

TABLE 1 – SUCTION LINE CAPACITIES IN TONS FOR REFRIGERANT 22

LINE SIZE	SATURATED SUCTION TEMPERATURE, °F														
	-40			-20			0			20			40		
	t = 2°F	t = 1°F	t = 0.5°F	t = 2°F	t = 1°F	t = 0.5°F	t = 2°F	t = 1°F	t = 0.5°F	t = 2°F	t = 1°F	t = 0.5°F	t = 2°F	t = 1°F	t = 0.5°F
TYPE L COPPER O.D.	p = 0.77	p = 0.39	p = 0.19	p = 1.13	p = 0.57	p = 0.29	p = 1.60	p = 0.81	p = 0.40	p = 2.18	p = 1.1	P = 1.1	p = 2.87	p = 1.45	p = 0.73
1/2	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.2	0.1	0.4	0.3	0.2	0.6	0.4	0.3
5/8	0.2	0.1	0.1	0.3	0.2	0.2	0.5	0.3	0.2	0.8	0.5	0.4	1.1	0.7	0.5
3/4	0.3	0.2	0.2	0.6	0.4	0.3	0.9	0.6	0.4	1.3	0.9	0.6	1.8	1.3	0.9
7/8	0.5	0.4	0.2	0.9	0.6	0.4	1.3	0.9	0.6	2.0	1.4	0.9	2.9	2.0	1.3
1-1/8	1.1	0.7	0.5	1.7	1.2	0.8	2.7	1.9	1.3	4.0	2.8	1.9	5.8	4.0	2.7
1-3/8	1.8	1.3	0.9	3.0	2.1	1.4	4.7	3.2	2.2	7.0	4.8	3.3	10.0	6.9	4.8
1-5/8	2.9	2.0	1.4	4.8	3.3	2.3	7.4	5.1	3.5	11.1	7.6	5.3	15.9	11.0	7.6
2-1/8	6.1	4.2	2.9	10.0	6.9	4.7	15.4	10.7	7.3	22.9	15.9	10.9	32.8	22.8	15.7
2-5/8	10.8	7.5	5.1	17.7	12.2	8.4	27.3	18.9	13.0	40.5	28.1	19.4	58.0	40.3	27.8
3-1/8	17.3	12.0	8.2	28.2	19.5	13.4	43.6	30.2	20.8	64.6	44.8	31.0	92.3	64.2	44.4
3-5/8	25.8	17.8	12.3	42.0	29.1	20.0	64.8	44.9	31.0	96.0	66.7	46.1	137.0	95.4	66.1
4-1/8	36.5	25.2	17.4	59.3	41.1	28.3	91.4	63.4	43.8	135.2	94.0	65.1	193.0	134.4	93.2
5-1/8	65.3	45.2	31.2	106.1	73.6	50.8	163.3	113.5	78.5	241.5	168.1	116.5	344.4	240.2	166.7
6-1/8	105.2	72.9	50.3	170.7	118.5	81.9	262.5	182.6	126.4	387.9	270.3	187.5	552.7	385.8	268.1
STEEL															
1/2	0.2	0.2	0.1	0.4	0.3	0.2	0.6	0.4	0.3	0.8	0.6	0.4	1.2	0.8	0.6
3/4	0.5	0.4	0.2	0.8	0.6	0.4	1.2	0.9	0.6	1.8	1.3	0.9	2.5	1.8	1.2
1	1.0	0.7	0.5	1.5	1.1	0.8	2.3	1.6	1.1	3.4	2.4	1.7	4.8	3.4	2.4
1-1/4	2.0	1.4	1.0	3.1	2.2	1.5	4.8	3.4	2.4	6.9	4.9	3.4	9.8	6.9	4.9
1-1/2	2.9	2.1	1.4	4.7	3.3	2.3	7.1	5.0	3.6	10.4	7.4	5.2	14.7	10.4	7.3
2	5.7	4.0	2.8	9.1	6.4	4.5	13.8	9.7	6.9	20.1	14.2	10.0	28.3	20.0	14.1
2-1/2	9.1	6.4	4.5	14.5	10.2	7.2	22.0	15.5	10.9	32.0	22.6	16.0	45.1	31.9	22.5
3	16.1	11.3	8.0	25.6	18.1	12.7	38.8	27.5	19.4	56.5	40.0	28.2	79.6	56.4	39.8
3-1/2	23.5	16.6	11.7	37.4	26.5	18.6	56.8	40.2	28.3	82.7	58.5	41.3	116.5	82.5	58.3
4	32.7	23.1	16.3	52.1	36.9	26.0	79.0	55.9	39.5	115.0	81.4	57.5	162.1	114.8	81.1
5	59.2	41.8	29.4	94.1	66.6	47.0	142.6	101.0	71.3	207.6	147.0	103.8	292.6	207.2	146.4
6	95.7	67.7	47.6	152.0	7.6	76.0	230.4	163.2	115.3	335.4	237.6	167.8	472.5	334.7	236.6

NOTES:

Capacities are in tons of refrigeration.

Dp = pressure drop due to line friction, psi per 100 feet equivalent length.

Dt = phange in saturation temperature corresponding to pressure drop, °F per 100 feet.

All steel pipe sizes are nominal and are for schedule 40. See notes at the bottom of Table 2.

TABLE 2 – DISCHARGE AND LIQUID LINE CAPACITIES IN TONS FOR REFRIGERANT 22

LINE SIZE TYPE L COPPER, O.D.	DISCHARGE LINES (delta t = 1°F, delta p = 3.03 PSI)					LINE SIZE TYPE L COPPER, O.D.	LIQUID LINES	
	SATURATED SUCTION TEMPERATURE, °F						VEL. = 100 FPM	Δt = 1°F Δp = 3.03
	-40	-20	0	20	40			
1/2	0.8	0.8	0.8	0.8	0.9	1/2	2.4	3.7
5/8	1.4	1.5	1.5	1.6	1.6	5/8	3.8	7.0
3/4	2.4	2.5	2.6	2.6	2.7	3/4	5.7	12.0
7/8	3.7	3.8	4.0	4.1	4.2	7/8	8.0	18.6
1-1/8	7.5	7.8	8.0	8.3	8.5	1-1/8	13.6	37.8
1-3/8	13.1	13.5	14.0	14.4	14.8	1-3/8	20.7	66.1
1-5/8	20.6	21.4	22.1	22.8	23.4	1-5/8	29.3	104.7
2-1/8	42.7	44.2	45.7	47.1	48.4	2-1/8	51.0	217.5
2-5/8	75.3	78.0	80.6	83.1	85.3	2-5/8	78.7	385.0
3-1/8	119.9	124.3	128.4	132.3	135.9	3-1/8	112.3	615.0
3-5/8	177.9	184.4	190.6	196.3	201.6	3-5/8	151.8	914.6
4-1/8	250.6	259.7	268.4	276.5	283.9	4-1/8	197.4	1291.0
5-1/8	447.0	463.3	478.7	493.2	506.4	5-1/8	307.6	–
6-1/8	717.1	743.2	768.0	791.2	812.5	6-1/8	442.2	–

STEEL										
IPS	SCH						IPS	SCH		
1/2	40	1.5	1.6	1.7	1.7	1.8	1/2	80	3.9	5.8
3/4	40	3.3	3.4	3.5	3.6	3.7	3/4	80	7.1	13.1
1	40	6.1	6.4	6.6	6.8	7.0	1	80	11.9	25.8
1-1/4	40	12.7	13.1	13.6	14.0	14.3	1-1/4	80	21.1	55.4
1-1/2	40	19.0	19.7	20.3	21.0	21.5	1-1/2	80	29.1	84.5
2	40	36.6	37.9	39.2	40.4	41.5	2	40	55.3	196.5
2-1/2	40	58.3	60.4	62.5	64.3	66.1	2-1/2	40	78.9	313.4
3	40	103.0	106.7	110.3	113.6	116.7	3	40	121.8	554.0
4	40	209.6	217.3	224.5	231.3	237.5	4	40	209.8	1129.0
5	40	378.3	392.1	405.2	417.4	428.6	5	40	329.7	2039.0
6	40	611.1	633.3	654.4	674.1	692.3	6	40	476.2	3294.0

- Table capacities are in tons of refrigeration.
 Δp = Pressure drop due to line friction, psi per 100 feet equivalent length.
 Δt = Change in saturation temperature corresponding to pressure drop, °F per 100 feet.

2. Line capacity for other saturation temperatures Δt and equivalent lengths.
 Line capacity = Table capacity × $\left(\frac{\text{Table } L_e}{\text{Actual } L_e}\right) \times \left(\frac{\text{Actual } \Delta t}{\text{Table } \Delta t}\right)^{0.55}$

3. Saturation temperature Δt for other capacities and equivalent lengths
 L_e

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

The refrigerant cycle for determining capacity is based on saturated gas leaving the evaporator and no subcooling in the condenser. Discharge superheat is 105°F. The saturated suction temperature is 40°F for liquid line sizing.

Multiply table capacities by the following factors for condensing temperatures other than 105°F.

CONDENSING TEMPERATURE, °F	SUCTION LINE	DISCHARGE LINE
80	1.12	0.82
90	1.07	0.89
100	1.03	0.96
110	0.97	1.03
120	0.92	1.10
130	0.87	1.16
140	0.82	1.22

91 **TABLE 3 – SUCTION LINE CAPACITIES IN TONS FOR REFRIGERANT 134a**

LINE SIZE	SATURATED SUCTION TEMPERATURE, °F														
	-40			-20			0			20			40		
	t = 2°F p = 0.98	t = 1°F p = 0.49	t = 0.5°F p = 0.25	t = 2°F p = 1.17	t = 1°F p = 0.59	t = 0.5°F p = 0.30	t = 2°F p = 1.39	t = 1°F p = 0.70	t = 0.5°F p = 0.35	t = 2°F p = 1.63	t = 1°F p = 0.82	t = 0.5°F p = 0.41	t = 2°F p = 1.90	t = 1°F p = 0.96	t = 0.5°F p = 0.48
1/2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.3	0.2	0.1	0.4	0.2	0.2
5/8	0.3	0.2	0.1	0.3	0.2	0.2	0.4	0.3	0.2	0.5	0.4	0.3	0.7	0.5	0.3
3/4	0.5	0.3	0.2	0.6	0.4	0.3	0.7	0.5	0.3	0.9	0.6	0.4	1.1	0.8	0.5
7/8	0.7	0.5	0.3	0.9	0.6	0.4	1.1	0.8	0.5	1.4	1	0.7	1.7	1.2	0.8
1-1/8	1.4	1	0.7	1.8	1.3	0.9	2.3	1.6	1.1	2.9	2	1.3	3.5	2.4	1.7
1-3/8	2.5	1.7	1.2	3.2	2.2	1.5	4	2.8	1.9	5	3.4	2.4	6.1	4.2	2.9
1-5/8	4	2.7	1.9	5.1	3.5	2.4	6.4	4.4	3	7.9	5.4	3.7	9.7	6.7	4.6
2-1/8	8.3	5.7	3.9	10.5	7.3	5	13.2	9.1	6.3	16.4	11.3	7.8	20.1	13.9	9.6
2-5/8	14.7	10.1	7	18.6	12.9	8.8	23.3	16.1	11.1	28.9	20	13.8	35.5	24.6	17
3-1/8	23.4	16.2	11.2	29.7	20.6	14.2	37.2	25.8	17.8	46.1	32	22.1	56.6	39.3	27.1
3-5/8	34.9	24.1	16.6	44.2	30.6	21.1	55.3	38.4	26.5	68.6	47.6	32.9	84.1	58.4	40.4
4-1/8	49.2	34.1	23.5	62.4	43.2	29.8	78.1	54.2	37.4	96.7	67.1	46.4	118.5	82.4	57
5-1/8	88.2	61.1	42.2	111.6	77.4	53.5	139.6	97	67.1	172.7	120.1	83.1	211.6	147.3	102.1
6-1/8	141.8	98.5	68	179.4	124.7	86.2	224.4	156	108	277.5	193.2	133.9	339.9	236.8	164.2

STEEL

IPS	SCH	0.2	0.2	0.1	0.3	0.2	0.1	0.4	0.3	0.2	0.4	0.3	0.2	0.5	0.4	0.3
1/2	40	0.5	0.4	0.3	0.6	0.5	0.3	0.8	0.6	0.4	1	0.7	0.5	1.2	0.8	0.6
3/4	40	1	0.7	0.5	1.2	0.9	0.6	1.5	1.1	0.8	1.9	1.3	0.9	2.3	1.6	1.1
1	40	2.6	1.8	1.3	3.3	2.3	1.6	4.1	2.9	2	5	3.5	2.5	6.1	4.3	3
1-1/4	40	3.9	2.8	1.9	4.9	3.5	2.4	6.1	4.3	3	7.5	5.3	3.7	9.1	6.4	4.5
1-1/2	40	7.6	5.3	3.7	9.5	6.7	4.7	11.8	8.3	5.9	14.5	10.2	7.2	17.6	12.4	8.8
2	40	12.1	8.5	6	15.1	10.7	7.5	18.8	13.3	9.3	23.1	16.3	11.5	28	19.8	14
2-1/2	40	21.3	15.1	10.6	26.7	18.9	13.3	33.2	23.5	16.5	40.7	28.8	20.3	49.6	35.1	24.7
3	40	31.2	22.1	15.5	39.1	27.7	19.5	48.5	34.3	24.2	59.6	42.2	29.8	72.5	51.3	36.2
4	40	43.5	30.7	21.7	54.5	38.5	27.2	67.6	47.8	33.7	82.9	58.7	41.4	100.9	71.4	50.4
5	40	78.5	55.5	39.2	98.4	69.6	49.1	122	86.4	60.9	149.7	106	74.9	182.1	129	91.1
6	40	126.9	89.8	63.3	159	112.6	79.4	197.1	139.6	98.5	241.9	171.3	121	294.2	208.4	147.2

NOTES:

Capacities are in tons of refrigeration.

Dp = pressure drop due to line friction, psi per 100 feet equivalent length.

Dt = change in saturation temperature corresponding to pressure drop, °F per 100 feet.

All steel pipe sizes are nominal and are for schedule 40. See notes at the bottom of Table 4.

TABLE 4 – DISCHARGE AND LIQUID LINE CAPACITIES IN TONS FOR REFRIGERANT 134A

LINE SIZE	DISCHARGE LINES (delta t = 1°F, delta p = 2.2 PSI)			LINE SIZE	LIQUID LINES	
TYPE L COPPER, O.D.	SATURATED SUCTION TEMPERATURE, °F			TYPE L COPPER, O.D.	VEL. = 100 FPM	Δt = 1°F Δp = 2.2
	0	20	40			
1/2	0.5	0.6	0.6	1/2	2.1	2.8
5/8	1.0	1.1	1.1	5/8	3.4	5.3
7/8	2.7	2.8	2.9	7/8	7.1	14.0
1-1/8	5.4	5.7	6.0	1-1/8	12.1	28.4
1-3/8	9.4	9.9	10.4	1-3/8	18.4	50.0
1-5/8	14.9	15.7	16.4	1-5/8	26.1	78.6
2-1/8	30.8	32.4	34.0	2-1/8	45.3	163.0
2-5/8	54.4	57.2	59.9	2-5/8	69.9	290.0
3-1/8	86.7	91.2	95.5	3-1/8	100.0	462.0
3-5/8	129.0	135.0	142.0	3-5/8	135.0	688.0
4-1/8	181.0	191.0	200.0	4-1/8	175.0	971.0
5-1/8	323.0	340.0	356.0	–	–	–
6-1/8	518.0	545.0	571.0	–	–	–

STEEL

IPS	SCH				IPS	SCH		
1/2	40	0.8	0.8	0.9	1/2	80	3.4	4.4
3/4	40	1.8	1.9	2.0	3/4	80	6.3	9.9
1	40	3.5	3.7	3.9	1	80	10.5	19.5
1-1/4	40	9.2	9.7	10.1	1-1/4	80	18.8	41.8
1-1/2	40	13.8	14.5	15.2	1-1/2	80	25.9	63.7
2	40	26.6	28.0	29.3	2	40	49.2	148.0
2-1/2	40	42.4	44.6	46.7	2-1/2	40	70.1	236.0
3	40	75.0	78.8	82.5	3	40	108.0	419.0
4	40	153.0	160.0	168.0	4	40	187.0	853.0

1. Table capacities are in tons of refrigeration.

Δp = Pressure drop due to line friction, psi per 100 feet equivalent length.

Δt = Change in saturation temperature corresponding to pressure drop, °F per 100 feet.

2. Line capacity for other saturation temperatures Δt and equivalent lengths.

$$\text{Line capacity} = \text{Table capacity} \times \left(\frac{\text{Table } L_e}{\text{Actual } L_e} \right) \times \left(\frac{\text{Actual } \Delta t}{\text{Table } \Delta t} \right)^{0.55}$$

3. Saturation temperature Δt for other capacities and equivalent lengths

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

The refrigerant cycle for determining capacity is based on saturated gas leaving the evaporator and no subcooling in the condenser. Discharge superheat is 105°F. The saturated suction temperature is 40°F for liquid line sizing.

Multiply table capacities by the following factors for condensing temperatures other than 105°F.

CONDENSING TEMPERATURE, °F	SUCTION LINE	DISCHARGE LINE
80	1.14	0.81
90	1.09	0.89
100	1.03	0.96
110	0.97	1.03
120	0.91	1.10
130	0.84	1.16
140	0.78	1.20

TABLE 7 – SUCTION LINE CAPACITIES IN TONS FOR REFRIGERANT 410A

LINE SIZE	SATURATED SUCTION TEMPERATURE, °F											
	-60		-40		-20		0		20		40	
	T = 1°F	t = 0.5°F	t = 1°F	t = 0.5°F	t = 1°F	t = 0.5°F	t = 1°F	t = 0.5°F	t = 1°F	t = 0.5°F	t = 1°F	t = 0.5°F
TYPE L COPPER, O.D.	P = 0.42	p = 0.21	P = 0.635	P = 0.318	p = 0.925	P = 0.463	P = 1.285	P = 0.643	P = 1.73	P = 0.865	p = 2.25	P = 1.125
1/2	0.06	0.04	0.11	0.08	0.18	0.13	0.29	0.20	0.43	0.29	0.61	0.42
5/8	0.12	0.08	0.21	0.14	0.35	0.24	0.54	0.37	0.80	0.55	1.15	0.79
3/4	0.21	0.14	0.36	0.25	0.60	0.41	0.92	0.63	1.37	0.94	1.96	1.34
7/8	0.33	0.22	0.57	0.38	0.92	0.63	1.43	0.98	2.12	1.45	3.02	2.08
1-1/8	0.67	0.46	1.15	0.79	1.88	1.28	2.90	1.99	4.29	2.95	6.12	4.22
1-3/8	1.18	0.80	2.02	1.38	3.28	2.25	5.06	3.47	7.49	5.15	10.65	7.34
1-5/8	1.87	1.27	3.20	2.19	5.20	3.56	8.00	5.50	11.84	8.16	16.82	11.62
2-1/8	3.90	2.66	6.66	4.57	10.80	7.42	16.60	11.43	24.53	16.94	34.82	24.06
2-5/8	6.92	4.74	11.81	8.11	19.15	13.16	29.37	20.24	43.30	29.96	61.42	42.54
3-1/8	11.10	7.59	18.88	12.98	30.56	21.03	46.84	32.36	69.12	47.78	97.93	67.88
3-5/8	16.54	11.32	28.12	19.33	45.48	31.32	69.66	48.14	102.68	71.03	145.29	100.82
4-1/8	23.37	16.04	39.75	27.34	64.13	44.26	98.29	67.89	144.70	100.22	204.80	142.08
5-1/8	41.90	28.80	71.16	49.04	114.79	79.27	175.44	121.50	257.95	179.21	365.02	253.76
6-1/8	67.56	46.54	114.71	79.08	184.50	127.75	282.30	195.66	414.50	287.76	586.12	407.59

STEEL

IPS	SCH												
3/8	80	0.05	0.04	0.09	0.06	0.15	0.10	0.22	0.16	0.32	0.23	0.45	0.32
1/2	80	0.11	0.07	0.18	0.13	0.29	0.20	0.44	0.31	0.64	0.45	0.89	0.63
3/4	80	0.25	0.17	0.41	0.29	0.65	0.46	0.99	0.69	1.44	1.01	2.01	1.42
1	80	0.48	0.34	0.81	0.57	1.28	0.90	1.94	1.36	2.81	1.98	3.94	2.78
1-1/4	40	1.04	0.73	1.74	1.22	2.76	1.94	4.16	2.92	6.04	4.25	8.45	5.96
1-1/2	40	1.60	1.11	2.66	1.86	4.21	2.96	6.35	4.46	9.20	6.48	12.90	9.09
2	40	3.73	2.60	6.19	4.34	9.79	6.88	14.72	10.38	21.40	15.08	29.94	21.09
2-1/2	40	5.94	4.16	9.85	6.93	15.59	10.98	23.46	16.53	34.03	24.02	47.62	33.61
3	40	10.52	7.37	17.43	12.25	27.60	19.43	41.47	29.26	60.13	42.44	84.14	59.39
4	40	21.48	15.08	35.60	25.06	56.24	39.58	84.52	59.63	122.57	86.51	171.56	121.08
5	40	38.84	27.30	64.25	45.21	101.52	71.51	152.52	107.63	221.30	156.17	309.01	218.33
6	40	62.85	44.23	104.14	73.26	164.15	115.77	246.64	174.04	357.45	252.55	499.76	353.09

NOTES:

Capacities are in tons of refrigeration.

Dp = pressure drop due to line friction, psi per 100 feet equivalent length.

Dt = phange in saturation temperature corresponding to pressure drop, °F per 100 feet.

All steel pipe sizes are nominal and are for schedule 40. See notes at the bottom of Table 8.

TABLE 8 – DISCHARGE AND LIQUID LINE CAPACITIES IN TONS FOR REFRIGERANT 410A

LINE SIZE COPPER, O.D.	TYPE L	DISCHARGE LINES (delta t = 1°F, delta p = 4.75 PSI)						LINE SIZE COPPER, O.D.	TYPE L	LIQUID LINES		
		SATURATED SUCTION TEMPERATURE, °F delta p = 4.75								VEL. = 100 FPM	delta t = 1°f	delta t = 5°f
		-60	-40	-20	0	20	40				delta p = 4.75	delta p = 23.3
1/2		1.13	1.17	1.22	1.26	1.30	1.33	0.50		2.00	4.60	10.81
5/8		2.11	2.20	2.29	2.36	2.43	2.49	0.63		3.20	8.60	20.24
3/4		3.59	3.74	3.88	4.02	4.14	4.23	0.75		4.70	14.30	33.53
7/8		5.53	5.76	5.99	6.19	6.38	6.52	0.88		6.70	22.60	52.92
1-1/8		11.16	11.64	12.09	12.50	12.88	13.17	1-1/8		11.40	45.80	106.59
1-3/8		19.39	20.21	21.00	21.72	22.37	22.88	1-3/8		17.40	79.70	185.04
1-5/8		30.63	31.92	33.16	34.30	35.33	36.14	1-5/8		24.60	125.90	291.48
2-1/8		63.20	65.88	68.44	70.78	72.90	74.57	2-1/8		42.80	260.70	601.13
2-5/8		111.20	115.90	120.41	124.53	128.25	131.20	2-5/8		66.00	459.70	1056.39
3-1/8		177.12	184.62	191.80	198.36	204.29	208.98	3-1/8		94.20	733.00	1680.52
3-5/8		262.44	273.54	284.19	293.90	302.70	309.64	3-5/8		127.40	1087.50	2491.00
4-1/8		369.45	385.08	400.07	413.75	426.13	435.90	4-1/8		165.70	1530.20	3500.91
5-1/8		658.32	686.18	712.88	737.26	759.31	776.72	5-1/8		258.20	2729.80	6228.40
6-1/8		1054.47	1099.10	1141.87	1180.91	1216.24	1244.13	6-1/8		371.10	4383.70	9980.43

STEEL

IPS	SCH							IPS	SCH			
3/8	80	0.81	0.84	0.88	0.91	0.93	0.95	3/8	80.00	1.90	3.40	7.60
1/2	80	1.59	1.66	1.73	1.78	1.84	1.88	0.50	80.00	3.20	6.70	15.00
3/4	80	3.59	3.74	3.88	4.02	4.14	4.23	0.75	80.00	6.00	15.10	33.60
1	80	7.02	7.32	7.60	7.86	8.10	8.28	1	80.00	10.00	29.50	65.80
1-1/4	80	15.03	15.67	16.28	16.83	17.34	17.74	1-1/4	80.00	17.70	63.30	140.90
1-1/2	80	22.89	23.86	24.79	25.64	26.41	27.01	1-1/2	80.00	24.40	96.60	214.70
2	40	53.16	55.41	57.57	59.54	61.32	62.73	2	40.00	46.40	224.20	498.00
2-1/2	40	84.56	88.14	91.57	94.70	97.53	99.77	2-1/2	40.00	66.20	356.50	793.00
3	40	149.44	155.76	161.82	167.36	172.37	176.32	3	40.00	102.20	630.00	1398.40
4	40	304.02	316.88	329.21	340.47	350.66	358.70	4	40.00	176.10	1284.60	2851.70
5	40	548.97	572.20	594.46	614.79	633.19	647.71	5	40.00	276.50	2313.70	5137.00
6	40	886.76	924.29	960.25	993.09	1022.80	1046.26	6	40.00	399.60	3741.90	8308.90

1. Table capacities are in tons of refrigeration.

$\Delta p =$ Pressure drop due to line friction, psi per 100 feet equivalent length.

$\Delta t =$ Change in saturation temperature corresponding to pressure drop, °F per 100 feet.

2. Line capacity for other saturation temperatures Δt and equivalent lengths.

$$\text{Line capacity} = \text{Table capacity} \times \left(\frac{\text{Table } L_e}{\text{Actual } L_e} \right) \times \left(\frac{\text{Actual } \Delta t}{\text{Table } \Delta t} \right)^{0.55}$$

3. Saturation temperature Δt for other capacities and equivalent lengths

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

The refrigerant cycle for determining capacity is based on saturated gas leaving the evaporator and no subcooling in the condenser. Discharge superheat is 105°F. The saturated suction temperature is 40°F for liquid line sizing.

Multiply table capacities by the following factors for condensing temperatures other than 105°F.

CONDENSING TEMPERATURE, °F	SUCTION LINE	DISCHARGE LINE
80	1.16	0.81
90	1.09	0.89
100	1.03	0.96
110	0.97	1.03
120	0.90	1.10
130	0.83	1.16
140	0.76	1.19

TABLE 9 – MINIMUM REFRIGERATION CAPACITY IN TONS FOR OIL ENTRAINMENT UP SUCTION RISERS (TYPE L COPPER TUBING)

REFRIGERANT	SATURATION SUCTION TEMP., °F	SUCTION GAS TEMP., °F	PIPE O.D., IN.											
			1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8
			AREA, IN ²											
				0.233	0.348	0.484	0.825	1.256	1.780	3.094	4.770	6.812	9.213	11.97
22	-40	-30	0.07	0.12	0.20	0.30	0.59	0.99	1.53	3.05	5.25	8.19	11.95	16.57
		-10	0.07	0.12	0.20	0.30	0.58	0.97	1.51	3.00	5.16	8.06	11.75	16.30
		10	0.07	0.12	0.20	0.30	0.58	0.98	1.52	3.02	5.19	8.11	11.82	16.40
	-20	-10	0.09	0.16	0.26	0.39	0.76	1.28	1.97	3.94	6.77	10.57	15.41	21.38
		10	0.09	0.15	0.25	0.38	0.74	1.26	1.95	3.89	6.68	10.42	15.20	21.09
		30	0.09	0.15	0.26	0.39	0.75	1.27	1.96	3.92	6.73	10.51	15.33	21.26
	0	10	0.11	0.20	0.33	0.49	0.96	1.63	2.52	5.03	8.63	13.48	19.65	27.26
		30	0.11	0.19	0.32	0.49	0.94	1.60	2.47	4.93	8.47	13.22	19.29	26.75
		50	0.11	0.20	0.32	0.49	0.95	1.61	2.49	4.97	8.54	13.33	19.44	26.96
	20	30	0.14	0.25	0.41	0.62	1.20	2.03	3.15	6.28	10.78	16.84	24.56	34.06
		50	0.14	0.24	0.40	0.61	1.19	2.01	3.11	6.21	10.66	16.65	24.28	33.68
		70	0.14	0.24	0.40	0.61	1.19	2.01	3.11	6.20	10.65	16.63	24.25	33.64
	40	50	0.17	0.30	0.50	0.76	1.48	2.49	3.86	7.70	13.22	20.64	30.11	41.76
		70	0.17	0.30	0.49	0.74	1.45	2.45	3.78	7.55	12.96	20.24	29.52	40.94
		90	0.17	0.30	0.49	0.74	1.45	2.45	3.78	7.55	12.97	20.26	29.54	40.98
134a	0	10	0.09	0.16	0.26	0.39	0.76	1.29	2.00	3.99	6.86	10.71	15.61	21.66
		30	0.09	0.15	0.25	0.38	0.75	1.26	1.95	3.90	6.70	10.46	15.26	21.16
		50	0.09	0.16	0.26	0.39	0.76	1.28	1.98	3.95	6.79	10.60	15.46	21.45
	10	20	0.10	0.17	0.28	0.43	0.84	1.41	2.18	4.36	7.49	11.69	17.05	23.65
		40	0.10	0.17	0.29	0.43	0.85	1.43	2.21	4.41	7.58	11.84	17.26	23.95
		60	0.10	0.18	0.29	0.44	0.86	1.45	2.24	4.47	7.68	11.99	17.49	24.26
	20	30	0.11	0.19	0.32	0.49	0.95	1.60	2.48	4.94	8.49	13.25	19.32	26.80
		50	0.11	0.20	0.33	0.49	0.96	1.62	2.51	5.01	8.61	13.44	19.60	27.19
		70	0.11	0.20	0.33	0.50	0.97	1.64	2.54	5.06	8.70	13.58	19.81	27.48
	30	40	0.12	0.22	0.37	0.55	1.08	1.82	2.82	5.63	9.67	15.10	22.02	30.55
		60	0.12	0.22	0.37	0.55	1.08	1.82	2.82	5.62	9.66	15.08	21.99	30.51
		80	0.13	0.23	0.37	0.56	1.10	1.86	2.87	5.73	9.85	15.38	22.43	31.11
	40	50	0.14	0.25	0.41	0.62	1.20	2.03	3.14	6.26	10.75	16.79	24.49	33.97
		70	0.14	0.25	0.41	0.62	1.20	2.03	3.14	6.28	10.78	16.83	24.55	34.05
		90	0.14	0.25	0.42	0.63	1.23	2.08	3.22	6.43	11.04	17.24	25.15	34.88

TABLE 9 – MINIMUM REFRIGERATION CAPACITY IN TONS FOR OIL ENTRAINMENT UP SUCTION RISERS (TYPE L COPPER TUBING)
(CONTINUED)

REFRIGERANT	SATURATION SUCTION TEMP., °F	SUCTION GAS TEMP., °F	PIPE O.D., IN.												
			1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8	
			AREA, IN ²												
			0.233	0.348	0.484	0.825	1.256	1.780	3.094	4.770	6.812	9.213	11.97		
407C	-40	-30	0.06	0.10	0.17	0.25	0.49	0.84	1.29	2.58	4.44	6.92	10.10	14.01	
		-10	0.06	0.10	0.17	0.26	0.51	0.86	1.33	2.65	4.55	7.10	10.35	14.36	
		10	0.06	0.11	0.18	0.27	0.52	0.88	1.37	2.73	4.69	7.32	10.67	14.81	
	-20	-10	0.08	0.14	0.23	0.34	0.67	1.13	1.75	3.49	6.00	9.36	13.65	18.93	
		10	0.08	0.14	0.23	0.35	0.68	1.15	1.78	3.56	6.11	9.54	13.92	19.30	
		30	0.08	0.14	0.24	0.36	0.70	1.18	1.83	3.65	6.28	0.80	14.29	19.82	
	0	10	0.10	0.18	0.29	0.45	0.87	1.47	2.27	4.53	7.78	12.14	17.71	24.56	
		0	0.10	0.18	0.30	0.46	0.89	1.51	2.33	4.65	7.98	12.46	18.17	25.20	
		50	0.10	0.19	0.31	0.47	0.91	1.54	2.38	4.76	8.17	12.76	18.61	25.82	
	20	30	0.13	0.23	0.38	0.58	1.12	1.90	2.94	5.86	10.06	15.71	22.92	31.79	
		50	0.13	0.23	0.39	0.59	1.14	1.93	2.98	5.95	10.22	15.95	23.27	32.28	
		70	0.13	0.24	0.39	0.60	1.16	1.96	3.03	6.05	10.40	16.24	23.68	32.85	
	40	50	0.16	0.29	0.47	0.71	1.39	2.35	3.64	7.26	12.47	19.46	28.39	39.38	
		70	0.16	0.29	0.48	0.73	1.41	2.39	3.70	7.38	12.68	19.79	28.87	40.05	
		90	0.17	0.30	0.49	0.74	1.44	2.44	3.77	7.52	12.92	20.17	29.42	40.82	
	410A	-40	-30	0.09	0.16	0.26	0.39	0.76	1.29	2.00	3.98	6.84	10.68	15.58	21.61
			-10	0.09	0.16	0.26	0.40	0.78	1.32	2.04	4.07	6.99	10.90	15.90	22.06
			10	0.09	0.16	0.27	0.41	0.79	1.34	2.08	4.15	7.12	11.12	16.22	22.50
-20		-10	0.11	0.20	0.33	0.50	0.98	1.66	2.56	5.12	8.79	13.72	20.01	27.76	
		10	0.11	0.21	0.34	0.51	1.00	1.69	2.62	5.22	8.97	14.01	20.43	28.35	
		30	0.12	0.21	0.35	0.52	1.02	1.73	2.67	5.33	9.15	14.29	20.84	28.91	
0		10	0.14	0.25	0.42	0.63	1.23	2.08	3.21	6.41	11.01	17.19	25.08	34.79	
		30	0.14	0.26	0.43	0.64	1.26	2.12	3.28	6.55	11.25	17.57	25.62	35.54	
		50	0.15	0.26	0.44	0.66	1.28	2.17	3.35	6.68	11.48	17.92	26.14	36.25	
20		30	0.19	0.34	0.56	0.85	1.65	2.79	4.32	8.61	14.80	23.10	33.69	46.74	
		50	0.19	0.35	0.57	0.87	1.69	2.85	4.41	8.81	15.13	23.62	34.45	47.78	
		70	0.20	0.35	0.58	0.88	1.72	2.91	4.50	8.97	15.42	24.07	35.11	48.70	
40		50	0.21	0.37	0.61	0.93	1.81	3.06	4.73	9.44	16.22	25.32	36.93	51.22	
		70	0.21	0.38	0.63	0.95	1.85	3.13	4.84	9.65	16.58	25.88	37.75	52.36	
		90	0.22	0.39	0.64	0.97	1.88	3.19	4.93	9.83	16.89	26.37	38.46	53.35	

Refrigeration capacity in tons is based on 90°F liquid temperature and superheat as indicated by the temperature in the table. The saturated condensing and suction conditions are referenced to the dewpoint for R-407C. For other liquid line temperatures, use correction factors to the capacity given in the table below.

REFRIGERANT	LIQUID TEMPERATURE, °F								
	50	60	70	80	100	110	120	130	140
22	1.16	1.12	1.08	1.04	0.96	0.91	0.87	0.82	0.78
134a	1.19	1.15	1.10	1.05	0.95	0.90	0.84	0.79	0.73
407C	1.21	1.16	1.11	1.05	0.94	0.89	0.83	0.77	0.70
410A	1.21	1.16	1.11	1.05	0.94	0.89	0.82	0.76	0.68

24 **TABLE 10 – MINIMUM REFRIGERATION CAPACITY IN TONS FOR OIL ENTRAINMENT UP HOT GAS RISERS (TYPE L COPPER TUBING)**

REFRIGERANT	SATURATION TEMP., °F	DISCHARGE GAS TEMP., °F	PIPE O.D., IN.												
			1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8	
			AREA, IN ²												
			0.233	0.348	0.484	0.825	1.256	1.780	3.094	4.770	6.812	9.213	11.97		
22	80	110	0.23	0.42	0.69	1.04	2.02	3.42	5.29	10.56	18.15	28.33	41.32	57.31	
		140	0.22	0.39	0.65	0.98	1.91	3.23	5.00	9.98	17.15	26.77	39.04	54.15	
		170	0.21	0.38	0.62	0.94	1.84	3.11	4.80	9.58	16.46	25.70	37.49	52.00	
	90	120	0.24	0.43	0.71	1.07	2.09	3.53	5.46	10.90	18.72	29.22	42.62	59.12	
		150	0.23	0.40	0.67	1.01	1.96	3.32	5.13	10.25	17.60	27.48	40.08	55.60	
		180	0.22	0.39	0.64	0.96	1.88	3.17	4.90	9.78	16.81	26.24	38.27	53.09	
	100	130	0.25	0.44	0.73	1.11	2.16	3.65	5.64	11.26	19.34	30.20	44.05	61.10	
		160	0.23	0.41	0.68	1.03	2.01	3.41	5.27	10.51	18.05	28.18	41.11	57.02	
		190	0.22	0.40	0.65	0.99	1.92	3.25	5.02	10.02	17.21	26.86	39.18	54.34	
	110	140	0.25	0.45	0.75	1.13	2.21	3.73	5.77	11.52	19.79	30.89	45.06	62.50	
		170	0.24	0.42	0.70	1.06	2.06	3.48	5.38	10.73	18.44	28.79	41.99	58.24	
		200	0.22	0.40	0.66	0.99	1.93	3.27	5.06	10.09	17.33	27.06	39.46	54.74	
	120	150	0.26	0.46	0.76	1.15	2.25	3.80	5.87	11.72	20.14	31.44	45.85	63.60	
		180	0.24	0.43	0.70	1.06	2.07	3.50	5.41	10.81	18.56	28.98	42.27	58.63	
		210	0.23	0.41	0.67	1.01	1.97	3.34	5.16	10.30	17.70	27.63	40.30	55.90	
	134a	80	110	0.20	0.36	0.59	0.89	1.73	2.93	4.52	9.03	15.51	24.22	35.32	48.99
			140	0.19	0.33	0.55	0.83	1.62	2.74	4.24	8.47	14.55	22.71	33.13	45.95
			170	0.18	0.32	0.53	0.80	1.55	2.63	4.06	8.10	13.92	21.73	31.70	43.97
90		120	0.20	0.37	0.61	0.92	1.79	3.02	4.67	9.32	16.01	24.99	36.45	50.56	
		150	0.19	0.34	0.56	0.85	1.66	2.80	4.33	8.64	14.84	23.17	33.79	46.87	
		180	0.18	0.33	0.54	0.82	1.59	2.69	4.16	8.30	14.26	22.27	32.48	45.05	
100		130	0.21	0.37	0.62	0.93	1.81	3.07	4.74	9.47	16.26	25.39	37.03	51.36	
		160	0.20	0.35	0.58	0.88	1.71	2.90	4.48	8.95	15.37	23.99	34.99	48.54	
		190	0.19	0.34	0.55	0.84	1.63	2.76	4.26	8.50	14.61	22.80	33.26	46.13	
110		140	0.21	0.38	0.63	0.96	1.86	3.15	4.88	9.73	16.71	26.09	38.06	52.79	
		170	0.20	0.36	0.59	0.90	1.75	2.95	4.57	9.11	15.66	24.44	35.65	49.45	
		200	0.19	0.34	0.56	0.85	1.65	2.80	4.32	8.63	14.83	23.15	33.76	46.83	
120		150	0.21	0.38	0.63	0.96	1.87	3.16	4.88	9.74	16.73	26.12	38.10	52.85	
		180	0.20	0.36	0.60	0.90	1.76	2.97	4.60	9.18	15.76	24.61	35.89	49.79	
		210	0.19	0.34	0.57	0.86	1.67	2.83	4.37	8.73	14.99	23.41	34.14	47.36	

**TABLE 10 – MINIMUM REFRIGERATION CAPACITY IN TONS FOR OIL ENTRAINMENT UP HOT GAS RISERS (TYPE L COPPER TUBING)
(CONTINUED)**

REFRIGERANT	SATURATION TEMP. °F	DISCHARGE GAS TEMP. °F	PIPE O.D., IN.											
			1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8
			AREA, IN ²											
			0.233	0.348	0.484	0.825	1.256	1.780	3.094	4.770	6.812	9.213	11.97	
407C	80	110		0.42	0.69	1.05	2.04	3.46	5.34	10.66	18.32	28.60	41.72	57.87
		140	0.22	0.40	0.66	0.99	1.93	3.27	5.05	10.08	17.31	27.02	39.42	54.67
		170	0.21	0.38	0.63	0.95	1.85	3.13	4.84	9.66	16.60	25.91	37.79	52.42
	90	120	0.24	0.43	0.71	1.07	2.07	3.51	5.42	10.83	18.60	29.03	42.35	58.74
		150	0.23	0.41	0.67	1.02	1.98	3.35	5.19	10.35	17.78	27.76	40.49	56.17
		180	0.22	0.39	0.65	0.98	1.90	3.22	4.97	9.93	17.06	26.63	38.83	53.87
	100	130	0.24	0.44	0.72	1.09	2.13	3.60	5.56	11.10	19.07	29.77	43.42	60.23
		160	0.23	0.42	0.69	1.05	2.04	3.44	5.32	10.62	18.25	28.49	41.55	57.63
		190	0.22	0.40	0.66	1.00	1.94	3.28	5.07	10.12	17.39	27.15	39.60	54.93
	110	140	0.25	0.45	0.73	1.11	2.16	3.66	5.65	11.28	19.38	30.25	44.12	61.21
		170	0.24	0.42	0.70	1.06	2.06	3.49	5.39	10.76	18.49	28.86	42.10	58.39
		200	0.23	0.41	0.67	1.01	1.98	3.34	5.17	10.31	17.71	27.65	40.32	55.93
	120	150	0.25	0.45	0.75	1.13	2.20	3.71	5.74	11.45	19.68	30.72	44.80	62.15
		180	0.24	0.43	0.71	1.07	2.09	3.53	5.46	10.91	18.73	29.25	42.66	59.17
		210	0.23	0.41	0.68	1.03	2.01	3.40	5.26	10.49	18.03	28.14	41.04	56.93
410A	80	110	0.30	0.54	0.88	1.33	2.60	4.40	6.80	13.56	23.30	36.38	53.06	73.60
		140	0.28	0.50	0.82	1.24	2.41	4.08	6.31	12.60	21.64	33.79	49.28	68.36
		170	0.25	0.45	0.74	1.11	2.17	3.67	5.67	11.32	19.44	30.35	44.27	61.41
	90	120	0.30	0.54	0.90	1.36	2.64	4.47	6.91	13.80	23.70	37.00	53.96	74.85
		150	0.28	0.50	0.83	1.25	2.43	4.11	6.36	12.69	21.79	34.02	49.62	68.83
		180	0.25	0.45	0.75	1.13	2.21	3.73	5.77	11.52	19.79	30.89	45.05	62.49
	100	130	0.31	0.55	0.91	1.37	2.67	4.51	6.98	13.93	23.93	37.36	54.49	75.59
		160	0.27	0.48	0.80	1.20	2.34	3.96	6.13	12.23	21.01	32.79	47.83	66.35
		190	0.26	0.46	0.76	1.15	2.23	3.77	5.84	11.65	20.01	31.24	45.56	63.19
	110	140	0.31	0.55	0.91	1.37	2.67	4.52	6.99	13.95	23.96	37.41	54.56	75.69
		170	0.27	0.49	0.80	1.21	2.36	3.99	6.16	12.30	21.13	32.98	48.11	66.73
		200	0.26	0.46	0.76	1.15	2.24	3.79	5.86	11.70	20.10	31.37	45.76	63.47
	120	150	0.30	0.54	0.90	1.36	2.64	4.47	6.91	13.80	23.70	37.00	53.97	74.86
		180	0.27	0.48	0.80	1.21	2.35	3.98	6.15	12.28	21.09	32.92	48.02	66.61
		210	0.26	0.46	0.76	1.15	2.23	3.78	5.84	11.66	20.03	31.27	45.61	63.27

Refrigeration capacity in tons is based on a saturated suction temperature of 20°F with 15°F superheat at the indicated saturated condensing temperature with 15°F subcooling. The saturated condensing and suction conditions are referenced to the dewpoint for R-407C. For other saturated suction temperatures with 15°F superheat, use correction factors to the capacity given in the table below.

Refrigerant	Saturated Suction Temperature, °F			
	-40	-20	0	40
22	0.91	0.94	0.97	1.03
134a	-	-	0.96	1.04
407C	0.88	0.92	0.96	1.04
410A	0.91	0.94	0.97	1.02

TABLE 11 – FITTING LOSSES IN EQUIVALENT FEET OF PIPE (SCREWED, WELDED, FLANGED AND BRAZED CONNECTIONS)







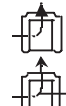
Nominal Pipe or Tube Size, in.	Smooth Bend Elbows							Smooth Bend Tees		
	90° Std. ^a	90° Long Radius ^b	90° Street ^a	45° Std. ^a	45° Std. ^a	180° Std. ^a	Flow Through Branch	Straight-Through Flow		
								No Reduction	Reduced 1/4	Reduced 1/2
3/8	1.4	0.9	2.3	0.7	1.1	2.3	2.7	0.9	1.2	1.4
1/2	1.6	1.0	2.5	0.8	1.3	2.5	3.0	1.0	1.4	1.6
3/4	2.0	1.4	3.2	0.9	1.6	3.2	4.0	1.4	1.9	2.0
1	2.6	1.7	4.1	1.3	2.1	4.1	5.0	1.7	2.2	2.6
1-1/4	3.3	2.3	5.6	1.7	3.0	5.6	7.0	2.3	3.1	3.3
1-1/2	4.0	2.6	6.3	2.1	3.4	6.3	8.0	2.6	3.7	4.0
2	5.0	3.3	8.2	2.6	4.5	8.2	10.0	3.3	4.7	5.0
2-1/2	6.0	4.1	10.0	3.2	5.2	10.0	12.0	4.1	5.6	6.0
3	7.5	5.0	12.0	4.0	6.4	12.0	15.0	5.0	7.0	7.5
3-1/2	9.0	5.9	8.2	4.7	7.3	15.0	18.0	5.9	8.0	9.0
4	10.0	6.7	10.0	5.2	8.5	17.0	21.0	6.7	9.0	10.0
5	13.0	8.2	12.0	6.5	11.0	21.0	25.0	8.2	12.0	13.0
6	16.0	10.0	15.0	7.9	13.0	25.0	30.0	10.0	14.0	16.0

TABLE 12 – SPECIAL FITTING LOSSES IN EQUIVALENT FEET OF PIPE (ASHRAE)

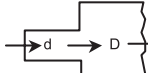
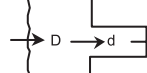

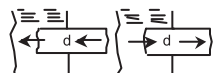
Nominal Pipe or Tube Size, In.	Sudden Enlargement, d/D			Sudden Contraction, d/D			Sharp Edge		Pipe Projection	
	1/4	1/2	3/4	1/4	1/2	3/4	Entrance	Exit	Entrance	Exit
										
3/8	1.4	0.8	0.3	0.7	0.5	0.3	1.5	0.8	1.5	1.1
1/2	1.8	1.1	0.4	0.9	0.7	0.4	1.8	1.0	1.8	1.5
3/4	2.5	1.5	0.5	1.2	1.0	0.5	2.8	1.4	2.8	2.2
1	3.2	2.0	0.7	1.6	1.2	0.7	3.7	1.8	3.7	2.7
1-1/4	4.7	3.0	1.0	2.3	1.8	1.0	5.3	2.6	5.3	4.2
1-1/2	5.8	3.6	1.2	2.9	2.2	1.2	6.6	3.3	6.6	5.0
2	8.0	4.8	1.6	4.0	3.0	1.6	9.0	4.4	9.0	6.8
2-1/2	10.0	6.1	2.0	5.0	3.8	2.0	12.0	5.6	12.0	8.7
3	13.0	8.0	2.6	6.5	4.9	2.6	14.0	7.2	14.0	11.0
3-1/2	15.0	9.2	3.0	7.7	6.0	3.0	17.0	8.5	17.0	13.0
4	17.0	11.0	3.8	9.0	6.8	3.8	20.0	10.0	20.0	16.0
5	24.0	15.0	5.0	12.0	9.0	5.0	27.0	14.0	27.0	20.0
6	29.0	22.0	6.0	15.0	11.0	6.0	33.0	19.0	33.0	25.0

TABLE 13 – VALVE LOSSES IN EQUIVALENT FEET OF PIPE (ASHRAE)

Nominal Pipe or Tube Size, in.	Globe ^a	60° Wye	45° Wye	Angle ^a	Gate ^b	Swing Check ^c	Lift Check
3/8	17	8	6	6	0.6	5	Globe and vertical lift same as globe valve ^d
1/2	18	9	7	7	0.7	6	
3/4	22	11	9	9	0.9	8	
1	29	15	12	12	1.0	10	
1-1/4	38	20	15	15	1.5	14	
1-1/2	43	24	18	18	1.8	16	
2	55	30	24	24	2.3	20	
2-1/2	69	35	29	29	2.8	25	Angle lift same as angle valve
3	84	43	35	35	3.2	30	
3-1/2	100	50	41	41	4.0	35	
4	12	58	47	47	4.5	40	
5	140	71	58	58	6.0	50	
6	170	88	70	70	7.0	60	

NOTE:

Losses are for valves in fully open position and with screwed, welded, flanged, or flared connections.

^a These losses do not apply to valves with needlepoint seats.

^b Regular and short pattern plug cock valves, when fully open, have the same loss as gate valve.

^c Losses also apply to the in-line, ball-type check valve.

^d For Y pattern globe lift check valve with seat approximately equal to the nominal pipe diameter, use values of 60° Wye valves for loss.

TABLE 14 – REFRIGERANT CHARGE IN POUNDS PER 100 FEET OF SUCTION LINE

Line Size, OD	Saturated Suction Temperature, °F											
	R-22			R-134a			R-407C			R-410A		
	-40	0	40	0	20	40	-40	0	40	-40	0	40
1/2	0.03	0.07	0.15	0.05	0.07	0.11	0.02	0.06	0.14	0.05	0.11	0.23
5/8	0.05	0.12	0.25	0.08	0.12	0.17	0.04	0.10	0.22	0.07	0.17	0.36
3/4	0.07	0.18	0.37	0.11	0.17	0.26	0.06	0.15	0.33	0.11	0.25	0.53
7/8	0.10	0.24	0.51	0.16	0.24	0.36	0.08	0.21	0.46	0.15	0.35	0.74
1-1/8	0.17	0.42	0.87	0.27	0.41	0.61	0.14	0.36	0.79	0.25	0.60	1.26
1-3/8	0.26	0.64	1.33	0.41	0.62	0.92	0.21	0.55	1.20	0.38	0.92	1.92
1-5/8	0.37	0.90	1.88	0.58	0.88	1.31	0.30	0.78	1.70	0.54	1.30	2.72
2-1/8	0.65	1.57	3.27	1.00	1.54	2.27	0.53	1.35	2.95	0.95	2.25	4.74
2-5/8	1.01	2.42	5.04	1.55	2.37	3.50	0.81	2.09	4.55	1.46	3.47	7.30
3-1/8	1.44	3.45	7.19	2.21	3.38	5.00	1.16	2.98	6.50	2.08	4.96	10.42
3-5/8	1.94	4.66	9.73	2.99	4.57	6.77	1.57	4.03	8.79	2.82	6.71	14.10
4-1/8	2.52	6.06	12.65	3.88	5.94	8.79	2.04	5.24	11.42	3.66	8.72	18.32
5-1/8	3.93	9.45	19.71	6.05	9.26	13.70	3.17	8.17	17.80	5.71	13.59	28.56
6-1/8	5.65	13.58	28.34	8.69	13.31	19.70	4.56	11.74	25.59	8.20	19.53	41.05

TABLE 15 – REFRIGERANT CHARGE IN POUNDS PER 100 FEET OF DISCHARGE LINE

Line Size, OD	Saturated Discharge Temperature, F											
	R-22			R-134a			R-407C			R-410A		
	80	110	140	80	110	140	80	110	140	80	110	140
1/2	0.22	0.33	0.48	0.17	0.27	0.40	0.21	0.33	0.50	0.37	0.56	0.85
5/8	0.35	0.53	0.77	0.27	0.43	0.65	0.34	0.53	0.80	0.58	0.89	1.35
3/4	0.53	0.79	1.15	0.41	0.64	0.97	0.50	0.78	1.19	0.86	1.34	2.02
7/8	0.73	1.10	1.60	0.57	0.89	1.34	0.70	1.09	1.65	1.20	1.85	2.81
1-1/8	1.25	1.87	2.72	0.97	1.52	2.29	1.19	1.86	2.81	2.05	3.16	4.79
1-3/8	1.90	2.85	4.14	1.48	2.31	3.49	1.81	2.83	4.28	3.12	4.82	7.29
1-5/8	2.69	4.04	5.86	2.09	3.28	4.94	2.57	4.01	6.06	4.42	6.82	10.31
2-1/8	4.67	7.02	10.20	3.63	5.70	8.59	4.47	6.97	10.55	7.68	11.86	17.94
2-5/8	7.20	10.83	15.72	5.60	8.79	13.25	6.89	10.74	16.27	11.85	18.29	27.66
3-1/8	10.28	15.45	22.45	8.00	12.54	18.92	9.83	15.34	23.22	16.91	26.10	39.48
3-5/8	13.91	20.90	30.36	10.82	16.96	25.59	13.30	20.74	31.40	22.88	35.32	53.42
4-1/8	18.08	27.17	39.46	14.06	22.05	33.26	17.29	26.96	40.82	29.72	45.89	69.41
5-1/8	28.17	42.34	61.50	21.91	34.37	51.84	26.94	42.02	63.62	46.34	71.54	108.20
6-1/8	40.50	60.87	88.41	31.50	49.40	74.52	38.73	60.41	91.46	66.60	102.82	155.52

Discharge superheat is 105°F for R-22 and R-407C, 85°F for R-134a, and 50°F for R-410A.

TABLE 16 – REFRIGERANT CHARGE IN POUNDS PER 100 FEET OF LIQUID LINE

Line Size, OD	Saturated Discharge Temperature, °F											
	R-22			R-134a			R-407C			R-410A		
	80	110	140	80	110	140	80	110	140	80	110	140
1/2	7.47	7.03	6.50	7.56	7.13	6.64	7.11	6.64	6.11	6.63	6.03	5.19
5/8	12.01	11.29	10.44	12.15	11.46	10.66	11.42	10.67	9.81	10.66	9.68	8.34
3/4	17.93	16.86	15.59	18.14	17.11	15.92	17.05	15.93	14.65	15.91	14.46	12.45
7/8	24.91	23.42	21.66	25.20	23.78	22.11	23.69	22.14	20.35	22.11	20.09	17.30
1-1/8	42.47	39.93	36.93	42.96	40.54	37.70	40.39	37.74	34.70	37.69	34.26	29.49
1-3/8	64.69	60.82	56.24	65.44	61.74	57.42	61.52	57.49	52.85	57.41	52.17	44.92
1-5/8	91.56	86.09	79.61	92.62	87.39	81.28	87.08	81.37	74.81	81.26	73.85	63.58
2-1/8	159.30	149.80	138.50	161.10	152.00	141.40	151.50	141.60	130.10	141.40	128.50	110.60
2-5/8	245.60	231.00	213.60	248.50	234.40	218.00	233.60	218.30	200.70	218.00	198.10	170.60
3-1/8	350.60	329.70	304.80	354.70	334.60	311.20	333.40	311.60	286.40	311.10	282.80	243.50
3-5/8	474.20	445.90	412.30	479.70	452.60	420.90	451.00	421.40	387.40	420.80	382.50	329.30
4-1/8	616.40	579.60	536.00	623.60	588.40	547.20	586.20	547.80	503.60	547.10	497.20	428.10
5-1/8	960.70	903.30	835.30	971.80	917.00	852.80	913.70	853.80	784.90	852.60	774.90	667.20
6-1/8	1381.00	1299.00	1201.00	1397.00	1318.00	1226.00	1313.00	1227.00	1128.00	1226.00	1114.00	959.10