.188	0.243	0.308	0.387	0.479	0.588	0.716	0.863	1.03
3/4		0.305	0.399	0.513	0.651	0.816	1.01	1.24	1.51	1.82	2.18
1		0.58	0.757	0.974	1.23	1.55	1.91	2.35	2.85	3.44	4.11
1-1/4		1.20	1.57	2.01	2.55	3.19	3.95	4.84	5.88	7.08	8.48
1-1/2		1.81	2.35	3.02	3.83	4.79	5.93	7.26	8.82	10.6	12.7
2		3.49	4.55	5.84	7.40	9.25	11.4	14.0	17.0	20.5	24.5
2-1/2		5.58	7.27	9.33	11.8	14.8	18.2	22.3	27.1	32.7	39.1
3		9.89	12.9	16.5	20.9	26.1	32.3	39.5	47.9	57.7	69.0
4		20.2	26.3	33.7	42.6	53.2	65.7	80.5	97.6	118	141

Note: (i) Capacity based on superheated vapor (superheat assumed useful)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 6c: Suction Line Capacities in Tons Refrigeration for KLEA®407A
Suction Line Vapor with 10.0°F of Superheat

Nominal line size inch	Saturation temperature change 2.0°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T dP/dL	-40	-30	-20	-10	0	10	20	30	40	50
	Type L Copper										
1/4	0.039	0.051	0.067	0.087	0.110	0.139	0.173	0.213	0.259	0.314	
3/8	0.090	0.119	0.156	0.200	0.255	0.320	0.397	0.488	0.595	0.719	
1/2	0.170	0.225	0.294	0.378	0.480	0.602	0.746	0.917	1.12	1.35	
5/8	0.291	0.386	0.503	0.646	0.820	1.03	1.27	1.56	1.90	2.30	
3/4	0.452	0.598	0.780	1.00	1.27	1.59	1.97	2.42	2.94	3.55	
1	0.922	1.22	1.59	2.04	2.58	3.22	3.99	4.89	5.95	7.18	
1-1/4	1.61	2.13	2.77	3.55	4.50	5.62	6.96	8.52	10.4	12.5	
1-1/2	2.56	3.38	4.40	5.63	7.12	8.90	11.0	13.5	16.4	19.7	
2	5.34	7.04	9.14	11.7	14.8	18.4	22.8	27.9	33.8	40.7	
2-1/2	9.46	12.5	16.2	20.7	26.1	32.6	40.3	49.2	59.7	71.8	
3	15.1	19.9	25.9	33.1	41.7	52.0	64.2	78.5	95.1	114	
3-1/2	22.6	29.7	38.5	49.2	62.0	77.3	95.3	117	141	170	
4	31.9	41.9	54.3	69.4	87.4	109	134	164	199	239	
	Schedule 40 Steel										
3/8	0.111	0.145	0.187	0.237	0.297	0.368	0.452	0.549	0.662	0.793	
1/2	0.207	0.270	0.348	0.441	0.552	0.684	0.838	1.02	1.23	1.47	
3/4	0.438	0.571	0.734	0.930	1.16	1.44	1.76	2.14	2.58	3.09	
1	0.830	1.08	1.39	1.76	2.20	2.72	3.34	4.05	4.88	5.84	
1-1/4	1.72	2.24	2.87	3.63	4.54	5.61	6.88	8.35	10.1	12.0	
1-1/2	2.58	3.36	4.31	5.45	6.81	8.42	10.3	12.5	15.1	18.0	
2	4.99	6.49	8.32	10.5	13.1	16.2	19.9	24.1	29.1	34.8	
2-1/2	7.96	10.4	13.3	16.8	21.0	25.9	31.7	38.5	46.3	55.4	
3	14.1	18.3	23.5	29.7	37.0	45.8	56.0	68.0	81.8	97.8	
4	28.7	37.3	47.8	60.4	75.4	93.2	114	138	167	199	

Note: (i) Capacity based on superheated vapor (superheat assumed useful)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 7a: Suction Line Capacities in Tons Refrigeration for KLEA® 407A
Suction Line Vapor at 65.0°F

Nominal line size inch	Saturation temperature change 0.5°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	dP/dL	0.21	0.26	0.31	0.38	0.45	0.53	0.62	0.72	0.83	0.95
Type L Copper											
1/4		0.014	0.020	0.026	0.035	0.045	0.058	0.073	0.091	0.114	0.141
3/8		0.034	0.046	0.061	0.081	0.104	0.133	0.169	0.211	0.262	0.324
1/2		0.065	0.088	0.117	0.153	0.198	0.252	0.319	0.399	0.495	0.610
5/8		0.112	0.151	0.201	0.263	0.339	0.433	0.546	0.683	0.846	1.04
3/4		0.174	0.235	0.312	0.409	0.527	0.672	0.847	1.06	1.31	1.61
1		0.357	0.482	0.64	0.835	1.08	1.37	1.73	2.15	2.66	3.28
1-1/4		0.629	0.847	1.12	1.46	1.88	2.40	3.02	3.76	4.65	5.71
1-1/2		1.00	1.35	1.79	2.33	2.99	3.80	4.78	5.96	7.37	9.05
2		2.10	2.82	3.73	4.86	6.24	7.93	9.96	12.4	15.3	18.8
2-1/2		3.74	5.02	6.63	8.63	11.1	14.1	17.6	21.9	27.1	33.2
3		6.01	8.06	10.6	13.8	17.7	22.5	28.2	35.1	43.2	53.0
3-1/2		8.97	12.0	15.9	20.6	26.4	33.5	42.0	52.2	64.3	78.7
4		12.7	17.0	22.4	29.1	37.3	47.3	59.3	73.6	90.7	111
Schedule 40 Steel											
3/8		0.045	0.060	0.079	0.103	0.131	0.165	0.205	0.253	0.310	0.377
1/2		0.085	0.113	0.148	0.191	0.244	0.307	0.382	0.471	0.576	0.700
3/4		0.181	0.241	0.315	0.406	0.516	0.648	0.806	0.993	1.21	1.48
1		0.345	0.458	0.599	0.771	0.979	1.23	1.53	1.88	2.30	2.79
1-1/4		0.717	0.952	1.24	1.60	2.03	2.54	3.15	3.88	4.74	5.76
1-1/2		1.08	1.43	1.87	2.40	3.04	3.82	4.74	5.83	7.12	8.64
2		2.10	2.78	3.62	4.65	5.89	7.38	9.15	11.3	13.7	16.7
2-1/2		3.36	4.45	5.79	7.42	9.40	11.8	14.6	17.9	21.9	26.6
3		5.97	7.89	10.3	13.2	16.6	20.8	25.8	31.7	38.7	47.0
4		12.2	16.1	21.0	26.8	34.0	42.5	52.6	64.7	78.9	95.7

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 7b: Suction Line Capacities in Tons Refrigeration for KLEA® 407A
Suction Line Vapor at 65.0°F

Nominal line size inch	Saturation temperature change 1.0°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	dP/dL	0.42	0.52	0.63	0.75	0.89	1.05	1.23	1.43	1.65	1.90
Type L Copper											
1/4		0.022	0.029	0.039	0.051	0.067	0.085	0.108	0.135	0.167	0.207
3/8		0.050	0.068	0.091	0.119	0.154	0.197	0.248	0.311	0.385	0.474
1/2		0.096	0.130	0.173	0.226	0.291	0.371	0.468	0.585	0.725	0.892
5/8		0.165	0.223	0.296	0.387	0.499	0.636	0.801	1.000	1.24	1.52
3/4		0.257	0.347	0.460	0.601	0.774	0.985	1.24	1.55	1.91	2.35
1		0.527	0.710	0.940	1.23	1.58	2.01	2.52	3.14	3.88	4.77
1-1/4		0.926	1.25	1.65	2.15	2.76	3.50	4.40	5.48	6.77	8.30
1-1/2		1.47	1.98	2.62	3.41	4.38	5.55	6.97	8.68	10.7	13.1
2		3.08	4.14	5.46	7.10	9.11	11.5	14.5	18.0	22.2	27.2
2-1/2		5.48	7.35	9.69	12.6	16.1	20.4	25.6	31.8	39.2	48.0
3		8.79	11.8	15.5	20.1	25.8	32.7	40.9	50.8	62.6	76.5
3-1/2		13.1	17.6	23.1	30.0	38.4	48.6	60.9	75.5	93.0	114
4		18.6	24.8	32.7	42.4	54.2	68.6	85.9	107	131	160
Schedule 40 Steel											
3/8		0.066	0.088	0.115	0.148	0.188	0.236	0.294	0.362	0.443	0.538
1/2		0.123	0.164	0.214	0.275	0.35	0.439	0.545	0.672	0.821	0.997
3/4		0.261	0.347	0.453	0.582	0.739	0.926	1.15	1.42	1.73	2.10
1		0.498	0.660	0.860	1.1	1.4	1.75	2.18	2.68	3.27	3.97
1-1/4		1.03	1.37	1.78	2.28	2.89	3.62	4.49	5.52	6.74	8.18
1-1/2		1.55	2.06	2.68	3.43	4.34	5.44	6.74	8.29	10.1	12.3
2		3.01	3.98	5.17	6.63	8.39	10.5	13.0	16.0	19.5	23.6
2-1/2		4.82	6.36	8.26	10.6	13.4	16.7	20.8	25.5	31.1	37.7
3		8.55	11.3	14.6	18.7	23.7	29.6	36.7	45.1	54.9	66.6
4		17.5	23.0	29.9	38.2	48.3	60.4	74.7	91.8	112	136

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 7c: Suction Line Capacities in Tons Refrigeration for KLEA® 407A
Suction Line Vapor at 65.0°F

Nominal line size inch	Saturation temperature change 2.0°F in 100ft										
	Mean evaporating temperature °F corresponding dP psi/100ft										
	T dP/dL	-40	-30	-20	-10	0	10	20	30	40	50
	Type L Copper										
1/4	0.032	0.044	0.058	0.076	0.098	0.126	0.158	0.198	0.246	0.303	
3/8	0.075	0.101	0.135	0.176	0.227	0.289	0.365	0.455	0.564	0.693	
1/2	0.142	0.192	0.254	0.332	0.428	0.545	0.686	0.856	1.06	1.30	
5/8	0.244	0.329	0.436	0.569	0.732	0.931	1.17	1.46	1.80	2.22	
3/4	0.379	0.511	0.676	0.882	1.13	1.44	1.81	2.26	2.79	3.42	
1	0.776	1.04	1.38	1.80	2.31	2.93	3.68	4.57	5.64	6.92	
1-1/4	1.36	1.83	2.41	3.14	4.03	5.11	6.41	7.97	9.82	12.0	
1-1/2	2.16	2.90	3.83	4.97	6.38	8.09	10.1	12.6	15.5	19.0	
2	4.51	6.05	7.97	10.3	13.3	16.8	21.0	26.1	32.1	39.3	
2-1/2	8.01	10.7	14.1	18.3	23.5	29.7	37.1	46.1	56.7	69.3	
3	12.8	17.2	22.6	29.3	37.5	47.4	59.2	73.4	90.3	110	
3-1/2	19.1	25.6	33.6	43.6	55.7	70.4	88.0	109	134	164	
4	27.1	36.1	47.5	61.5	78.6	99.3	124	154	189	231	
	Schedule 40 Steel										
3/8	0.095	0.126	0.165	0.212	0.269	0.338	0.419	0.516	0.63	0.765	
1/2	0.178	0.236	0.307	0.394	0.5	0.627	0.778	0.956	1.17	1.42	
3/4	0.376	0.498	0.649	0.832	1.05	1.32	1.64	2.01	2.46	2.98	
1	0.715	0.946	1.23	1.58	2.00	2.50	3.10	3.81	4.64	5.63	
1-1/4	1.48	1.96	2.54	3.26	4.12	5.15	6.39	7.84	9.57	11.6	
1-1/2	2.23	2.94	3.82	4.89	6.18	7.73	9.58	11.8	14.3	17.4	
2	4.31	5.68	7.38	9.44	11.9	14.9	18.5	22.7	27.7	33.5	
2-1/2	6.89	9.08	11.8	15.1	19.0	23.8	29.5	36.2	44.1	53.4	
3	12.2	16.1	20.8	26.6	33.7	42.1	52.1	63.9	77.9	94.4	
4	24.9	32.8	42.5	54.3	68.6	85.6	106	130	159	192	

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 8a: Discharge Line Capacities in Tons Refrigeration for KLEA®407A Saturated Vapor Leaving Evaporator

Nominal line size inch	Condenser Saturation Temperature Change 1.0° F in 100ft										
	Pressure gradient of 3.78 psi/100ft										
	Discharge line superheat of 80.0°F										
	Mean evaporating temperature °F										
	T	-40	-30	-20	-10	0	10	20	30	40	50
Type L Copper											
1/4		0.345	0.356	0.367	0.377	0.388	0.398	0.407	0.417	0.426	0.434
3/8		0.792	0.817	0.841	0.865	0.889	0.912	0.934	0.956	0.977	0.996
1/2		1.49	1.53	1.58	1.62	1.67	1.71	1.75	1.79	1.83	1.87
5/8		2.53	2.61	2.69	2.77	2.84	2.92	2.99	3.06	3.12	3.19
3/4		3.91	4.04	4.16	4.28	4.39	4.51	4.62	4.72	4.83	4.92
1		7.92	8.17	8.42	8.66	8.89	9.12	9.35	9.56	9.77	9.97
1-1/4		13.8	14.2	14.6	15.1	15.5	15.9	16.3	16.6	17.0	17.3
1-1/2		21.8	22.5	23.1	23.8	24.5	25.1	25.7	26.3	26.9	27.4
2		45.1	46.5	47.9	49.2	50.6	51.9	53.2	54.4	55.6	56.7
2-1/2		79.5	82	84.5	86.9	89.2	91.6	93.8	96.0	98.0	100
3		127	131	135	138	142	146	149	153	156	159
3-1/2		188	194	200	205	211	217	222	227	232	237
4		265	273	281	289	297	305	312	320	327	333
Schedule 40 Steel											
3/8		0.882	0.910	0.937	0.964	0.990	1.02	1.04	1.06	1.09	1.11
1/2		1.64	1.69	1.74	1.79	1.83	1.88	1.93	1.97	2.02	2.06
3/4		3.44	3.55	3.65	3.76	3.86	3.96	4.06	4.15	4.24	4.33
1		6.50	6.71	6.91	7.10	7.30	7.49	7.67	7.85	8.02	8.18
1-1/4		13.4	13.8	14.2	14.6	15.0	15.4	15.8	16.2	16.5	16.8
1-1/2		20.1	20.7	21.3	21.9	22.5	23.1	23.7	24.2	24.8	25.3
2		38.7	39.9	41.1	42.3	43.4	44.6	45.7	46.7	47.7	48.7
2-1/2		61.7	63.6	65.5	67.4	69.2	71	72.8	74.5	76.1	77.6
3		109	112	116	119	122	125	129	132	134	137
4		222	229	236	242	249	255	262	268	274	279

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 8b: Discharge Line Capacities in Tons Refrigeration for KLEA®407A Saturated Vapor Leaving Evaporator

Nominal line size inch	Condenser Saturation Temperature Change 1.0° F in 100ft										
	Pressure gradient of 3.78 psi/100ft										
	Discharge line superheat of 80.0°F										
	Mean evaporating temperature °F										
	T	-40	-30	-20	-10	0	10	20	30	40	50
Type L Copper											
1/4		0.326	0.336	0.346	0.356	0.366	0.375	0.385	0.393	0.402	0.410
3/8		0.749	0.772	0.795	0.818	0.84	0.862	0.883	0.904	0.923	0.942
1/2		1.41	1.45	1.50	1.54	1.58	1.62	1.66	1.70	1.74	1.77
5/8		2.40	2.48	2.55	2.62	2.69	2.76	2.83	2.90	2.96	3.02
3/4		3.71	3.83	3.94	4.05	4.16	4.27	4.38	4.48	4.58	4.67
1		7.52	7.76	7.99	8.22	8.44	8.66	8.87	9.07	9.27	9.46
1-1/4		13.1	13.5	13.9	14.3	14.7	15.1	15.4	15.8	16.1	16.5
1-1/2		20.7	21.4	22.0	22.6	23.2	23.8	24.4	25.0	25.5	26.0
2		42.9	44.2	45.6	46.9	48.1	49.4	50.6	51.8	52.9	53.9
2-1/2		75.7	78.1	80.4	82.7	85.0	87.2	89.3	91.4	93.3	95.2
3		121	124	128	132	135	139	142	146	149	152
3-1/2		179	185	190	196	201	206	211	216	221	225
4		253	260	268	276	283	291	298	305	311	318
Schedule 40 Steel											
3/8		0.847	0.873	0.9	0.925	0.95	0.975	0.999	1.02	1.04	1.07
1/2		1.57	1.62	1.67	1.72	1.76	1.81	1.85	1.89	1.94	1.98
3/4		3.30	3.41	3.51	3.61	3.71	3.80	3.90	3.99	4.07	4.16
1		6.25	6.44	6.64	6.83	7.01	7.19	7.37	7.54	7.70	7.86
1-1/4		12.9	13.3	13.7	14.1	14.4	14.8	15.2	15.5	15.9	16.2
1-1/2		19.3	19.9	20.5	21.1	21.7	22.2	22.8	23.3	23.8	24.3
2		37.2	38.4	39.6	40.7	41.8	42.9	43.9	44.9	45.9	46.8
2-1/2		59.3	61.2	63.0	64.8	66.6	68.3	70	71.6	73.2	74.7
3		105	108	111	115	118	121	124	127	129	132
4		213	220	227	233	240	246	252	258	263	269

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 9a: Liquid line Capacities in Tons Refrigeration for KLEA®407A Saturated Vapor Leaving Evaporator

Nominal line size inch	Liquid Line Velocity 1.5 fps Mean evaporating temperature °F										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	Type L Copper										
1/4	0.780	0.804	0.828	0.852	0.875	0.898	0.920	0.941	0.961	0.981	
3/8	1.45	1.50	1.54	1.59	1.63	1.67	1.71	1.75	1.79	1.83	
1/2	2.33	2.41	2.48	2.55	2.62	2.69	2.75	2.82	2.88	2.94	
5/8	3.49	3.60	3.70	3.81	3.91	4.02	4.11	4.21	4.3	4.39	
3/4	4.84	5.00	5.15	5.29	5.44	5.58	5.71	5.85	5.97	6.09	
1	8.26	8.52	8.77	9.02	9.27	9.51	9.74	9.97	10.2	10.4	
1-1/4	12.6	13.0	13.4	13.7	14.1	14.5	14.8	15.2	15.5	15.8	
1-1/2	17.8	18.4	18.9	19.5	20.0	20.5	21.0	21.5	22.0	22.4	
2	31.0	31.9	32.9	33.8	34.8	35.7	36.5	37.4	38.2	39.0	
2-1/2	47.8	49.3	50.7	52.2	53.6	55.0	56.3	57.6	58.9	60.1	
3	68.2	70.3	72.4	74.5	76.5	78.5	80.4	82.3	84.0	85.7	
3-1/2	92.2	95.1	97.9	101	103	106	109	111	114	116	
4	120	124	127	131	135	138	141	145	148	151	
	Schedule 40 Steel										
3/8	1.91	1.97	2.03	2.09	2.14	2.20	2.25	2.30	2.35	2.40	
1/2	3.04	3.14	3.23	3.32	3.41	3.50	3.59	3.67	3.75	3.83	
3/4	5.34	5.50	5.67	5.83	5.99	6.14	6.29	6.44	6.58	6.71	
1	8.65	8.92	9.18	9.45	9.70	9.95	10.2	10.4	10.7	10.9	
1-1/4	15.0	15.4	15.9	16.4	16.8	17.2	17.7	18.1	18.5	18.8	
1-1/2	20.4	21	21.6	22.3	22.9	23.5	24.0	24.6	25.1	25.6	
2	33.6	34.6	35.7	36.7	37.7	38.7	39.6	40.5	41.4	42.2	
2-1/2	47.9	49.4	50.9	52.3	53.8	55.2	56.5	57.8	59.1	60.3	
3	74.0	76.3	78.6	80.8	83	85.2	87.3	89.3	91.2	93.1	
4	127	131	135	139	143	147	150	154	157	160	

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 9b: Liquid Line Capacities in Tons Refrigeration for KLEA®407A Saturated Vapor Leaving Evaporator

Nominal line size inch	Condenser Saturation Temperature Change 1.0° F in 100m Pressure gradient of 3.78 psi/100ft Mean evaporating temperature °F										
	T	-40	-30	-20	-10	0	10	20	30	40	50
	Type L Copper										
1/4	1.33	1.37	1.41	1.45	1.49	1.53	1.57	1.60	1.64	1.67	
3/8	3.05	3.15	3.24	3.34	3.43	3.52	3.60	3.69	3.77	3.84	
1/2	5.75	5.93	6.10	6.28	6.45	6.62	6.78	6.94	7.09	7.23	
5/8	9.81	10.1	10.4	10.7	11.0	11.3	11.6	11.8	12.1	12.3	
3/4	15.2	15.6	16.1	16.6	17.0	17.5	17.9	18.3	18.7	19.1	
1	30.8	31.7	32.7	33.6	34.5	35.4	36.3	37.1	37.9	38.7	
1-1/4	53.6	55.3	56.9	58.6	60.2	61.7	63.2	64.7	66.1	67.4	
1-1/2	84.8	87.5	90.1	92.6	95.2	97.6	100	102	105	107	
2	176	181	187	192	197	202	207	212	217	221	
2-1/2	310	320	330	339	348	357	366	375	383	391	
3	495	511	526	541	556	570	584	597	610	623	
3-1/2	736	759	781	804	825	847	868	888	907	925	
4	1037	1069	1101	1133	1164	1194	1223	1251	1278	1304	
	Schedule 40 Steel										
3/8	3.49	3.60	3.71	3.82	3.92	4.02	4.12	4.22	4.31	4.39	
1/2	6.48	6.68	6.88	7.08	7.27	7.46	7.64	7.82	7.99	8.15	
3/4	13.6	14.1	14.5	14.9	15.3	15.7	16.1	16.5	16.8	17.2	
1	25.8	26.6	27.4	28.2	29.0	29.7	30.4	31.1	31.8	32.5	
1-1/4	53.2	54.8	56.5	58.1	59.7	61.2	62.7	64.2	65.6	66.9	
1-1/2	79.8	82.3	84.7	87.2	89.5	91.8	94.1	96.3	98.4	100	
2	154	159	163	168	173	177	181	186	190	194	
2-1/2	245	253	260	268	275	282	289	296	302	308	
3	433	447	460	473	486	499	511	523	534	545	
4	882	909	937	964	990	101	1041	1065	1088	1110	

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F

Table 10a: Minimum Refrigeration Capacities in Tons Refrigeration for KLEA® 407A

Type L Copper Tubing		Nominal line size, inch												
Evap. Temp. °F	Suction Temp. °F	1/4	3/8	1/2	5/8	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4
50	60	0.081	0.176	0.318	0.525	0.792	1.54	2.61	4.03	8.05	13.8	21.6	31.5	43.7
	70	0.079	0.173	0.313	0.517	0.779	1.52	2.57	3.96	7.92	13.6	21.2	31.0	43.0
	80	0.078	0.170	0.308	0.509	0.767	1.49	2.53	3.90	7.80	13.4	20.9	30.5	42.3
40	50	0.073	0.159	0.287	0.475	0.716	1.39	2.36	3.64	7.28	12.5	19.5	28.5	39.5
	60	0.072	0.156	0.283	0.467	0.704	1.37	2.32	3.58	7.16	12.3	19.2	28.0	38.9
	70	0.071	0.154	0.278	0.460	0.694	1.35	2.29	3.53	7.05	12.1	18.9	27.6	38.3
30	40	0.066	0.143	0.258	0.427	0.644	1.25	2.12	3.28	6.55	11.2	17.6	25.6	35.5
	50	0.065	0.141	0.254	0.421	0.634	1.24	2.09	3.23	6.45	11.1	17.3	25.2	35.0
	60	0.064	0.139	0.251	0.414	0.625	1.22	2.06	3.18	6.35	10.9	17.0	24.8	34.5
20	30	0.059	0.128	0.232	0.383	0.577	1.12	1.90	2.94	5.86	10.1	15.7	22.9	31.8
	40	0.058	0.126	0.228	0.377	0.568	1.11	1.87	2.89	5.78	9.93	15.5	22.6	31.4
	50	0.057	0.124	0.225	0.371	0.560	1.09	1.85	2.85	5.69	9.78	15.3	22.3	30.9
10	20	0.052	0.114	0.206	0.341	0.514	1.00	1.69	2.62	5.23	8.98	14.0	20.4	28.4
	30	0.052	0.112	0.203	0.336	0.506	0.987	1.67	2.58	5.15	8.85	13.8	20.1	28.0
	40	0.051	0.111	0.200	0.331	0.499	0.973	1.65	2.54	5.08	8.72	13.6	19.8	27.5
0	10	0.046	0.101	0.183	0.302	0.456	0.888	1.50	2.32	4.63	7.96	12.4	18.1	25.2
	20	0.046	0.100	0.180	0.298	0.449	0.875	1.48	2.29	4.57	7.84	12.2	17.9	24.8
	30	0.045	0.098	0.178	0.294	0.443	0.863	1.46	2.25	4.50	7.73	12.1	17.6	24.4
-10	0	0.041	0.089	0.161	0.266	0.402	0.783	1.32	2.04	4.08	7.01	10.9	16.0	22.2
	10	0.040	0.088	0.159	0.262	0.396	0.771	1.30	2.01	4.02	6.91	10.8	15.7	21.8
	20	0.040	0.087	0.157	0.259	0.390	0.760	1.29	1.99	3.97	6.81	10.6	15.5	21.5
-20	-10	0.036	0.078	0.141	0.233	0.351	0.685	1.16	1.79	3.57	6.14	9.58	14.0	19.4
	0	0.035	0.077	0.139	0.230	0.346	0.675	1.14	1.76	3.52	6.05	9.44	13.8	19.1
	10	0.035	0.076	0.137	0.226	0.341	0.665	1.13	1.74	3.47	5.96	9.31	13.6	18.8
-30	-20	0.031	0.068	0.123	0.203	0.305	0.595	1.01	1.55	3.10	5.33	8.32	12.1	16.9
	-10	0.031	0.067	0.121	0.200	0.301	0.587	0.992	1.53	3.06	5.26	8.20	12.0	16.6
	0	0.030	0.066	0.119	0.197	0.297	0.578	0.978	1.51	3.02	5.18	8.09	11.8	16.4
-40	-30	0.027	0.058	0.106	0.175	0.263	0.513	0.867	1.34	2.68	4.60	7.17	10.5	14.5
	-20	0.026	0.058	0.104	0.172	0.259	0.506	0.855	1.32	2.64	4.53	7.07	10.3	14.3
	-10	0.026	0.057	0.103	0.170	0.256	0.498	0.843	1.30	2.60	4.47	6.97	10.2	14.1

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F
(iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

Table 10b: Minimum Refrigeration Capacities in Tons Refrigeration for KLEA® 407A
Lubricant Is EMKARATE RL32S

Schedule 40 Steel Pipe		Nominal line size, inch									
Evap. Temp. °F	Suction Temp. °F	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
50	60	0.247	0.443	0.894	1.63	3.24	4.77	8.91	13.9	23.9	47.2
	70	0.243	0.435	0.879	1.61	3.19	4.69	8.76	13.7	23.5	46.4
	80	0.240	0.429	0.866	1.58	3.14	4.62	8.62	13.4	23.2	45.7
40	50	0.224	0.400	0.808	1.48	2.93	4.31	8.05	12.6	21.6	42.6
	60	0.220	0.394	0.795	1.45	2.89	4.24	7.92	12.4	21.3	41.9
	70	0.217	0.388	0.783	1.43	2.84	4.18	7.80	12.2	20.9	41.3
30	40	0.201	0.360	0.727	1.33	2.64	3.88	7.24	11.3	19.4	38.4
	50	0.198	0.354	0.716	1.31	2.60	3.82	7.13	11.1	19.1	37.8
	60	0.195	0.349	0.705	1.29	2.56	3.76	7.03	11.0	18.9	37.2
20	30	0.180	0.322	0.651	1.19	2.36	3.47	6.49	10.1	17.4	34.4
	40	0.177	0.318	0.641	1.17	2.33	3.42	6.39	9.97	17.2	33.8
	50	0.175	0.313	0.632	1.15	2.29	3.37	6.30	9.82	16.9	33.3
10	20	0.161	0.287	0.580	1.06	2.11	3.10	5.78	9.02	15.5	30.6
	30	0.158	0.283	0.572	1.04	2.07	3.05	5.70	8.88	15.3	30.2
	40	0.156	0.279	0.563	1.03	2.04	3.01	5.61	8.76	15.1	29.7
0	10	0.142	0.255	0.514	0.940	1.87	2.74	5.13	7.99	13.8	27.1
	20	0.140	0.251	0.507	0.926	1.84	2.70	5.05	7.88	13.6	26.7
	30	0.138	0.247	0.500	0.913	1.81	2.67	4.98	7.76	13.4	26.4
-10	0	0.125	0.224	0.453	0.828	1.64	2.42	4.52	7.04	12.1	23.9
	10	0.124	0.221	0.447	0.816	1.62	2.38	4.45	6.94	11.9	23.6
	20	0.122	0.218	0.440	0.805	1.60	2.35	4.39	6.84	11.8	23.2
-20	-10	0.110	0.196	0.397	0.725	1.44	2.12	3.95	6.16	10.6	20.9
	0	0.108	0.194	0.391	0.715	1.42	2.09	3.90	6.07	10.5	20.6
	10	0.107	0.191	0.385	0.704	1.40	2.06	3.84	5.99	10.3	20.3
-30	-20	0.095	0.171	0.345	0.630	1.25	1.84	3.43	5.36	9.22	18.2
	-10	0.094	0.168	0.340	0.621	1.23	1.81	3.39	5.28	9.09	17.9
	0	0.093	0.166	0.335	0.612	1.22	1.79	3.34	5.20	8.96	17.7
-40	-30	0.082	0.147	0.297	0.543	1.08	1.58	2.96	4.62	7.95	15.7
	-20	0.081	0.145	0.293	0.535	1.06	1.56	2.92	4.55	7.83	15.4
	-10	0.080	0.143	0.289	0.528	1.05	1.54	2.88	4.49	7.72	15.2

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F
(iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

**Table 10c: Minimum Refrigeration Capacities in Tons Refrigeration for KLEA® 407A
Lubricant Is EMKARATE RL68S**

Type L Copper Tubing		Nominal line size, inch												
Evap. Temp. °F	Suction Temp. °F	1/4	3/8	1/2	5/8	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4
50	60	0.081	0.176	0.318	0.525	0.792	1.54	2.61	4.03	8.05	13.8	21.6	31.5	43.7
	70	0.079	0.173	0.313	0.517	0.779	1.52	2.57	3.97	7.92	13.6	21.2	31.0	43.0
	80	0.078	0.170	0.308	0.509	0.767	1.49	2.53	3.90	7.80	13.4	20.9	30.5	42.3
40	50	0.073	0.159	0.287	0.475	0.716	1.39	2.36	3.64	7.28	12.5	19.5	28.5	39.5
	60	0.072	0.156	0.283	0.467	0.704	1.37	2.32	3.59	7.16	12.3	19.2	28.0	38.9
	70	0.071	0.154	0.278	0.460	0.694	1.35	2.29	3.53	7.05	12.1	18.9	27.6	38.3
30	40	0.066	0.143	0.258	0.427	0.644	1.26	2.12	3.28	6.55	11.3	17.6	25.6	35.5
	50	0.065	0.141	0.255	0.421	0.634	1.24	2.09	3.23	6.45	11.1	17.3	25.2	35.0
	60	0.064	0.139	0.251	0.414	0.625	1.22	2.06	3.18	6.35	10.9	17.0	24.8	34.5
20	30	0.059	0.128	0.232	0.383	0.577	1.12	1.90	2.94	5.87	10.1	15.7	22.9	31.8
	40	0.058	0.126	0.228	0.377	0.568	1.11	1.87	2.89	5.78	9.93	15.5	22.6	31.4
	50	0.057	0.124	0.225	0.371	0.560	1.09	1.85	2.85	5.69	9.78	15.3	22.3	30.9
10	20	0.052	0.114	0.206	0.341	0.514	1.00	1.69	2.62	5.23	8.98	14.0	20.4	28.4
	30	0.052	0.112	0.203	0.336	0.507	0.987	1.67	2.58	5.15	8.85	13.8	20.1	28.0
	40	0.051	0.111	0.200	0.331	0.499	0.973	1.65	2.54	5.08	8.72	13.6	19.9	27.6
0	10	0.046	0.101	0.183	0.302	0.456	0.888	1.50	2.32	4.63	7.96	12.4	18.1	25.2
	20	0.046	0.100	0.180	0.298	0.449	0.875	1.48	2.29	4.57	7.85	12.2	17.9	24.8
	30	0.045	0.098	0.178	0.294	0.443	0.863	1.46	2.25	4.50	7.73	12.1	17.6	24.4
-10	0	0.041	0.089	0.161	0.266	0.402	0.783	1.32	2.04	4.08	7.02	10.9	16.0	22.2
	10	0.040	0.088	0.159	0.262	0.396	0.771	1.30	2.01	4.02	6.91	10.8	15.7	21.8
	20	0.040	0.087	0.157	0.259	0.390	0.760	1.29	1.99	3.97	6.82	10.6	15.5	21.5
-20	-10	0.036	0.078	0.141	0.233	0.351	0.685	1.16	1.79	3.57	6.14	9.58	14.0	19.4
	0	0.035	0.077	0.139	0.230	0.346	0.675	1.14	1.76	3.52	6.05	9.44	13.8	19.1
	10	0.035	0.076	0.137	0.226	0.341	0.666	1.13	1.74	3.47	5.97	9.31	13.6	18.8
-30	-20	0.031	0.068	0.123	0.203	0.305	0.595	1.01	1.55	3.11	5.34	8.32	12.1	16.9
	-10	0.031	0.067	0.121	0.200	0.301	0.587	0.992	1.53	3.06	5.26	8.20	12.0	16.6
	0	0.030	0.066	0.119	0.197	0.297	0.578	0.978	1.51	3.02	5.18	8.09	11.8	16.4
-40	-30	0.027	0.058	0.106	0.175	0.263	0.513	0.868	1.34	2.68	4.60	7.17	10.5	14.5
	-20	0.026	0.058	0.104	0.172	0.259	0.506	0.855	1.32	2.64	4.53	7.07	10.3	14.3
	-10	0.026	0.057	0.103	0.170	0.256	0.498	0.843	1.30	2.60	4.47	6.97	10.2	14.1

Note: (i) Capacity based on saturated vapor (no useful superheat)
(ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F
(iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

Table 10d: Minimum Refrigeration Capacities in Tons Refrigeration for KLEA® 407A
Lubricant Is EMKARATE RL68S

Schedule 40 Steel Pipe		Nominal line size, inch									
Evap. Temp. °F	Suction Temp. °F	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
50	60	0.247	0.443	0.894	1.63	3.24	4.77	8.91	13.90	23.9	47.2
	70	0.243	0.435	0.879	1.61	3.19	4.69	8.76	13.70	23.5	46.4
	80	0.240	0.429	0.866	1.58	3.14	4.62	8.63	13.50	23.2	45.7
40	50	0.224	0.400	0.808	1.48	2.93	4.31	8.05	12.60	21.6	42.6
	60	0.220	0.394	0.795	1.45	2.89	4.24	7.92	12.40	21.3	42.0
	70	0.217	0.388	0.783	1.43	2.84	4.18	7.80	12.20	20.9	41.3
30	40	0.201	0.360	0.727	1.33	2.64	3.88	7.24	11.30	19.4	38.4
	50	0.198	0.354	0.716	1.31	2.60	3.82	7.13	11.10	19.1	37.8
	60	0.195	0.349	0.705	1.29	2.56	3.76	7.03	11.00	18.9	37.2
20	30	0.180	0.322	0.651	1.19	2.36	3.47	6.49	10.10	17.4	34.4
	40	0.178	0.318	0.641	1.17	2.33	3.42	6.39	9.97	17.2	33.8
	50	0.175	0.313	0.632	1.16	2.29	3.37	6.30	9.82	16.9	33.3
10	20	0.161	0.287	0.580	1.06	2.11	3.10	5.78	9.02	15.5	30.6
	30	0.158	0.283	0.572	1.05	2.08	3.05	5.70	8.89	15.3	30.2
	40	0.156	0.279	0.564	1.03	2.05	3.01	5.62	8.76	15.1	29.7
0	10	0.142	0.255	0.514	0.94	1.87	2.74	5.13	7.99	13.8	27.1
	20	0.140	0.251	0.507	0.927	1.84	2.70	5.05	7.88	13.6	26.7
	30	0.138	0.247	0.500	0.913	1.81	2.67	4.98	7.76	13.4	26.4
-10	0	0.125	0.224	0.453	0.829	1.65	2.42	4.52	7.04	12.1	23.9
	10	0.124	0.221	0.447	0.816	1.62	2.38	4.45	6.94	11.9	23.6
	20	0.122	0.218	0.440	0.805	1.60	2.35	4.39	6.84	11.8	23.2
-20	-10	0.110	0.196	0.397	0.725	1.44	2.12	3.95	6.17	10.6	20.9
	0	0.108	0.194	0.391	0.715	1.42	2.09	3.90	6.08	10.5	20.6
	10	0.107	0.191	0.385	0.705	1.40	2.06	3.84	5.99	10.3	20.3
-30	-20	0.095	0.171	0.345	0.630	1.25	1.84	3.44	5.36	9.22	18.2
	-10	0.094	0.168	0.340	0.621	1.23	1.81	3.39	5.28	9.09	17.9
	0	0.093	0.166	0.335	0.612	1.22	1.79	3.34	5.20	8.96	17.7
-40	-30	0.082	0.147	0.297	0.543	1.08	1.59	2.96	4.62	7.95	15.7
	-20	0.081	0.145	0.293	0.535	1.06	1.56	2.92	4.55	7.83	15.5
	-10	0.080	0.143	0.289	0.528	1.05	1.54	2.88	4.49	7.72	15.2

- Note :
- (i) Capacity based on saturated vapor (no useful superheat)
 - (ii) Mean condenser temperature 110°F (no subcooling) i.e. liquid temperature of 106.1°F
 - (iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

Table 11: Suction Line Capacity Correction Factors For KLEA® 407A

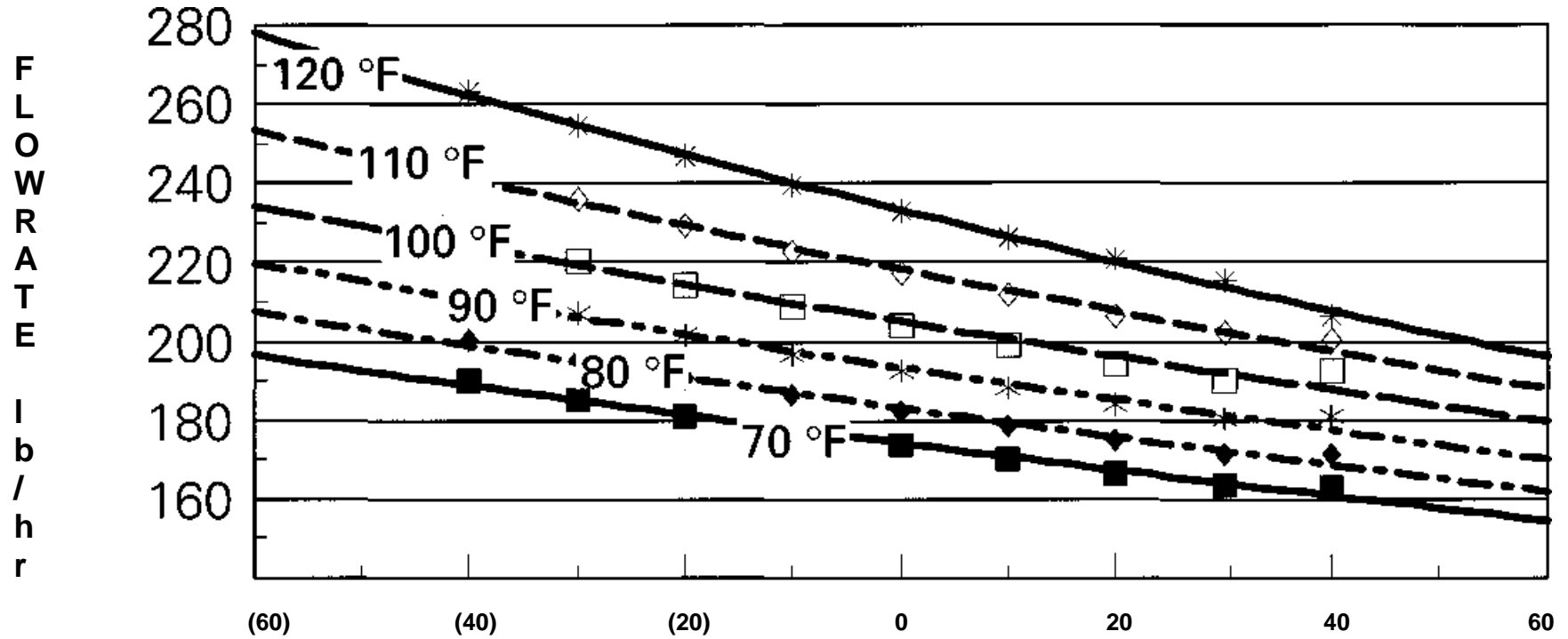
To convert from tabulated values at a mean condenser temperature of 110°F to the desired value, multiply by the appropriate factor.

T evap °F	T liquid °F						
	70	80	90	100	106.1	110	120
40	1.234	1.172	1.108	1.042	1.000	0.973	0.900
30	1.233	1.177	1.120	1.061	1.000	0.937	0.870
20	1.238	1.181	1.123	1.062	1.000	0.935	0.867
10	1.244	1.186	1.126	1.064	1.000	0.934	0.863
0	1.250	1.190	1.129	1.065	1.000	0.932	0.860
-10	1.257	1.195	1.132	1.067	1.000	0.930	0.856
-20	1.264	1.201	1.136	1.069	1.000	0.928	0.852
-30	1.272	1.207	1.140	1.071	1.000	0.926	0.848
-40	1.280	1.213	1.144	1.073	1.000	0.924	0.843

Note: liquid temperature at a mean condensing temperature of 110.0°F is 106.1°F
hence table is referenced to a liquid temperature of 106.1°F

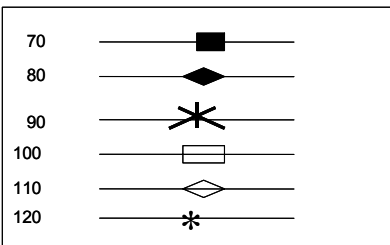
Refrigerant Flowrate for 1 Ton of Refrigeration

KLEA[®]407A



Mean Evaporating Temperature, °F

Legend shows liquid temperature at valve inlet °F



KLEA® 407A



Mexichem.
FLUOR

**Mexichem Fluor Inc, 4990 B ICI Road, Hwy. 75, PO Box 30, St. Gabriel, LA 70776
Telephone: (225) 642-0094 (main line), 800-ASK-KLEA (toll free), Fax; (225) 642-8629
www.mexichemfluor.com**

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