

KLEA® 404A



Engineers' Tables SI Units

1. Introduction

The following tables provide practical information to help you design or set up refrigeration systems using KLEA®404A. 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®404A and the booklets of Thermodynamic Property Data for KLEA®404A.

2. Temperature-Pressure Tables for KLEA®404A

2.1 Evaporator and Condenser Tables

The temperature glide need cause no problems so long as you know the correct relationship between pressure and temperature for the evaporator and the condenser. If you are unsure about the basic behaviour of blended refrigerants, refer to the Mexichem Fluor Technical Note Introduction to Mixed Refrigerants for further guidance. Bear in mind:

- When specifying the evaporating and condensing temperatures we set mean temperatures in these exchangers.
- When setting evaporator superheat we calculate it from the saturated vapour or dew point temperature in the evaporator.
- When setting subcool we calculate 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 vapour 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 vapour temperature from pressure (dew point).

Table 4: Condenser pressure from mean temperature.

Table 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 4.
- To calculate the superheat for a given pressure, use the table of saturated vapour temperatures (dew points) to give you the saturation temperature for the vapour leaving the evaporator.
- To calculate 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: 40 °C.
Desired evaporating temperature: -15 °C.
What is the evaporator pressure to use?
What is the effect of a liquid temperature of 30 °C?

Solution:

For KLEA®404A, with a liquid temperature at the valve of 40 °C and a desired mean evaporating temperature of -15 °C, read Table 1 to get an evaporator pressure of 3.68 bara. A liquid temperature of 30 °C gives no change in pressure.

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

Problem:

Evaporator pressure gauge reads 2.5 bara.
Measured exit temperature (from thermometer) is -20 °C.
What is the mean evaporator temperature?
What is the superheat in the evaporator?

Solution:

For KLEA®404A, we have a measured evaporator pressure of 2.5 bara and a measured exit temperature of -20 °C; we want to check superheat and evaporating temperature. The liquid temperature is 40 °C. Table 2 shows that the mean evaporating temperature is -25.4 °C. The superheat is calculated from the dewpoint, which is -25.2 °C; hence we have a working superheat of 5.2 K, 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 40 °C.
The liquid temperature at the valve will be 30 °C.
What is the condensing pressure?
What degree of subcooling will be required?

Solution:

Table 3 supplies the condenser pressure of 18.3 bara for a mean condenser of 40 °C. Then the subcooling is obtained by subtracting the liquid

temperature of 30 °C from the bubble point of 39.8 °C, giving a subcool of 9.8 K.

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 datasheets, thermodynamic tables. 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 over-predict capacity if the total pressure drop is appreciable compared to the static pressure. The likely over-prediction will be in the region of 5-10% depending on the evaporator pressure and total line loss (including fittings loss).

Mexichem 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 40 °C.
Zero subcooling (i.e. liquid at bubble point).
Vapour 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 40 °C; 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 0.01, 0.02 and 0.04 Kelvin for every metre of suction line. 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 kg/hr required for a duty of 1 kW 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 40 °C.
- Zero subcooling i.e. liquid at bubble point.
- Vapour leaves evaporator at dew point i.e. zero useful superheat.
- Superheat at compressor discharge is (i) 45 or (ii) 60 °C.
- Evaporator temperatures are true mean values.

3.4 Liquid Line Capacity Tables

These are quoted for conditions of (i) 0.5 m/s maximum velocity or (ii) 0.02 K/m drop in saturation temperature. 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 0.01, 0.02 and 0.04 K in one metre length. In order to correct the capacities for different values of temperature drop or line length, use the following equation:

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

where:

ΔT_e is the change in evaporating temperature

ΔL_e is the length of suction line

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

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

Table I: Evaporator pressure from liquid temperature and mean evaporating temperature

KLEA 404A

Pressure in bara

Temp. mean °C	Temperature liquid °C		
	30	40	50
5	7.11	7.10	7.10
4	6.90	6.89	6.88
3	6.69	6.68	6.67
2	6.48	6.48	6.47
1	6.28	6.28	6.27
0	6.09	6.08	6.08
-1	5.90	5.89	5.89
-2	5.71	5.71	5.70
-3	5.53	5.53	5.52
-4	5.36	5.35	5.35
-5	5.18	5.18	5.17
-6	5.02	5.01	5.01
-7	4.85	4.85	4.84
-8	4.69	4.69	4.68
-9	4.54	4.53	4.53
-10	4.39	4.38	4.38
-11	4.24	4.23	4.23
-12	4.09	4.09	4.09
-13	3.95	3.95	3.95
-14	3.82	3.81	3.81
-15	3.68	3.68	3.68
-16	3.55	3.55	3.55
-17	3.43	3.42	3.42
-18	3.31	3.30	3.30
-19	3.19	3.18	3.18
-20	3.07	3.07	3.06
-21	2.96	2.95	2.95
-22	2.85	2.85	2.84
-23	2.74	2.74	2.74
-24	2.64	2.64	2.63
-25	2.54	2.54	2.53
-26	2.44	2.44	2.44
-27	2.35	2.34	2.34
-28	2.26	2.25	2.25
-29	2.17	2.16	2.16
-30	2.08	2.08	2.07
-31	2.00	1.99	1.99
-32	1.92	1.91	1.91
-33	1.84	1.84	1.83
-34	1.76	1.76	1.76
-35	1.69	1.69	1.68
-36	1.62	1.62	1.61
-37	1.55	1.55	1.54
-38	1.48	1.48	1.48
-39	1.42	1.42	1.41
-40	1.36	1.35	1.35

Table 2: Mean evaporator temperature from pressure and liquid temperature

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Pressure bara	Temperature liquid °C			Temp. dew °C
	30	40	50	
1	-46.56	-46.53	-46.49	-46.37
1.1	-44.55	-44.52	-44.48	-44.36
1.2	-42.68	-42.65	-42.61	-42.49
1.3	-40.93	-40.90	-40.86	-40.74
1.4	-39.29	-39.25	-39.22	-39.09
1.5	-37.73	-37.70	-37.66	-37.54
1.6	-36.25	-36.22	-36.18	-36.06
1.7	-34.84	-34.81	-34.77	-34.65
1.8	-33.49	-33.46	-33.42	-33.30
1.9	-32.20	-32.17	-32.13	-32.01
2	-30.96	-30.93	-30.90	-30.77
2.1	-29.77	-29.74	-29.70	-29.57
2.2	-28.62	-28.59	-28.55	-28.43
2.3	-27.51	-27.48	-27.44	-27.31
2.4	-26.44	-26.41	-26.37	-26.24
2.5	-25.40	-25.37	-25.33	-25.20
2.6	-24.39	-24.36	-24.32	-24.19
2.7	-23.41	-23.38	-23.34	-23.21
2.8	-22.45	-22.43	-22.39	-22.26
2.9	-21.53	-21.50	-21.47	-21.33
3	-20.63	-20.60	-20.56	-20.43
3.1	-19.75	-19.72	-19.68	-19.55
3.2	-18.89	-18.86	-18.83	-18.69
3.3	-18.05	-18.02	-17.99	-17.85
3.4	-17.23	-17.20	-17.17	-17.03
3.5	-16.43	-16.40	-16.37	-16.23
3.6	-15.64	-15.62	-15.58	-15.45
3.7	-14.88	-14.85	-14.82	-14.68
3.8	-14.13	-14.10	-14.06	-13.93
3.9	-13.39	-13.36	-13.33	-13.19
4	-12.67	-12.64	-12.60	-12.47
4.1	-11.96	-11.93	-11.90	-11.76
4.2	-11.26	-11.23	-11.20	-11.06
4.3	-10.58	-10.55	-10.52	-10.38
4.4	-9.90	-9.88	-9.84	-9.71
4.5	-9.24	-9.22	-9.18	-9.05
4.6	-8.60	-8.57	-8.54	-8.40
4.7	-7.96	-7.93	-7.90	-7.76
4.8	-7.33	-7.30	-7.27	-7.13
4.9	-6.71	-6.68	-6.65	-6.51
5	-6.10	-6.07	-6.04	-5.90
5.1	-5.50	-5.47	-5.44	-5.30
5.2	-4.91	-4.88	-4.85	-4.71
5.3	-4.33	-4.30	-4.27	-4.13
5.4	-3.75	-3.73	-3.69	-3.55
5.5	-3.19	-3.16	-3.13	-2.99
5.6	-2.63	-2.60	-2.57	-2.43
5.7	-2.08	-2.05	-2.02	-1.88
5.8	-1.53	-1.51	-1.48	-1.33
5.9	-1.00	-0.97	-0.94	-0.80
6	-0.47	-0.44	-0.41	-0.27

Pressure bara	Temperature liquid °C			Temp. dew °C
	30	40	50	
6.1	0.06	0.08	0.11	0.26
6.2	0.57	0.60	0.63	0.77
6.3	1.08	1.11	1.14	1.28
6.4	1.59	1.61	1.64	1.79
6.5	2.09	2.11	2.14	2.29
6.6	2.58	2.61	2.64	2.78
6.7	3.07	3.09	3.12	3.27
6.8	3.55	3.57	3.60	3.75
6.9	4.02	4.05	4.08	4.22
7	4.49	4.52	4.55	4.69
7.1	4.96	4.99	5.02	5.16
7.2	5.42	5.45	5.48	5.62
7.3	5.88	5.90	5.93	6.08
7.4	6.33	6.35	6.38	6.53
7.5	6.77	6.80	6.83	6.98
7.6	7.22	7.24	7.27	7.42
7.7	7.65	7.68	7.71	7.86
7.8	8.09	8.11	8.14	8.29
7.9	8.52	8.54	8.57	8.72
8	8.94	8.97	9.00	9.14
8.1	9.36	9.39	9.42	9.57
8.2	9.78	9.81	9.84	9.98
8.3	10.20	10.22	10.25	10.40
8.4	10.61	10.63	10.66	10.81
8.5	11.01	11.04	11.07	11.21
8.6	11.41	11.44	11.47	11.61
8.7	11.81	11.84	11.87	12.01
8.8	12.21	12.23	12.26	12.41
8.9	12.60	12.63	12.65	12.80
9	12.99	13.01	13.04	13.19
9.1	13.37	13.40	13.43	13.57
9.2	13.76	13.78	13.81	13.96
9.3	14.14	14.16	14.19	14.34
9.4	14.51	14.54	14.57	14.71
9.5	14.88	14.91	14.94	15.09
9.6	15.25	15.28	15.31	15.46
9.7	15.62	15.65	15.68	15.82
9.8	15.99	16.01	16.04	16.19
9.9	16.35	16.37	16.40	16.55
10	16.71	16.73	16.76	16.91

Note: Superheat should be set from dew point

Note: Superheat should be set from dew point

Table 3: Condenser mean pressure, dew and bubble points from the mean temperature

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Mean temp. °C	Pressure bara	Bubble/liquid temp. °C	Dew temp. °C
10	8.27	9.76	10.25
11	8.51	10.76	11.25
12	8.76	11.76	12.25
13	9.01	12.76	13.25
14	9.28	13.77	14.24
15	9.54	14.77	15.24
16	9.81	15.77	16.24
17	10.09	16.77	17.24
18	10.38	17.78	18.23
19	10.67	18.78	19.23
20	10.96	19.78	20.23
21	11.27	20.78	21.22
22	11.57	21.79	22.22
23	11.89	22.79	23.22
24	12.21	23.79	24.21
25	12.54	24.79	25.21
26	12.87	25.79	26.21
27	13.21	26.80	27.21
28	13.56	27.80	28.20
29	13.92	28.80	29.20
30	14.28	29.80	30.20
31	14.65	30.80	31.19
32	15.03	31.81	32.19
33	15.41	32.81	33.19
34	15.80	33.81	34.18
35	16.20	34.81	35.18
36	16.61	35.82	36.18
37	17.02	36.82	37.17
38	17.45	37.82	38.17
39	17.88	38.82	39.17
40	18.31	39.83	40.16
41	18.76	40.83	41.16
42	19.22	41.83	42.16
43	19.68	42.84	43.15
44	20.15	43.84	44.15
45	20.63	44.84	45.15
46	21.12	45.85	46.15
47	21.62	46.85	47.14
48	22.13	47.85	48.14
49	22.64	48.86	49.14
50	23.17	49.86	50.14
51	23.70	50.86	51.13
52	24.25	51.87	52.13
53	24.80	52.87	53.13
54	25.37	53.88	54.13
55	25.94	54.88	55.13
56	26.53	55.89	56.13
57	27.12	56.89	57.13
58	27.73	57.90	58.13
59	28.34	58.91	59.13
60	28.97	59.91	60.13

Table 4: Condenser bubble, dew and mean temperatures from condenser pressure

KLEA 404A

Pressure bara	Temperatures °C		
	Bubble/liquid	Mean	Dew
10	16.44	16.67	16.91
10.2	17.16	17.39	17.62
10.4	17.86	18.09	18.31
10.6	18.55	18.78	19.00
10.8	19.23	19.46	19.68
11	19.91	20.13	20.35
11.2	20.57	20.79	21.01
11.4	21.22	21.44	21.66
11.6	21.87	22.09	22.30
11.8	22.51	22.72	22.94
12	23.14	23.35	23.57
12.2	23.76	23.97	24.18
12.4	24.37	24.58	24.79
12.6	24.98	25.19	25.40
12.8	25.58	25.78	25.99
13	26.17	26.38	26.58
13.2	26.75	26.96	27.16
13.4	27.33	27.54	27.74
13.6	27.90	28.11	28.31
13.8	28.47	28.67	28.87
14	29.03	29.23	29.43
14.2	29.58	29.78	29.98
14.4	30.13	30.32	30.52
14.6	30.67	30.86	31.06
14.8	31.21	31.40	31.59
15	31.74	31.93	32.12
15.2	32.26	32.45	32.64
15.4	32.78	32.97	33.16
15.6	33.30	33.48	33.67
15.8	33.81	33.99	34.18
16	34.31	34.49	34.68
16.2	34.81	34.99	35.18
16.4	35.31	35.49	35.67
16.6	35.80	35.98	36.16
16.8	36.28	36.46	36.64
17	36.76	36.94	37.12
17.2	37.24	37.42	37.59
17.4	37.72	37.89	38.06
17.6	38.18	38.36	38.53
17.8	38.65	38.82	38.99
18	39.11	39.28	39.45
18.2	39.57	39.74	39.91
18.4	40.02	40.19	40.36
18.6	40.47	40.64	40.80
18.8	40.92	41.08	41.25
19	41.36	41.52	41.69
19.2	41.80	41.96	42.12
19.4	42.23	42.39	42.56
19.6	42.67	42.83	42.99
19.8	43.09	43.25	43.41
20	43.52	43.68	43.83

Pressure bara	Temperatures °C		
	Bubble/liquid	Mean	Dew
20.2	43.94	44.10	44.25
20.4	44.36	44.52	44.67
20.6	44.78	44.93	45.08
20.8	45.19	45.34	45.49
21	45.60	45.75	45.90
21.2	46.00	46.15	46.30
21.4	46.41	46.56	46.71
21.6	46.81	46.96	47.10
21.8	47.21	47.35	47.50
22	47.60	47.75	47.89
22.2	48.00	48.14	48.28
22.4	48.39	48.53	48.67
22.6	48.77	48.91	49.06
22.8	49.16	49.30	49.44
23	49.54	49.68	49.82
23.2	49.92	50.06	50.19
23.4	50.29	50.43	50.57
23.6	50.67	50.81	50.94
23.8	51.04	51.18	51.31
24	51.41	51.54	51.68
24.2	51.78	51.91	52.04
24.4	52.14	52.27	52.41
24.6	52.51	52.64	52.77
24.8	52.87	53.00	53.12
25	53.22	53.35	53.48
25.2	53.58	53.71	53.83
25.4	53.93	54.06	54.19
25.6	54.29	54.41	54.54
25.8	54.64	54.76	54.88
26	54.98	55.11	55.23
26.2	55.33	55.45	55.57
26.4	55.67	55.79	55.91
26.6	56.01	56.13	56.25
26.8	56.35	56.47	56.59
27	56.69	56.81	56.92
27.2	57.03	57.14	57.26
27.4	57.36	57.47	57.59
27.6	57.69	57.81	57.92
27.8	58.02	58.13	58.25
28	58.35	58.46	58.57
28.2	58.68	58.79	58.90
28.4	59.00	59.11	59.22
28.6	59.32	59.43	59.54
28.8	59.65	59.75	59.86
29	59.96	60.07	60.18
29.2	60.28	60.39	60.49
29.4	60.60	60.70	60.81
29.6	60.91	61.02	61.12
29.8	61.23	61.33	61.43
30	61.54	61.64	61.74

Table 5a: Suction line capacities in kW for KLEA 404A
Saturated vapour leaving evaporator

Nominal line size mm	Saturation temperature change 1.0 K in 100 m									
	T	Mean evaporating temperature °C at corresponding pressure drop, Pa/m								
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
$\Delta P/\Delta L$	61	72	85	99	114	131	150	170	192	216
Type L Copper										
10	0.064	0.082	0.103	0.130	0.161	0.198	0.241	0.291	0.348	0.415
12	0.148	0.190	0.240	0.300	0.372	0.457	0.555	0.670	0.802	0.954
15	0.280	0.359	0.454	0.568	0.703	0.862	1.05	1.26	1.51	1.80
19	0.482	0.616	0.779	0.973	1.20	1.47	1.79	2.16	2.58	3.06
22	0.749	0.957	1.21	1.51	1.87	2.29	2.77	3.34	3.99	4.74
28	1.53	1.95	2.47	3.08	3.80	4.65	5.64	6.78	8.10	9.61
35	2.68	3.42	4.32	5.38	6.64	8.12	9.84	11.8	14.1	16.8
42	4.26	5.44	6.85	8.54	10.5	12.9	15.6	18.7	22.4	26.5
54	8.90	11.3	14.3	17.8	21.9	26.7	32.4	38.9	46.4	55.0
67	15.8	20.1	25.3	31.5	38.8	47.3	57.3	68.8	82.0	97.1
79	25.3	32.2	40.5	50.4	62.0	75.6	91.5	110	131	155
92	37.7	48.0	60.3	75.0	92.3	113	136	163	194	230
105	53.3	67.8	85.2	106	130	159	192	230	274	324
Schedule 40 Steel										
10	0.188	0.237	0.297	0.367	0.450	0.545	0.656	0.783	0.929	1.09
15	0.350	0.442	0.553	0.683	0.836	1.01	1.22	1.45	1.72	2.03
20	0.741	0.936	1.17	1.44	1.76	2.14	2.57	3.06	3.63	4.27
25	1.41	1.78	2.22	2.74	3.34	4.05	4.86	5.80	6.87	8.08
32	2.92	3.68	4.58	5.65	6.90	8.36	10.0	12.0	14.2	16.7
40	4.38	5.53	6.89	8.49	10.4	12.5	15.1	18.0	21.2	25.0
50	8.48	10.7	13.3	16.4	20.0	24.2	29.1	34.6	41.0	48.2
65	13.6	17.1	21.2	26.2	31.9	38.6	46.4	55.2	65.3	76.8
80	24.0	30.2	37.6	46.3	56.5	68.3	82.0	97.6	115	136
100	49.0	61.6	76.7	94.4	115	139	167	199	235	276

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 5b: Suction line capacities in kW for KLEA 404A
Saturated vapour leaving evaporator

Nominal line size mm	Saturation temperature change 2.0 K in 100 m									
	T	Mean evaporating temperature °C at corresponding pressure drop, Pa/m								
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
$\Delta P/\Delta L$	122	144	169	197	228	262	299	340	384	432
Type L Copper										
10	0.094	0.121	0.153	0.192	0.237	0.291	0.354	0.427	0.512	0.609
12	0.219	0.280	0.354	0.443	0.548	0.671	0.815	0.982	1.18	1.40
15	0.414	0.529	0.668	0.835	1.03	1.26	1.53	1.85	2.21	2.62
19	0.710	0.907	1.14	1.43	1.76	2.16	2.62	3.15	3.77	4.47
22	1.10	1.41	1.77	2.21	2.73	3.34	4.05	4.87	5.82	6.90
28	2.25	2.87	3.61	4.50	5.55	6.78	8.22	9.88	11.8	14.0
35	3.93	5.01	6.31	7.86	9.69	11.8	14.3	17.2	20.5	24.3
42	6.24	7.95	10.0	12.4	15.3	18.7	22.7	27.2	32.4	38.4
54	13.0	16.5	20.8	25.9	31.8	38.8	47.0	56.4	67.2	79.5
67	23.0	29.3	36.8	45.8	56.3	68.7	83.0	99.6	119	140
79	36.9	46.9	58.8	73.1	89.9	110	132	159	189	223
92	54.9	69.8	87.6	109	134	163	197	236	281	332
105	77.5	98.5	124	153	189	230	277	332	395	467
Schedule 40 steel										
10	0.270	0.341	0.426	0.526	0.643	0.779	0.936	1.12	1.32	1.56
15	0.503	0.635	0.792	0.977	1.19	1.45	1.74	2.07	2.45	2.89
20	1.06	1.34	1.67	2.06	2.52	3.05	3.66	4.36	5.16	6.07
25	2.02	2.54	3.17	3.90	4.76	5.76	6.92	8.25	9.76	11.5
32	4.17	5.25	6.53	8.05	9.82	11.9	14.3	17.0	20.1	23.6
40	6.26	7.88	9.81	12.1	14.7	17.8	21.4	25.5	30.2	35.5
50	12.1	15.2	18.9	23.3	28.4	34.4	41.3	49.1	58.1	68.4
65	19.3	24.3	30.2	37.2	45.4	54.8	65.8	78.3	92.7	109
80	34.2	43.0	53.4	65.8	80.2	96.9	116	138	164	192
100	69.7	87.6	109	134	163	197	237	282	333	392

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 5c: Suction line capacities in kW for KLEA 404A
Saturated vapour leaving evaporator

Nominal line size mm	Saturation temperature change 4.0 K in 100 m									
	T	Mean evaporating temperature °C at corresponding pressure drop, Pa/m								
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
$\Delta P/\Delta L$	243	289	339	395	457	525	599	680	768	863
Type L Copper										
10	0.140	0.179	0.226	0.282	0.349	0.428	0.520	0.626	0.749	0.890
12	0.323	0.412	0.521	0.650	0.803	0.983	1.19	1.44	1.72	2.04
15	0.609	0.778	0.981	1.22	1.51	1.85	2.24	2.69	3.22	3.82
19	1.04	1.33	1.68	2.09	2.58	3.15	3.82	4.59	5.48	6.49
22	1.62	2.06	2.60	3.23	3.99	4.87	5.90	7.09	8.45	10.0
28	3.29	4.19	5.27	6.56	8.09	9.87	11.9	14.3	17.1	20.2
35	5.74	7.31	9.20	11.4	14.1	17.2	20.8	24.9	29.7	35.2
42	9.11	11.6	14.6	18.1	22.3	27.2	32.9	39.4	46.9	55.5
54	18.9	24.1	30.2	37.6	46.2	56.3	68.0	81.5	97.0	115
67	33.5	42.6	53.5	66.4	81.6	99.3	120	144	171	202
79	53.6	68.0	85.3	106	130	158	191	229	272	322
92	79.7	101	127	157	193	235	284	340	404	477
105	113	143	179	222	272	331	400	478	569	671
Schedule 40 steel										
10	0.387	0.489	0.609	0.751	0.917	1.11	1.33	1.59	1.88	2.21
15	0.720	0.907	1.13	1.39	1.70	2.06	2.47	2.94	3.49	4.10
20	1.52	1.91	2.38	2.93	3.58	4.33	5.20	6.19	7.33	8.62
25	2.88	3.62	4.51	5.55	6.77	8.19	9.83	11.7	13.8	16.3
32	5.94	7.48	9.30	11.4	14.0	16.9	20.2	24.1	28.5	33.5
40	8.92	11.2	14.0	17.2	20.9	25.3	30.4	36.2	42.8	50.3
50	17.2	21.7	26.9	33.1	40.4	48.8	58.5	69.7	82.4	96.9
65	27.5	34.5	42.9	52.8	64.4	77.8	93.3	111	131	154
80	48.6	61.1	75.9	93.3	114	137	165	196	232	273
100	99.0	124	155	190	232	280	335	399	472	555

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 6a: Suction line capacities in kW for KLEA 404A
Suction line vapour with 5°C of superheat

Nominal line size mm	Saturation temperature change 1.0 K in 100 m										
	T ΔP/ΔL	-40	-35	-30	-25	-20	-15	-10	-5	0	5
		Mean evaporating temperature °C at corresponding pressure drop, Pa/m									
		61	72	85	99	114	131	150	170	192	216
Type L Copper											
10	0.065	0.083	0.106	0.133	0.165	0.203	0.247	0.298	0.357	0.425	
12	0.151	0.194	0.246	0.308	0.381	0.468	0.569	0.687	0.822	0.977	
15	0.287	0.367	0.465	0.582	0.720	0.883	1.07	1.29	1.55	1.84	
19	0.493	0.631	0.797	0.997	1.23	1.51	1.84	2.21	2.64	3.14	
22	0.766	0.980	1.24	1.55	1.91	2.34	2.84	3.42	4.09	4.86	
28	1.57	2.00	2.53	3.15	3.89	4.77	5.78	6.96	8.31	9.85	
35	2.74	3.50	4.42	5.51	6.81	8.33	10.1	12.1	14.5	17.2	
42	4.36	5.57	7.02	8.75	10.8	13.2	16.0	19.2	22.9	27.2	
54	9.11	11.6	14.6	18.2	22.5	27.4	33.2	39.9	47.6	56.3	
67	16.2	20.6	25.9	32.3	39.8	48.6	58.8	70.6	84.1	99.6	
79	25.9	33.0	41.5	51.6	63.6	77.6	93.9	113	134	159	
92	38.6	49.1	61.8	76.9	94.6	115	140	168	199	236	
105	54.6	69.5	87.3	109	134	163	197	236	281	333	
Schedule 40 steel											
10	0.192	0.243	0.305	0.377	0.462	0.560	0.674	0.805	0.954	1.12	
15	0.359	0.454	0.567	0.701	0.858	1.04	1.25	1.49	1.77	2.08	
20	0.760	0.960	1.20	1.48	1.81	2.20	2.64	3.15	3.73	4.39	
25	1.44	1.82	2.28	2.81	3.43	4.16	5.00	5.96	7.06	8.30	
32	2.99	3.77	4.70	5.80	7.09	8.59	10.3	12.3	14.6	17.1	
40	4.50	5.67	7.07	8.72	10.6	12.9	15.5	18.4	21.8	25.7	
50	8.70	11.0	13.7	16.8	20.6	24.9	29.9	35.6	42.1	49.5	
65	13.9	17.5	21.8	26.9	32.8	39.7	47.6	56.8	67.1	78.9	
80	24.6	31.0	38.6	47.6	58.0	70.2	84.2	100	119	139	
100	50.3	63.3	78.7	97.0	118	143	172	204	242	284	

Note: (i) Capacity based on superheated vapour (superheat assumed useful)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 6b: Suction line capacities in kW for KLEA 404A
Suction line vapour with 5°C of superheat

Nominal line size mm	Saturation temperature change 2.0 K in 100 m										
	T ΔP/ΔL	-40	-35	-30	-25	-20	-15	-10	-5	0	5
		Mean evaporating temperature °C at corresponding pressure drop, Pa/m									
		122	144	169	197	228	262	299	340	384	432
Type L Copper											
10	0.096	0.124	0.157	0.196	0.243	0.299	0.363	0.438	0.524	0.623	
12	0.224	0.286	0.362	0.453	0.561	0.688	0.836	1.01	1.20	1.43	
15	0.423	0.542	0.684	0.855	1.06	1.30	1.57	1.89	2.26	2.69	
19	0.726	0.928	1.17	1.46	1.81	2.21	2.69	3.23	3.86	4.58	
22	1.13	1.44	1.82	2.27	2.80	3.43	4.15	5.00	5.97	7.07	
28	2.30	2.93	3.70	4.61	5.69	6.96	8.43	10.1	12.1	14.3	
35	4.02	5.13	6.46	8.05	9.93	12.1	14.7	17.7	21.1	24.9	
42	6.38	8.14	10.2	12.8	15.7	19.2	23.3	27.9	33.3	39.4	
54	13.3	16.9	21.3	26.5	32.7	39.9	48.2	57.9	68.9	81.5	
67	23.6	30.0	37.7	46.9	57.8	70.5	85.2	102	122	144	
79	37.7	48.0	60.3	75.0	92.3	112	136	163	194	229	
92	56.2	71.5	89.8	112	137	167	202	242	288	340	
105	79.4	101	127	157	194	236	285	341	406	479	
Schedule 40 steel											
10	0.277	0.350	0.437	0.540	0.661	0.801	0.962	1.15	1.36	1.60	
15	0.516	0.651	0.813	1.00	1.23	1.49	1.79	2.13	2.52	2.96	
20	1.09	1.38	1.72	2.12	2.59	3.13	3.76	4.48	5.30	6.24	
25	2.07	2.61	3.25	4.01	4.89	5.92	7.11	8.47	10.0	11.8	
32	4.28	5.39	6.71	8.27	10.1	12.2	14.7	17.5	20.7	24.3	
40	6.42	8.09	10.1	12.4	15.2	18.3	22.0	26.2	31.0	36.4	
50	12.4	15.6	19.5	24.0	29.2	35.4	42.4	50.5	59.8	70.2	
65	19.8	24.9	31.0	38.2	46.6	56.4	67.6	80.5	95.2	112	
80	35.1	44.1	54.9	67.6	82.4	99.7	120	142	168	198	
100	71.5	89.9	112	138	168	203	243	290	343	402	

Note: (i) Capacity based on superheated vapour (superheat assumed useful)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 6c: Suction line capacities in kW for KLEA 404A
Suction line vapour with 5°C of superheat

Nominal line size mm	Saturation temperature change 4.0 K in 100 m									
	T	Mean evaporating temperature °C at corresponding pressure drop, Pa/m								
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
$\Delta P/\Delta L$	243	289	339	395	457	525	599	680	768	863
Type L Copper										
10	0.143	0.183	0.231	0.289	0.358	0.439	0.533	0.642	0.768	0.912
12	0.330	0.422	0.533	0.666	0.823	1.01	1.22	1.47	1.76	2.09
15	0.623	0.796	1.00	1.25	1.55	1.89	2.30	2.76	3.30	3.91
19	1.07	1.36	1.72	2.14	2.64	3.23	3.92	4.71	5.62	6.66
22	1.65	2.11	2.66	3.31	4.09	5.00	6.05	7.27	8.67	10.3
28	3.36	4.29	5.40	6.73	8.29	10.1	12.3	14.7	17.5	20.8
35	5.88	7.49	9.43	11.7	14.5	17.6	21.3	25.6	30.5	36.1
42	9.32	11.9	14.9	18.6	22.9	27.9	33.7	40.4	48.1	56.9
54	19.4	24.7	31.0	38.5	47.4	57.7	69.8	83.6	99.5	118
67	34.3	43.6	54.8	68.1	83.7	102	123	148	175	207
79	54.9	69.7	87.5	109	133	163	196	235	279	330
92	81.6	104	130	161	198	241	291	349	415	489
105	115	146	183	228	280	340	410	491	584	689
Schedule 40 steel										
10	0.397	0.501	0.625	0.771	0.942	1.14	1.37	1.63	1.93	2.27
15	0.738	0.931	1.16	1.43	1.75	2.12	2.54	3.03	3.58	4.21
20	1.56	1.96	2.45	3.01	3.68	4.45	5.34	6.37	7.53	8.85
25	2.95	3.72	4.63	5.70	6.96	8.42	10.1	12.0	14.2	16.7
32	6.10	7.67	9.55	11.8	14.3	17.3	20.8	24.8	29.3	34.4
40	9.15	11.5	14.3	17.6	21.5	26.0	31.2	37.2	43.9	51.6
50	17.7	22.2	27.6	34.0	41.5	50.2	60.2	71.6	84.7	99.5
65	28.2	35.5	44.1	54.3	66.2	80.0	95.9	114	135	159
80	49.9	62.7	77.9	95.9	117	141	169	202	238	280
100	102	128	159	195	238	288	345	410	485	570

Note: (i) Capacity based on superheated vapour (superheat assumed useful)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 7a: Suction line capacities in kW for KLEA 404A
Suction line vapour at 20°C

Nominal line size mm	Saturation temperature change 1.0 K in 100 m										
	T ΔP/ΔL	-40	-35	-30	-25	-20	-15	-10	-5	0	5
		61	72	85	99	114	131	150	170	192	216
	Type L Copper										
10	0.053	0.070	0.089	0.114	0.143	0.178	0.220	0.269	0.327	0.394	
12	0.125	0.162	0.208	0.264	0.331	0.412	0.508	0.620	0.753	0.908	
15	0.237	0.308	0.395	0.500	0.627	0.778	0.958	1.17	1.42	1.71	
19	0.408	0.529	0.677	0.858	1.07	1.33	1.64	2.00	2.42	2.92	
22	0.634	0.823	1.05	1.33	1.67	2.07	2.54	3.10	3.75	4.52	
28	1.30	1.68	2.15	2.72	3.40	4.21	5.17	6.30	7.62	9.17	
35	2.28	2.95	3.77	4.76	5.95	7.36	9.03	11.0	13.3	16.0	
42	3.63	4.69	5.99	7.56	9.44	11.7	14.3	17.4	21.1	25.3	
54	7.59	9.80	12.5	15.8	19.7	24.3	29.8	36.2	43.7	52.4	
67	13.5	17.4	22.2	28.0	34.8	43.0	52.7	64.0	77.3	92.7	
79	21.6	27.9	35.5	44.7	55.7	68.8	84.2	102	123	148	
92	32.3	41.6	53.0	66.6	83.0	102	125	152	183	220	
105	45.7	58.8	74.9	94.2	117	145	177	215	259	310	
	Schedule 40 steel										
10	0.162	0.208	0.263	0.329	0.408	0.500	0.608	0.734	0.880	1.05	
15	0.303	0.388	0.490	0.613	0.759	0.930	1.13	1.36	1.63	1.95	
20	0.643	0.822	1.04	1.30	1.60	1.96	2.38	2.87	3.44	4.10	
25	1.22	1.56	1.97	2.46	3.04	3.72	4.52	5.44	6.51	7.75	
32	2.54	3.24	4.08	5.09	6.28	7.69	9.32	11.2	13.4	16.0	
40	3.82	4.87	6.14	7.65	9.44	11.5	14.0	16.9	20.2	24.0	
50	7.40	9.43	11.9	14.8	18.2	22.3	27.0	32.5	38.9	46.3	
65	11.8	15.1	19.0	23.6	29.1	35.6	43.1	51.9	62.0	73.7	
80	21.0	26.7	33.6	41.8	51.5	62.9	76.2	91.7	110	130	
100	42.9	54.6	68.6	85.3	105	128	155	187	223	265	

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 7b: Suction line capacities in kW for KLEA 404A
Suction line vapour at 20°C

Nominal line size mm	Saturation temperature change 2.0 K in 100 m										
	T ΔP/ΔL	-40	-35	-30	-25	-20	-15	-10	-5	0	5
		122	144	169	197	228	262	299	340	384	432
	Type L Copper										
10	0.079	0.103	0.133	0.168	0.211	0.263	0.324	0.396	0.480	0.579	
12	0.185	0.240	0.308	0.390	0.489	0.606	0.746	0.911	1.10	1.33	
15	0.350	0.454	0.582	0.736	0.922	1.14	1.41	1.71	2.08	2.50	
19	0.602	0.780	0.997	1.26	1.58	1.96	2.40	2.93	3.54	4.26	
22	0.935	1.21	1.55	1.96	2.45	3.03	3.72	4.53	5.48	6.58	
28	1.91	2.47	3.16	3.98	4.97	6.15	7.55	9.19	11.1	13.3	
35	3.35	4.33	5.52	6.96	8.69	10.7	13.2	16.0	19.3	23.2	
42	5.32	6.87	8.76	11.0	13.8	17.0	20.8	25.3	30.6	36.7	
54	11.1	14.3	18.2	23.0	28.6	35.3	43.3	52.5	63.3	75.9	
67	19.7	25.4	32.3	40.7	50.7	62.5	76.5	92.8	112	134	
79	31.6	40.7	51.7	65.1	81.0	99.8	122	148	178	214	
92	47.1	60.6	77.1	96.8	120	148	181	220	265	317	
105	66.6	85.7	109	137	170	209	256	310	373	447	
	Schedule 40 steel										
10	0.234	0.300	0.379	0.473	0.584	0.716	0.869	1.05	1.25	1.49	
15	0.437	0.558	0.705	0.879	1.09	1.33	1.61	1.94	2.33	2.77	
20	0.925	1.18	1.49	1.86	2.29	2.80	3.40	4.09	4.90	5.83	
25	1.76	2.24	2.82	3.52	4.34	5.30	6.43	7.74	9.26	11.0	
32	3.64	4.64	5.84	7.27	8.96	10.9	13.3	16.0	19.1	22.7	
40	5.47	6.97	8.77	10.9	13.4	16.4	19.9	23.9	28.6	34.0	
50	10.6	13.5	16.9	21.1	26.0	31.7	38.4	46.2	55.2	65.6	
65	16.9	21.5	27.0	33.6	41.4	50.5	61.2	73.6	88.0	105	
80	30.0	38.1	47.8	59.5	73.2	89.4	108	130	155	185	
100	61.2	77.7	97.5	121	149	182	220	265	317	376	

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 7c: Suction line capacities in kW for KLEA 404A
Suction line vapour at 20°C

Nominal line size mm	Saturation temperature change 4.0 K in 100 m										
	T	Mean evaporating temperature °C at corresponding pressure drop, Pa/m									
	-40	-35	-30	-25	-20	-15	-10	-5	0	5	
	$\Delta P/\Delta L$	243	289	339	395	457	525	599	680	768	863
Type L Copper											
10	0.118	0.153	0.196	0.249	0.312	0.387	0.476	0.581	0.704	0.848	
12	0.273	0.354	0.453	0.574	0.718	0.890	1.09	1.33	1.61	1.94	
15	0.517	0.669	0.856	1.08	1.35	1.67	2.06	2.50	3.03	3.64	
19	0.886	1.15	1.46	1.85	2.31	2.86	3.51	4.27	5.16	6.19	
22	1.38	1.78	2.27	2.86	3.58	4.42	5.42	6.59	7.96	9.56	
28	2.81	3.62	4.62	5.82	7.26	8.97	11.0	13.4	16.1	19.3	
35	4.91	6.33	8.07	10.2	12.7	15.6	19.1	23.2	28.0	33.6	
42	7.79	10.0	12.8	16.1	20.0	24.7	30.3	36.7	44.3	53.0	
54	16.2	20.9	26.6	33.4	41.6	51.3	62.7	76.0	91.5	110	
67	28.8	37.0	47.1	59.1	73.5	90.6	111	134	161	193	
79	46.0	59.2	75.2	94.4	117	144	176	214	257	308	
92	68.6	88.1	112	140	174	215	262	317	382	456	
105	96.8	124	158	198	246	303	369	447	537	642	
Schedule 40 steel											
10	0.337	0.430	0.543	0.677	0.835	1.02	1.24	1.49	1.78	2.12	
15	0.628	0.801	1.01	1.26	1.55	1.89	2.30	2.77	3.31	3.93	
20	1.33	1.69	2.13	2.65	3.26	3.99	4.83	5.82	6.96	8.27	
25	2.52	3.20	4.03	5.01	6.18	7.55	9.14	11.0	13.1	15.6	
32	5.20	6.62	8.32	10.3	12.7	15.6	18.8	22.7	27.1	32.2	
40	7.82	9.94	12.5	15.5	19.1	23.3	28.3	34.0	40.6	48.3	
50	15.1	19.2	24.1	30.0	36.9	45.0	54.5	65.5	78.3	93.0	
65	24.1	30.6	38.4	47.8	58.8	71.7	86.8	104	125	148	
80	42.7	54.2	68.0	84.5	104	127	153	184	220	262	
100	87.0	110	139	172	212	258	312	375	448	533	

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

**Table 8a: Discharge line capacities in kW for KLEA 404A
Saturated vapour leaving evaporator**

Nominal line size mm	Condenser saturation temperature change 2.0 K in 100 m Mean evaporating temperature °C					Pressure gradient of 885 Pa/m Discharge line superheat of 45.0 °C					
	T	-40.0	-35.0	-30.0	-25.0	-20.0	-15.0	-10.0	-5.0	0.0	5.0
Type L Copper											
10	0.979	1.02	1.05	1.09	1.13	1.17	1.20	1.23	1.27	1.30	1.30
12	2.24	2.32	2.41	2.50	2.58	2.66	2.74	2.82	2.90	2.97	2.97
15	4.19	4.35	4.52	4.68	4.83	4.99	5.14	5.29	5.43	5.57	5.57
19	7.13	7.40	7.68	7.95	8.22	8.48	8.74	8.99	9.23	9.47	9.47
22	11.0	11.4	11.8	12.3	12.7	13.1	13.5	13.9	14.2	14.6	14.6
28	22.2	23.1	23.9	24.8	25.6	26.4	27.2	28.0	28.8	29.5	29.5
35	38.5	40.1	41.5	43.0	44.5	45.9	47.3	48.6	49.9	51.2	51.2
42	60.8	63.2	65.5	67.9	70.1	72.4	74.6	76.7	78.8	80.8	80.8
54	126	130	135	140	145	149	154	158	163	167	167
67	221	230	238	247	255	263	271	279	286	294	294
79	352	365	379	393	406	419	431	444	456	467	467
92	522	542	562	582	602	621	640	658	676	693	693
105	734	763	791	819	847	874	900	926	951	975	975
Schedule 40 steel											
10	2.41	2.51	2.60	2.69	2.78	2.87	2.96	3.04	3.12	3.20	3.20
15	4.47	4.64	4.81	4.98	5.15	5.32	5.48	5.64	5.79	5.93	5.93
20	9.39	9.76	10.1	10.5	10.8	11.2	11.5	11.8	12.2	12.5	12.5
25	17.7	18.4	19.1	19.8	20.5	21.1	21.8	22.4	23.0	23.6	23.6
32	36.5	37.9	39.4	40.7	42.1	43.5	44.8	46.1	47.3	48.5	48.5
40	54.7	56.9	59.0	61.1	63.1	65.2	67.1	69.1	70.9	72.7	72.7
50	105	110	114	118	122	126	129	133	137	140	140
65	168	175	181	188	194	200	206	212	218	223	223
80	297	308	320	331	342	353	364	375	385	394	394
100	604	628	651	674	697	719	741	762	783	802	802

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

**Table 8b: Discharge line capacities in kW for KLEA 404A
Saturated vapour leaving evaporator**

Nominal line size mm	Condenser saturation temperature change 2.0 K in 100 m Mean evaporating temperature °C					Pressure gradient of 885 Pa/m Discharge line superheat of 60.0 °C					
	T	-40.0	-35.0	-30.0	-25.0	-20.0	-15.0	-10.0	-5.0	0.0	5.0
Type L Copper											
10	0.938	0.974	1.01	1.05	1.08	1.12	1.15	1.18	1.21	1.25	1.25
12	2.14	2.23	2.31	2.39	2.47	2.55	2.63	2.71	2.78	2.85	2.85
15	4.02	4.17	4.33	4.48	4.63	4.78	4.93	5.07	5.21	5.34	5.34
19	6.84	7.10	7.37	7.63	7.88	8.14	8.38	8.62	8.86	9.08	9.08
22	10.5	11.0	11.4	11.8	12.2	12.6	12.9	13.3	13.7	14.0	14.0
28	21.3	22.1	23.0	23.8	24.6	25.4	26.1	26.9	27.6	28.3	28.3
35	37.0	38.5	39.9	41.3	42.7	44.1	45.4	46.7	48.0	49.2	49.2
42	58.4	60.7	62.9	65.2	67.4	69.5	71.6	73.7	75.7	77.6	77.6
54	121	125	130	135	139	144	148	152	156	160	160
67	212	221	229	237	245	253	261	268	275	282	282
79	338	351	364	377	390	403	415	427	438	449	449
92	502	521	541	560	578	597	615	633	650	666	666
105	706	733	761	788	814	840	866	891	915	938	938
Schedule 40 steel											
10	2.32	2.42	2.51	2.59	2.68	2.77	2.85	2.93	3.01	3.09	3.09
15	4.31	4.47	4.64	4.80	4.97	5.13	5.28	5.43	5.58	5.72	5.72
20	9.05	9.41	9.76	10.1	10.4	10.8	11.1	11.4	11.7	12.0	12.0
25	17.1	17.8	18.4	19.1	19.7	20.4	21.0	21.6	22.2	22.7	22.7
32	35.2	36.6	37.9	39.3	40.6	41.9	43.2	44.4	45.6	46.8	46.8
40	52.8	54.9	56.9	58.9	60.9	62.8	64.7	66.6	68.4	70.1	70.1
50	102	106	110	114	117	121	125	128	132	135	135
65	162	168	175	181	187	193	199	204	210	215	215
80	286	297	309	319	330	341	351	361	371	380	380
100	583	605	628	650	672	693	714	735	755	774	774

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 9a: Liquid line capacities in kW for KLEA 404A
Saturated vapour leaving evaporator

Nominal line size mm	Liquid line velocity 0.5 m/s Mean evaporating temperature °C									
	T	-40.0	-35.0	-30.0	-25.0	-20.0	-15.0	-10.0	-5.0	0.0
Type L Copper										
10	1.99	2.06	2.14	2.22	2.29	2.36	2.44	2.51	2.57	2.64
12	3.70	3.85	3.99	4.13	4.27	4.41	4.54	4.67	4.80	4.92
15	5.95	6.18	6.41	6.63	6.86	7.08	7.29	7.50	7.70	7.90
19	8.89	9.23	9.58	9.92	10.2	10.6	10.9	11.2	11.5	11.8
22	12.3	12.8	13.3	13.8	14.2	14.7	15.1	15.6	16.0	16.4
28	21.0	21.9	22.7	23.5	24.3	25.1	25.8	26.6	27.3	28.0
35	32.0	33.3	34.5	35.8	37.0	38.1	39.3	40.4	41.5	42.6
42	45.4	47.1	48.9	50.6	52.3	54.0	55.6	57.2	58.8	60.3
54	78.9	82.0	85.0	88.0	91.0	93.9	96.8	99.6	102	105
67	122	126	131	136	140	145	149	154	158	162
79	174	180	187	194	200	207	213	219	225	231
92	235	244	253	262	271	280	288	296	304	312
105	305	317	329	341	352	364	375	385	396	406
Schedule 40 steel										
10	4.87	5.06	5.24	5.43	5.61	5.79	5.97	6.14	6.30	6.46
15	7.75	8.05	8.35	8.65	8.94	9.22	9.50	9.78	10.0	10.3
20	13.6	14.1	14.7	15.2	15.7	16.2	16.7	17.2	17.6	18.1
25	22.0	22.9	23.7	24.6	25.4	26.2	27.0	27.8	28.5	29.3
32	38.1	39.6	41.1	42.5	44.0	45.4	46.8	48.1	49.4	50.7
40	51.9	53.9	55.9	57.9	59.9	61.8	63.6	65.5	67.2	68.9
50	85.6	88.9	92.2	95.5	98.7	102	105	108	111	114
65	122	127	132	136	141	145	150	154	158	162
80	189	196	203	210	217	224	231	238	244	250
100	325	337	350	362	374	386	398	410	421	431

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 9b: Liquid line capacities in kW for KLEA 404A
Saturated vapour leaving evaporator

Nominal line size mm	Condenser saturation temperature change 2.0 K in 100 m Pressure gradient of 885 Pa/m Mean evaporating temperature °C									
	T	-40.0	-35.0	-30.0	-25.0	-20.0	-15.0	-10.0	-5.0	0.0
Type L Copper										
10	3.34	3.47	3.60	3.72	3.85	3.97	4.09	4.21	4.32	4.43
12	7.67	7.97	8.27	8.56	8.85	9.13	9.41	9.68	9.94	10.2
15	14.4	15.0	15.5	16.1	16.6	17.2	17.7	18.2	18.7	19.2
19	24.6	25.6	26.5	27.5	28.4	29.3	30.2	31.0	31.9	32.7
22	38.0	39.5	41.0	42.5	43.9	45.3	46.7	48.0	49.3	50.6
28	77.1	80.1	83.1	86.1	89.0	91.8	94.6	97.3	99.9	102
35	134	140	145	150	155	160	165	170	174	179
42	213	221	229	237	245	253	261	268	275	282
54	440	457	474	491	508	524	540	555	570	585
67	778	808	838	868	897	926	954	981	1007	1033
79	1240	1288	1336	1383	1430	1476	1520	1564	1606	1647
92	1841	1913	1985	2055	2124	2192	2259	2323	2386	2446
105	2595	2697	2797	2896	2993	3089	3183	3274	3363	3448
Schedule 40 steel										
10	8.72	9.06	9.40	9.73	10.1	10.4	10.7	11.0	11.3	11.6
15	16.2	16.8	17.4	18.1	18.7	19.3	19.8	20.4	21.0	21.5
20	34.1	35.4	36.7	38.0	39.3	40.5	41.8	43.0	44.1	45.2
25	64.4	66.9	69.4	71.9	74.3	76.7	79.0	81.2	83.4	85.6
32	133	138	143	148	153	158	163	167	172	176
40	199	207	215	222	230	237	244	251	258	264
50	384	399	414	428	443	457	471	484	497	510
65	612	636	659	683	706	728	750	772	793	813
80	1081	1123	1165	1206	1247	1287	1326	1364	1401	1436
100	2201	2287	2372	2456	2539	2620	2700	2777	2852	2924

Note: (i) Capacity based on saturated vapour (no useful superheat)
(ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C

Table 10a: Minimum refrigeration capacities in kW for KLEA 404A
Lubricant is EMKARATE RL™ 32S
 Type L Copper Tubing

Evap. Temp. °C	Suction Temp. °C	Nominal line size, mm	Capacity (kW)												
			10	12	15	19	22	28	35	42	54	67	79	92	105
5	10		0.262	0.571	1.03	1.71	2.57	5.02	8.48	13.1	26.2	45.0	70.2	102	142
	15		0.258	0.563	1.02	1.68	2.53	4.94	8.35	12.9	25.8	44.3	69.1	101	140
	20		0.255	0.554	1.00	1.66	2.50	4.87	8.23	12.7	25.4	43.6	68.1	99.3	138
0	5		0.240	0.522	0.943	1.56	2.35	4.58	7.75	12.0	23.9	41.1	64.1	93.4	130
	10		0.236	0.514	0.929	1.54	2.32	4.51	7.63	11.8	23.5	40.5	63.1	92.1	128
	15		0.233	0.507	0.916	1.51	2.28	4.45	7.52	11.6	23.2	39.9	62.2	90.8	126
-5	0		0.218	0.475	0.858	1.42	2.14	4.17	7.05	10.9	21.7	37.4	58.3	85.0	118
	5		0.215	0.468	0.846	1.40	2.11	4.11	6.94	10.7	21.4	36.8	57.4	83.8	116
	10		0.212	0.461	0.834	1.38	2.08	4.05	6.85	10.6	21.1	36.3	56.6	82.6	115
-10	-5		0.198	0.430	0.778	1.29	1.94	3.78	6.39	9.86	19.7	33.9	52.8	77.1	107
	0		0.195	0.424	0.767	1.27	1.91	3.72	6.30	9.72	19.4	33.4	52.1	76.0	105
	5		0.192	0.418	0.756	1.25	1.88	3.67	6.21	9.59	19.2	32.9	51.4	74.9	104
-15	-10		0.178	0.388	0.702	1.16	1.75	3.41	5.77	8.90	17.8	30.6	47.7	69.6	96.5
	-5		0.176	0.383	0.692	1.14	1.73	3.36	5.69	8.78	17.5	30.1	47.0	68.6	95.2
	0		0.173	0.378	0.683	1.13	1.70	3.32	5.61	8.66	17.3	29.7	46.4	67.7	93.9
-20	-15		0.160	0.349	0.631	1.04	1.57	3.06	5.18	8.00	16.0	27.5	42.9	62.5	86.8
	-10		0.158	0.344	0.622	1.03	1.55	3.02	5.11	7.89	15.8	27.1	42.3	61.7	85.6
	-5		0.156	0.340	0.614	1.01	1.53	2.98	5.04	7.79	15.6	26.7	41.7	60.8	84.5
-25	-20		0.143	0.312	0.565	0.933	1.41	2.74	4.64	7.16	14.3	24.6	38.4	56.0	77.7
	-15		0.142	0.308	0.557	0.921	1.39	2.71	4.57	7.07	14.1	24.3	37.8	55.2	76.6
	-10		0.140	0.304	0.550	0.908	1.37	2.67	4.51	6.97	13.9	23.9	37.3	54.5	75.6
-30	-25		0.128	0.278	0.503	0.831	1.25	2.44	4.13	6.38	12.7	21.9	34.2	49.8	69.2
	-20		0.126	0.274	0.496	0.820	1.24	2.41	4.07	6.29	12.6	21.6	33.7	49.2	68.2
	-15		0.124	0.271	0.490	0.809	1.22	2.38	4.02	6.21	12.4	21.3	33.3	48.5	67.3
-35	-30		0.113	0.246	0.446	0.737	1.11	2.16	3.66	5.65	11.3	19.4	30.3	44.2	61.3
	-25		0.112	0.243	0.440	0.727	1.10	2.13	3.61	5.58	11.1	19.1	29.9	43.6	60.5
	-20		0.110	0.240	0.434	0.717	1.08	2.11	3.56	5.50	11.0	18.9	29.5	43.0	59.7
-40	-35		0.100	0.217	0.393	0.649	0.978	1.91	3.22	4.98	9.95	17.1	26.7	38.9	54.0
	-30		0.098	0.214	0.387	0.640	0.965	1.88	3.18	4.91	9.81	16.9	26.3	38.4	53.3
	-25		0.097	0.211	0.382	0.632	0.952	1.86	3.14	4.85	9.68	16.6	26.0	37.9	52.6

- (i) Capacity based on saturated vapour (no useful superheat)
- (ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C
- (iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

Table 10b: Minimum refrigeration capacities in kW for KLEA 404A
Lubricant is EMKARATE RL™ 32S
 Schedule 40 Steel Pipe

Evap. Temp. °C	Suction Temp. °C	Nominal line size, mm	Capacity (kW)									
			10	15	20	25	32	40	50	65	80	100
5	10		0.804	1.44	2.91	5.31	10.5	15.5	29.0	45.1	77.7	153
	15		0.792	1.42	2.86	5.23	10.4	15.3	28.5	44.5	76.5	151
	20		0.780	1.40	2.82	5.15	10.2	15.0	28.1	43.8	75.4	149
0	5		0.734	1.31	2.65	4.85	9.63	14.2	26.4	41.2	71.0	140
	10		0.723	1.29	2.61	4.78	9.49	13.9	26.0	40.6	69.9	138
	15		0.713	1.28	2.58	4.71	9.35	13.7	25.7	40.0	68.9	136
-5	0		0.668	1.19	2.41	4.41	8.76	12.9	24.0	37.5	64.6	127
	5		0.658	1.18	2.38	4.35	8.63	12.7	23.7	37.0	63.6	126
	10		0.649	1.16	2.35	4.29	8.51	12.5	23.4	36.4	62.7	124
-10	-5		0.605	1.08	2.19	4.00	7.94	11.7	21.8	34.0	58.5	115
	0		0.597	1.07	2.16	3.94	7.83	11.5	21.5	33.5	57.7	114
	5		0.589	1.05	2.13	3.89	7.72	11.3	21.2	33.0	56.9	112
-15	-10		0.546	0.978	1.97	3.61	7.17	10.5	19.7	30.7	52.8	104
	-5		0.539	0.964	1.95	3.56	7.07	10.4	19.4	30.3	52.1	103
	0		0.532	0.951	1.92	3.51	6.97	10.2	19.1	29.8	51.4	101
-20	-15		0.491	0.879	1.78	3.24	6.44	9.47	17.7	27.6	47.5	93.7
	-10		0.485	0.867	1.75	3.20	6.35	9.34	17.4	27.2	46.8	92.4
	-5		0.478	0.855	1.73	3.16	6.27	9.21	17.2	26.8	46.2	91.1
-25	-20		0.440	0.787	1.59	2.90	5.76	8.47	15.8	24.7	42.5	83.8
	-15		0.434	0.776	1.57	2.86	5.69	8.36	15.6	24.3	41.9	82.7
	-10		0.428	0.766	1.55	2.83	5.61	8.25	15.4	24.0	41.4	81.6
-30	-25		0.392	0.700	1.41	2.59	5.13	7.55	14.1	22.0	37.8	74.6
	-20		0.386	0.691	1.40	2.55	5.06	7.45	13.9	21.7	37.3	73.6
	-15		0.381	0.682	1.38	2.52	5.00	7.35	13.7	21.4	36.8	72.7
-35	-30		0.347	0.621	1.25	2.29	4.55	6.69	12.5	19.5	33.5	66.1
	-25		0.342	0.612	1.24	2.26	4.49	6.60	12.3	19.2	33.1	65.2
	-20		0.338	0.604	1.22	2.23	4.43	6.51	12.2	19.0	32.6	64.4
-40	-35		0.306	0.547	1.10	2.02	4.01	5.89	11.0	17.2	29.5	58.3
	-30		0.301	0.539	1.09	1.99	3.95	5.81	10.9	16.9	29.1	57.5
	-25		0.298	0.532	1.08	1.96	3.90	5.74	10.7	16.7	28.8	56.7

- (i) Capacity based on saturated vapour (no useful superheat)
- (ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C
- (iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

**Table 10c: Minimum refrigeration capacities in kW for KLEA 404A
Lubricant is EMKARATE RL™ 68S
Type L Copper Tubing**

Evap. Temp. °C	Suction Temp. °C	Nominal bore mm	10	12	15	19	22	28	35	42	54	67	79	92	105
5	10		0.263	0.573	1.04	1.71	2.58	5.03	8.51	13.1	26.3	45.1	70.4	103	143
	15		0.259	0.564	1.02	1.69	2.54	4.96	8.38	12.9	25.9	44.4	69.3	101	140
	20		0.255	0.556	1.01	1.66	2.51	4.88	8.26	12.8	25.5	43.8	68.3	99.6	138
0	5		0.240	0.523	0.946	1.56	2.36	4.59	7.77	12.0	24.0	41.2	64.3	93.7	130
	10		0.237	0.515	0.932	1.54	2.32	4.53	7.65	11.8	23.6	40.6	63.3	92.4	128
	15		0.233	0.508	0.919	1.52	2.29	4.46	7.55	11.7	23.3	40.0	62.4	91.0	126
-5	0		0.219	0.476	0.861	1.42	2.14	4.18	7.07	10.9	21.8	37.5	58.5	85.3	118
	5		0.216	0.469	0.848	1.40	2.11	4.12	6.97	10.8	21.5	36.9	57.6	84.1	117
	10		0.213	0.463	0.837	1.38	2.08	4.06	6.87	10.6	21.2	36.4	56.8	82.9	115
-10	-5		0.198	0.431	0.780	1.29	1.94	3.79	6.41	9.89	19.8	34.0	53.0	77.3	107
	0		0.195	0.425	0.769	1.27	1.92	3.74	6.32	9.75	19.5	33.5	52.2	76.2	106
	5		0.193	0.419	0.759	1.25	1.89	3.68	6.23	9.62	19.2	33.0	51.5	75.2	104
-15	-10		0.179	0.390	0.704	1.16	1.76	3.42	5.78	8.93	17.8	30.7	47.8	69.8	96.9
	-5		0.176	0.384	0.695	1.15	1.73	3.37	5.70	8.81	17.6	30.2	47.2	68.8	95.5
	0		0.174	0.379	0.685	1.13	1.71	3.33	5.63	8.69	17.4	29.8	46.5	67.9	94.2
-20	-15		0.161	0.350	0.633	1.05	1.58	3.07	5.20	8.03	16.0	27.6	43.0	62.7	87.1
	-10		0.159	0.345	0.624	1.03	1.56	3.03	5.13	7.92	15.8	27.2	42.4	61.9	85.9
	-5		0.157	0.341	0.616	1.02	1.54	2.99	5.06	7.81	15.6	26.8	41.8	61.0	84.7
-25	-20		0.144	0.313	0.567	0.936	1.41	2.75	4.65	7.19	14.4	24.7	38.5	56.1	77.9
	-15		0.142	0.309	0.559	0.924	1.39	2.71	4.59	7.09	14.2	24.3	38.0	55.4	76.9
	-10		0.140	0.305	0.551	0.911	1.37	2.68	4.53	6.99	14.0	24.0	37.4	54.6	75.8
-30	-25		0.128	0.279	0.505	0.834	1.26	2.45	4.14	6.40	12.8	22.0	34.3	50.0	69.4
	-20		0.126	0.275	0.498	0.823	1.24	2.42	4.09	6.31	12.6	21.7	33.8	49.3	68.5
	-15		0.125	0.272	0.491	0.812	1.22	2.39	4.03	6.23	12.4	21.4	33.4	48.7	67.5
-35	-30		0.114	0.247	0.447	0.739	1.11	2.17	3.67	5.67	11.3	19.5	30.4	44.3	61.5
	-25		0.112	0.244	0.441	0.729	1.10	2.14	3.62	5.59	11.2	19.2	30.0	43.7	60.6
	-20		0.111	0.241	0.435	0.719	1.08	2.11	3.57	5.52	11.0	18.9	29.6	43.1	59.8
-40	-35		0.100	0.218	0.394	0.651	0.981	1.91	3.23	5.00	9.98	17.1	26.7	39.0	54.2
	-30		0.099	0.215	0.389	0.642	0.968	1.89	3.19	4.93	9.84	16.9	26.4	38.5	53.4
	-25		0.097	0.212	0.383	0.634	0.955	1.86	3.15	4.86	9.71	16.7	26.0	38.0	52.7

- (i) Capacity based on saturated vapour (no useful superheat)
- (ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C
- (iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

**Table 10d: Minimum refrigeration capacities in kW for KLEA 404A
Lubricant is EMKARATE RL™ 68S
Schedule 40 Steel Pipe**

Evap. Temp. °C	Suction Temp. °C	Nominal bore mm	10	15	20	25	32	40	50	65	80	100
5	10		0.807	1.44	2.91	5.33	10.6	15.5	29.0	45.3	78.0	154
	15		0.794	1.42	2.87	5.25	10.4	15.3	28.6	44.6	76.8	151
	20		0.783	1.40	2.83	5.17	10.3	15.1	28.2	43.9	75.7	149
0	5		0.736	1.32	2.66	4.86	9.66	14.2	26.5	41.4	71.2	140
	10		0.726	1.30	2.62	4.79	9.51	14.0	26.1	40.7	70.1	138
	15		0.715	1.28	2.58	4.72	9.38	13.8	25.8	40.2	69.1	136
-5	0		0.670	1.20	2.42	4.43	8.79	12.9	24.1	37.6	64.8	128
	5		0.660	1.18	2.39	4.36	8.66	12.7	23.8	37.1	63.8	126
	10		0.651	1.16	2.35	4.30	8.54	12.6	23.4	36.6	62.9	124
-10	-5		0.607	1.09	2.19	4.01	7.96	11.7	21.9	34.1	58.7	116
	0		0.599	1.07	2.16	3.95	7.85	11.5	21.6	33.6	57.9	114
	5		0.590	1.06	2.13	3.90	7.74	11.4	21.3	33.2	57.1	113
-15	-10		0.548	0.981	1.98	3.62	7.19	10.6	19.7	30.8	53.0	105
	-5		0.541	0.967	1.95	3.57	7.09	10.4	19.5	30.4	52.3	103
	0		0.533	0.954	1.93	3.52	6.99	10.3	19.2	29.9	51.5	102
-20	-15		0.493	0.882	1.78	3.25	6.46	9.50	17.7	27.7	47.6	94.0
	-10		0.486	0.870	1.76	3.21	6.37	9.37	17.5	27.3	47.0	92.7
	-5		0.480	0.858	1.73	3.17	6.29	9.24	17.3	26.9	46.4	91.4
-25	-20		0.441	0.789	1.59	2.91	5.78	8.50	15.9	24.8	42.6	84.1
	-15		0.435	0.778	1.57	2.87	5.70	8.39	15.7	24.4	42.1	82.9
	-10		0.429	0.768	1.55	2.83	5.63	8.27	15.5	24.1	41.5	81.8
-30	-25		0.393	0.703	1.42	2.59	5.15	7.57	14.1	22.1	38.0	74.9
	-20		0.387	0.693	1.40	2.56	5.08	7.47	14.0	21.8	37.5	73.9
	-15		0.382	0.684	1.38	2.53	5.01	7.37	13.8	21.5	37.0	72.9
-35	-30		0.348	0.623	1.26	2.30	4.56	6.71	12.5	19.5	33.6	66.3
	-25		0.343	0.614	1.24	2.27	4.50	6.62	12.4	19.3	33.2	65.5
	-20		0.339	0.606	1.22	2.24	4.44	6.53	12.2	19.0	32.7	64.6
-40	-35		0.307	0.548	1.11	2.02	4.02	5.91	11.0	17.2	29.6	58.5
	-30		0.302	0.541	1.09	2.00	3.97	5.83	10.9	17.0	29.2	57.7
	-25		0.298	0.534	1.08	1.97	3.91	5.75	10.7	16.8	28.8	56.9

- (i) Capacity based on saturated vapour (no useful superheat)
- (ii) Mean condenser temperature 40 °C (no subcooling) i.e. liquid temperature of 39.8 °C
- (iii) Content of refrigerant in lubricant estimated from solubility data at suction gas temperature and pressure

Table I Ia: Suction line capacity correction factors for KLEA 404A

To convert from tabulated values at a mean condenser temperature of 40°C to the desired value, multiply by the appropriate factor.

Evap. Temp. °C	Temperature liquid °C							
	20	25	30	35	39.8	40	45	50
5	1.293	1.223	1.151	1.076	1.000	0.997	0.915	0.826
0	1.300	1.228	1.154	1.077	1.000	0.997	0.912	0.822
-5	1.308	1.235	1.159	1.080	1.000	0.997	0.910	0.817
-10	1.317	1.241	1.163	1.082	1.000	0.997	0.907	0.812
-15	1.327	1.249	1.168	1.084	1.000	0.997	0.905	0.806
-20	1.337	1.257	1.173	1.087	1.000	0.997	0.902	0.800
-25	1.349	1.265	1.179	1.090	1.000	0.997	0.898	0.793
-30	1.361	1.275	1.186	1.093	1.000	0.997	0.895	0.786
-35	1.374	1.285	1.193	1.097	1.000	0.996	0.891	0.778
-40	1.389	1.296	1.200	1.100	1.000	0.996	0.886	0.769

Note: liquid temperature at a mean condensing temperature of 40.0 °C is 39.8 °C hence table is referenced to a liquid temperature of 39.8 °C

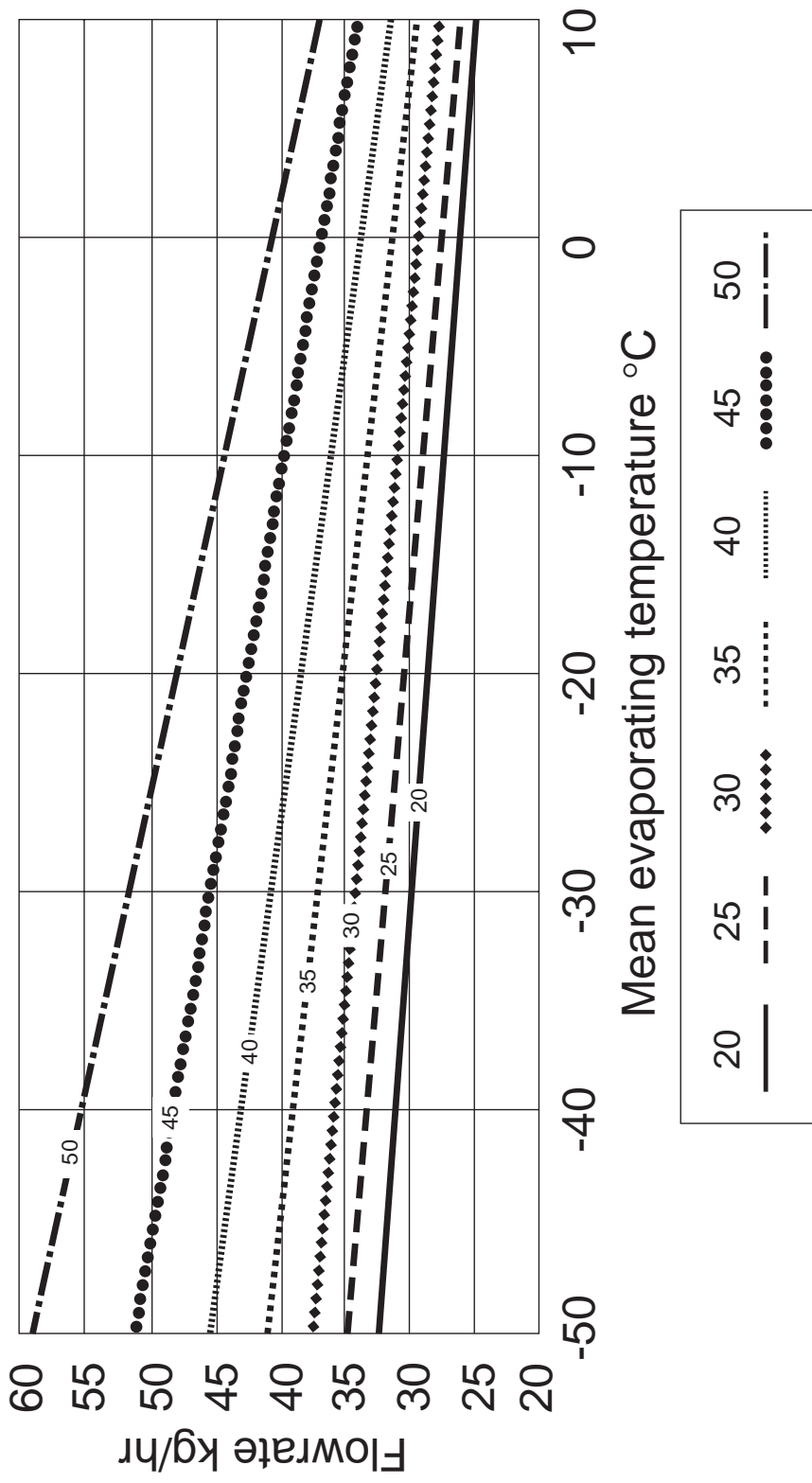
Table I Ib: Discharge line capacity correction factors for KLEA 404A

To convert tabulated values to values for true mean condenser temperature multiply by the appropriate factor from this table.

Evap. Temp. °C	Mean Condenser Temp, °C		
	30	40	50
5	0.915	1.000	1.033
0	0.918	1.000	1.027
-5	0.922	1.000	1.021
-10	0.925	1.000	1.015
-15	0.929	1.000	1.008
-20	0.934	1.000	1.000
-25	0.939	1.000	0.992
-30	0.944	1.000	0.983
-35	0.949	1.000	0.973
-40	0.955	1.000	0.962

Note: (i) Condenser temperatures refer to true mean temperature
(ii) Capacities based on saturated vapour leaving evaporator

Refrigerant Flowrate for 1 kW Refrigeration KLEA 404A



Legend shows liquid temperature at valve inlet °C

KLEA® 404A



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FLUOR

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