



# RECOMMENDED LINE SIZES R134a

TABLE 1

SUCTION LINE																									LIQUID LINE												
Refrig Duty (KW)	-10°C Sat. Evap. Temp					-5°C Sat. Evap. Temp					0°C Sat. Evap. Temp					+5°C Sat. Evap. Temp					+10°C Sat. Evap. Temp					Receiver to T.X valve					Refrig Duty (KW)						
	Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Equivalent length (m)												
	10	25	30	50	80	10	25	30	50	80	10	25	30	50	80	10	25	30	50	80	10	25	30	50	80	10	25	30	50	80	10	25	30	50	80		
0.5	1/3	1/2	1/2	1/2	5/8	5/8	1/4	1/2	1/2	1/2	1/2	5/8	1/4	3/8	1/2	1/2	1/2	1/2	1/2	1/5	3/8	1/2	1/2	1/2	1/2	1/5	3/8	1/2	1/2	1/2	1/2	1/4	1/4	1/4	3/8	3/8	0.5
1	1/2	1/2	5/8	5/8	3/4	3/4	1/2	1/2	5/8	5/8	5/8	3/4	3/8	1/2	5/8	5/8	5/8	5/8	3/8	3/8	1/2	1/2	5/8	5/8	1/3	3/8	1/2	1/2	5/8	5/8	1/4	1/4	1/4	3/8	3/8	1	
2	1-1/2	5/8	3/4	7/8	7/8	7/8	1	5/8	3/4	3/4	7/8	7/8	3/4	5/8	3/4	3/4	3/4	7/8	3/4	5/8	5/8	5/8	3/4	3/4	1/2	1/2	5/8	5/8	3/4	3/4	3/8	3/8	3/8	3/8	3/8	2	
3	2	3/4	7/8	7/8	1-1/8	1-1/8	1-3/4	3/4	7/8	7/8	7/8	1-1/8	1-1/2	3/4	3/4	3/4	7/8	1-1/8	1	5/8	3/4	3/4	7/8	7/8	1	5/8	3/4	3/4	3/4	7/8	3/8	3/8	3/8	3/8	1/2	3	
4	3-1/2	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3	3/4	7/8	7/8	1-1/8	1-1/8	1-3/4	3/4	7/8	7/8	1-1/8	1-1/8	1-1/2	3/4	7/8	7/8	7/8	1-1/8	1-3/4	5/8	3/4	3/4	7/8	7/8	3/8	3/8	3/8	1/2	1/2	4	
5	4	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3-1/2	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3	3/4	7/8	1-1/8	1-1/8	1-1/8	3	3/4	7/8	7/8	1-1/8	1-1/8	3	3/4	7/8	7/8	1-1/8	1-1/8	3/8	3/8	1/2	1/2	1/2	5	
6	5	7/8	1-1/8	1-1/8	1-3/8	1-3/8	4	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3-1/2	3/4	1-1/8	1-1/8	1-1/8	1-3/8	3-1/2	3/4	7/8	7/8	1-1/8	1-1/8	2-1/4	3/4	7/8	7/8	1-1/8	1-1/8	3/8	1/2	1/2	1/2	1/2	6	
7.5	6	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	5	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	5	7/8	1-1/8	1-1/8	1-3/8	1-3/8	5	7/8	1-1/8	1-1/8	1-1/8	1-3/8	2-3/4	3/4	7/8	1-1/8	1-1/8	1-1/8	3/8	1/2	1/2	1/2	5/8	7.5	
10	7	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	6	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	6	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	6	7/8	1-1/8	1-1/8	1-3/8	1-3/8	3	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1/2	1/2	1/2	5/8	5/8	10	
12.5	7-1/2	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	7-1/2	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7-1/2	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	4	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1/2	1/2	5/8	5/8	5/8	12.5	
15		1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	10	1-1/8	1-3/8	1-3/8	1-5/8	2-1/8	10	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	10	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	4	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1/2	5/8	5/8	5/8	7/8	15	
17.5		1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	7-1/2	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	7-1/2	1-1/8	1-3/8	1-3/8	1-5/8	2-1/8	7-1/2	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7-1/2	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1/2	5/8	5/8	7/8	7/8	17.5	
20		1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	10	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	10	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	7-1/2	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7-1/2	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1/2	5/8	5/8	7/8	7/8	20	
30	30	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	30	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	30	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	30	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	30	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	5/8	7/8	7/8	7/8	7/8	30	
40	40	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	25	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	30	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	5/8	7/8	7/8	7/8	1-1/8	40	
50	50	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	40	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	25	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	7/8	7/8	7/8	7/8	1-1/8	50	
60	60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	50	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	40	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	7/8	7/8	7/8	1-1/8	1-1/8	60	
75		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	50	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	40	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	75
90		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	50	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	40	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	90
105		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	50	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	50	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	105	
120		2-5/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	3-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	3-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	120	
140		3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8		2-1/8	2-5/8	2-5/8	3-1/8	4-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	140	
160		3-1/8	4-1/8	4-1/8	4-1/8			3-1/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	160	
180		3-1/8	4-1/8	4-1/8	4-1/8			3-1/8	4-1/8	4-1/8	4-1/8			2-5/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	180	
200		3-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8			3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	200	
240		4-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8			3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	4-1/8	4-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-5/8	2-1/8	240	
260		4-1/8	4-1/8					4-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8			3-1/8	4-1/8	4-1/8	4-1/8			2-5/8	4-1/8	4-1/8	4-1/8	4-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	260	
280		4-1/8						4-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8			3-1/8	4-1/8	4-1/8	4-1/8	4-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	280	
300		4-1/8						4-1/8	4-1/8					3-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8			3-1/8	4-1/8	4-1/8	4-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	300		

Notes:

- (1) This chart has been based on ASHRAE (1998) for type "L" refrigeration grade copper pipe.
- (2) Lengths are "total equivalent lengths" including valves and fittings. Refer to TABLE - 5 for estimates of "equivalent lengths of some of the more common valves and fittings used in our industry today.
- (3) This chart has been formulated to assist the reader only and does not intend to be a substitute for good pipe work system design and practice.
- (4) Duties are based on 40C cond. temp. Multiply **required duty** by the following factors for other cond. temps : 20C = 0.85, 30C = 0.91, 40C = 1.00, 45C = 1.05, 50C = 1.10.
- (5) Nominal HP's are to assist you to obtain a "rough" unit size at each evaporating temperature (@ 40C condensing temperature). HP's are based on current hermetic units up to 1-3/4 hp, scroll units up to 15 hp and semihermetic units above this point.



# RECOMMENDED LINE SIZES R22 & R417a

TABLE 2

SUCTION LINE																									LIQUID LINE															
Refrig Duty (KW)	-30°C Sat. Evap. Temp										-20°C Sat. Evap. Temp					-5°C Sat. Evap. Temp					+5°C Sat. Evap. Temp					+10°C Sat. Evap. Temp					Receiver to T.X valve						Refrig Duty (KW)			
	Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Equivalent length (m)									
		10	25	30	50	80		10	25	30	50	80		10	25	30	50	80		10	25	30	50	80		10	25	30	50	80	10	25	30	50	80	10		25	30	50
0.5	3/4	1/2	1/2	1/2	5/8	5/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8	1/4	3/8	3/8	3/8	3/8	1/2	1/2	1/5	3/8	3/8	3/8	3/8	1/2	1/2	3/8	3/8	3/8	1/2	1/2	1/4	1/4	1/4	3/8	3/8	0.5		
1	1-1/4	5/8	5/8	5/8	3/4	3/4	1	1/2	5/8	5/8	5/8	3/4	3/4	3/8	1/2	1/2	1/2	5/8	5/8	1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/4	3/8	3/8	1/2	1/2	1/2	3/8	3/8	3/8	3/8	3/8	1		
2	2	3/4	3/4	7/8	7/8	7/8	1-1/2	5/8	3/4	3/4	7/8	7/8	7/8	1	1/2	5/8	5/8	3/4	3/4	5/8	1/2	5/8	5/8	5/8	3/4	3/4	1/2	1/2	5/8	5/8	5/8	5/8	5/8	3/8	3/8	3/8	3/8	3/8	2	
3	3-1/2	7/8	7/8	7/8	1-1/8	1-1/8	3	3/4	7/8	7/8	7/8	7/8	7/8	1-1/2	5/8	3/4	3/4	3/4	7/8	1	1/2	5/8	5/8	3/4	3/4	3/4	3/4	3/4	1/2	5/8	5/8	3/4	3/4	3/4	3/8	3/8	3/8	3/8	1/2	3
4	5	7/8	7/8	1-1/8	1-1/8	1-1/8	3-1/2	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8	2	5/8	3/4	3/4	7/8	7/8	1-1/4	5/8	3/4	3/4	3/4	7/8	1-1/4	5/8	5/8	3/4	3/4	7/8	3/8	3/8	3/8	3/8	1/2	4			
5	6	7/8	1-1/8	1-1/8	1-1/8	1-3/8	4	7/8	7/8	1-1/8	1-1/8	1-3/8	4	7/8	3/4	7/8	7/8	1-1/8	1-3/4	5/8	3/4	3/4	7/8	7/8	1-1/2	5/8	3/4	3/4	7/8	7/8	3/8	3/8	1/2	1/2	1/2	5				
6	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	5	7/8	1-1/8	1-1/8	1-1/8	1-3/8	5	7/8	3/4	7/8	7/8	1-1/8	1-1/8	2	3/4	3/4	7/8	7/8	1-1/8	2	3/4	7/8	7/8	7/8	7/8	3/8	3/8	1/2	1/2	1/2	6			
7.5	10	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	6	7/8	1-1/8	1-1/8	1-3/8	1-3/8	6	7/8	1-1/8	1-1/8	1-1/8	1-1/8	3-1/2	3/4	7/8	7/8	7/8	1-1/8	3	3/4	7/8	7/8	7/8	1-1/8	2	3/4	7/8	7/8	7/8	1-1/8	7.5			
10	13	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	7-1/2	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	3-1/2	3/4	7/8	7/8	1-1/8	1-1/8	4	3/4	7/8	7/8	1-1/8	1-1/8	3	7/8	7/8	1-1/8	1-1/8	1-1/8	10			
12.5		1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	10	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	10	1-1/8	1-3/8	1-3/8	1-3/8	1-3/8	4	7/8	7/8	1-1/8	1-1/8	1-3/8	3	7/8	7/8	1-1/8	1-1/8	1-1/8	1/2	1/2	1/2	5/8	5/8	12.5				
15	15	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	13	1-1/8	1-3/8	1-3/8	1-5/8	2-1/8	13	1-1/8	1-3/8	1-3/8	1-3/8	1-3/8	5	7/8	1-1/8	1-1/8	1-1/8	1-3/8	4	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1/2	1/2	1/2	5/8	5/8	15				
17.5		1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	15	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	15	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	6	7/8	1-1/8	1-1/8	1-3/8	1-3/8	4	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1/2	5/8	5/8	5/8	5/8	17.5				
20	22	1-5/8	1-5/8	2-1/8	2-1/8	2-5/8	20	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	20	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	4-1/2	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1/2	5/8	5/8	5/8	5/8	20				
30	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	1-5/8	2-1/8	2-1/8	2-5/8	30	1-5/8	1-5/8	1-5/8	1-5/8	2-1/8	15	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	7-1/2	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	5/8	5/8	5/8	7/8	7/8	30				
40	40	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	35	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	15	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	10	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	5/8	7/8	7/8	7/8	7/8	40				
50	50	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	50	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	50	2-1/8	2-1/8	2-1/8	2-1/8	2-1/8	20	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	15	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	7/8	7/8	7/8	7/8	7/8	50				
60	60	2-5/8	2-5/8	3-1/8	3-1/8	3-1/8	60	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	60	2-1/8	2-1/8	2-1/8	2-1/8	2-1/8	25	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	20	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	7/8	7/8	7/8	7/8	1-1/8	60				
75		2-5/8	3-1/8	3-1/8	3-1/8	4-1/8		2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	40	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	25	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	7/8	7/8	7/8	1-1/8	1-1/8	75				
90		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	3-1/8	50	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	7/8	7/8	7/8	1-1/8	1-1/8	90				
105		2-5/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	3-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	2-5/8	2-5/8	40	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	105				
120		3-1/8	4-1/8	4-1/8	4-1/8			2-5/8	3-1/8	3-1/8	4-1/8	4-1/8	50	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	50	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	40	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	120				
140		3-1/8	4-1/8	4-1/8	4-1/8			2-5/8	3-1/8	4-1/8	4-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	60	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	50	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	140				
160		3-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	3-1/8		2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	60	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	160				
180		4-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8			2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-1/8	2-5/8	2-5/8	3-1/8	3-1/8		2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	180				
200		4-1/8	4-1/8					3-1/8	4-1/8	4-1/8	4-1/8			2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-1/8	2-5/8	3-1/8	3-1/8	3-1/8		2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	200				
240		4-1/8						3-1/8	4-1/8	4-1/8				2-5/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	3-1/8	4-1/8		2-1/8	2-5/8	2-5/8	3-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	240				
260		4-1/8						4-1/8	4-1/8	4-1/8				2-5/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	260				
280		4-1/8						4-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	280				
300		4-1/8						4-1/8	4-1/8					3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	300				

Notes:

- (1) This chart has been based on ASHRAE (1998) for type "L" refrigeration grade copper pipe.
- (2) Lengths are "total equivalent lengths" including valves and fittings. Refer to TABLE - 5 for estimates of "equivalent lengths of some of the more common valves and fittings used in our industry today.
- (3) This chart has been formulated to assist the reader only and does not intend to be a substitute for good pipe work system design and practice.
- (4) Duties are based on 40C cond. temp. Multiply **required duty** by the following factors for other cond. temps : 20C = 0.85, 30C = 0.91, 40C = 1.00, 45C = 1.05, 50C = 1.10.
- (5) Nominal HP's are to assist you to obtain a "rough" unit size at each evaporating temperature (@ 40C condensing temperature). HP's are based on current hermetic units up to 1-3/4 hp, scroll units up to 15 hp and semihermetic units above this point.



# RECOMMENDED LINE SIZES R404a & R507

TABLE 3

SUCTION LINE																									LIQUID LINE																
Refrig Duty (KW)	-40°C Sat. Evap. Temp						-30°C Sat. Evap. Temp						-20°C Sat. Evap. Temp						-5°C Sat. Evap. Temp						5°C Sat. Evap. Temp						Receiver to T.X valve						Refrig Duty (KW)				
	Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Nom. HP(5)	Equivalent length (m)					Equivalent length (m)										
		10	25	30	50	80		10	25	30	50	80		10	25	30	50	80		10	25	30	50	80		10	25	30	50	80		10	25	30	50	80			10	25	30
0.5	1-1/4	1/2	1/2	1/2	5/8	5/8	3/4	1/2	1/2	1/2	5/8	5/8	1/3	3/8	1/2	1/2	5/8	5/8	1/4	3/8	3/8	3/8	1/2	1/2		3/8	3/8	3/8	3/8	1/2	1/4	1/4	1/4	3/8	3/8	0.5					
1		5/8	5/8	3/4	7/8	7/8	1-1/2	5/8	5/8	5/8	3/4	7/8	3/4	1/2	5/8	5/8	3/4	3/4	3/8	1/2	1/2	1/2	5/8	5/8	1/3	3/8	3/8	1/2	1/2	1/2	3/8	3/8	3/8	3/8	3/8	1					
2	3-1/2	3/4	3/4	7/8	7/8	1-1/8	3	3/4	3/4	7/8	7/8	7/8	1-1/2	5/8	3/4	3/4	7/8	7/8	3/4	5/8	5/8	5/8	3/4	3/4	5/8	1/2	5/8	5/8	5/8	3/4	3/4	3/8	3/8	3/8	3/8	3/8	2				
3	5	7/8	7/8	7/8	1-1/8	1-1/8	4	7/8	7/8	7/8	1-1/8	1-1/8		3/4	7/8	7/8	7/8	1-1/8	1-1/2	5/8	5/8	3/4	3/4	7/8	1-1/4	5/8	5/8	5/8	3/4	3/4	3/8	3/8	3/8	3/8	1/2	3					
4	7-1/2	7/8	7/8	1-1/8	1-1/8	1-3/8	5	7/8	7/8	1-1/8	1-1/8	1-3/8	3	7/8	7/8	7/8	1-1/8	1-1/8		5/8	3/4	3/4	7/8	7/8	1-1/2	5/8	3/4	3/4	3/4	7/8	3/8	3/8	3/8	1/2	1/2	4					
5	10	7/8	1-1/8	1-1/8	1-3/8	1-3/8	6	7/8	1-1/8	1-1/8	1-3/8	1-3/8	3-1/2	7/8	7/8	1-1/8	1-1/8	1-1/8		3/4	3/4	7/8	7/8	1-1/8		5/8	3/4	3/4	7/8	7/8	3/8	1/2	1/2	1/2	5						
6		1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	4	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3	3/4	7/8	7/8	1-1/8	1-1/8	3	3/4	3/4	7/8	7/8	1-1/8	3/8	1/2	1/2	1/2	1/2	6					
7.5	13	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8		1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	6	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	3-1/2	7/8	7/8	1-1/8	1-1/8	1-1/8	3	3/4	7/8	7/8	7/8	1-1/8	3/8	1/2	1/2	1/2	5/8	7.5					
10	15	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	10	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	5	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3-1/2	7/8	7/8	7/8	1-1/8	1-1/8	1/2	1/2	1/2	5/8	5/8	10					
12.5	22	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	13	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	10	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	6	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	5	7/8	7/8	1-1/8	1-1/8	1-3/8	1/2	5/8	5/8	5/8	5/8	12.5					
15	27	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8		1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	13	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	6	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1/2	5/8	5/8	5/8	5/8	15					
17.5	30	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	15	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	15	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8		1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1/2	5/8	5/8	5/8	5/8	17.5					
20	37	1-5/8	1-5/8	2-1/8	2-1/8	2-5/8	22	1-5/8	1-5/8	2-1/8	2-1/8	2-5/8	20	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	10	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7-1/2	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	5/8	5/8	5/8	5/8	7/8	20					
30	45	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	30	1-5/8	1-5/8	2-1/8	2-1/8	2-5/8	15	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	13	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	5/8	5/8	7/8	7/8	7/8	30					
40		2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	37	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	25	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	15	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7/8	7/8	7/8	7/8	1-1/8	40					
50		2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	45	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	40	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	30	1-5/8	1-5/8	2-1/8	2-1/8	2-5/8	20	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	7/8	7/8	7/8	1-1/8	1-1/8	50					
60		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8	50	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	25	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	7/8	7/8	1-1/8	1-1/8	1-1/8	60					
75		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	40	1-5/8	2-1/8	2-5/8	2-5/8	2-5/8	30	1-5/8	1-5/8	2-1/8	2-1/8	2-5/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	75					
90		3-1/8	3-1/8	4-1/8	4-1/8			3-1/8	3-1/8	4-1/8	4-1/8		50	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	35	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	35	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	90					
105		3-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8			60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	40	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	40	1-5/8	2-1/8	2-5/8	2-5/8	2-5/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	105					
120		4-1/8	4-1/8	4-1/8				4-1/8	4-1/8	4-1/8			50	2-1/8	2-5/8	3-1/8	3-1/8	4-1/8	50	2-1/8	2-5/8	3-1/8	3-1/8	3-1/8	50	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	120					
140		4-1/8	4-1/8					4-1/8	4-1/8					2-5/8	2-5/8	3-1/8	3-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	4-1/8		2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	140					
160		4-1/8	4-1/8					4-1/8	4-1/8					2-5/8	3-1/8	3-1/8	3-1/8	4-1/8		2-5/8	3-1/8	3-1/8	3-1/8	4-1/8	60	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	160					
180		4-1/8	4-1/8					4-1/8	4-1/8					2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	4-1/8	4-1/8		2-5/8	2-5/8	3-1/8	3-1/8	3-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	180					
200		4-1/8						4-1/8						3-1/8	4-1/8	4-1/8				3-1/8	3-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	3-1/8	4-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	200					
240								4-1/8	4-1/8	4-1/8				4-1/8	4-1/8	4-1/8				3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		2-5/8	3-1/8	3-1/8	3-1/8	4-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	240					
260								4-1/8	4-1/8					4-1/8	4-1/8					3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		3-1/8	3-1/8	3-1/8	4-1/8	4-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	260					
280								4-1/8	4-1/8					4-1/8	4-1/8					3-1/8	4-1/8	4-1/8	4-1/8	4-1/8		3-1/8	3-1/8	4-1/8	4-1/8	4-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	280					
300								4-1/8						4-1/8	4-1/8	4-1/8	4-1/8				4-1/8	4-1/8	4-1/8	4-1/8		3-1/8	4-1/8	4-1/8	4-1/8	4-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	300					

Notes:

- (1) This chart has been based on ASHRAE (1998) for type "L" refrigeration grade copper pipe.
- (2) Lengths are "total equivalent lengths" including valves and fittings. Refer to TABLE - 5 for estimates of "equivalent lengths of some of the more common valves and fittings used in our industry today."
- (3) This chart has been formulated to assist the reader only and does not intend to be a substitute for good pipe work system design and practice.
- (4) Duties are based on 40°C cond. temp. Multiply **required duty** by the following factors for other cond. temps :- 20°C = 0.85, 30°C = 0.91, 40°C = 1.00, 45°C = 1.05, 50°C = 1.10.
- (5) Nominal HP's are to assist you to obtain a "rough" unit size at each evaporating temperature (@ 40°C condensing temperature). HP's are based on current hermetic units up to 1-3/4 hp, scroll units up to 15 hp and semihermetic units above this point.

## RECOMMENDED REMOTE CONDENSER LINE SIZES

Net Evap Refrig Duty (Kw)	R134a							R22 & R417a						R404a & R507						Net Evap Refrig Duty (Kw)		
	DISCHARGE LINE					DRAIN LINE		DISCHARGE LINE					DRAIN LINE		DISCHARGE LINE						DRAIN LINE	
	Equivalent length (m)					(4)Cond to Rec	(5)Cond to Rec	Equivalent length (m)					(4)Cond to Rec	(5)Cond to Rec	Equivalent length (m)						(4)Cond to Rec	(5)Cond to Rec
	10	25	30	50	80			10	25	30	50	80			10	25	30	50	80			
0.5	3/8	3/8	1/2	1/2	1/2	1/4	1/4	3/8	3/8	3/8	3/8	3/8	1/4	1/4	3/8	3/8	3/8	1/2	1/2	1/4	1/4	0.5
1	3/8	1/2	1/2	1/2	1/2	1/4	3/8	3/8	3/8	3/8	3/8	1/2	3/8	3/8	3/8	1/2	1/2	1/2	1/2	3/8	3/8	1
2	1/2	1/2	1/2	5/8	5/8	3/8	3/8	3/8	1/2	1/2	1/2	1/2	3/8	3/8	3/8	1/2	1/2	5/8	5/8	3/8	3/8	2
3	1/2	5/8	5/8	5/8	3/4	3/8	3/8	1/2	1/2	1/2	5/8	5/8	3/8	3/8	1/2	5/8	5/8	5/8	3/4	3/8	3/8	3
4	1/2	5/8	5/8	3/4	3/4	3/8	3/8	1/2	1/2	5/8	5/8	5/8	3/8	3/8	1/2	5/8	5/8	3/4	3/4	3/8	1/2	4
5	5/8	5/8	3/4	3/4	7/8	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/8	3/8	5/8	5/8	5/8	3/4	7/8	1/2	5/8	5
6	5/8	3/4	3/4	7/8	7/8	1/2	1/2	1/2	5/8	5/8	3/4	3/4	1/2	3/8	5/8	3/4	3/4	3/4	7/8	1/2	5/8	6
7.5	5/8	3/4	3/4	7/8	7/8	1/2	1/2	5/8	3/4	3/4	3/4	7/8	1/2	1/2	5/8	3/4	3/4	7/8	7/8	1/2	5/8	7.5
10	3/4	7/8	7/8	7/8	1-1/8	5/8	5/8	5/8	3/4	3/4	7/8	7/8	1/2	5/8	3/4	7/8	7/8	7/8	1-1/8	5/8	5/8	10
12.5	3/4	7/8	7/8	1-1/8	1-1/8	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	5/8	5/8	3/4	7/8	7/8	1-1/8	1-1/8	5/8	3/4	12.5
15	7/8	7/8	1-1/8	1-1/8	1-1/8	5/8	3/4	3/4	7/8	7/8	7/8	1-1/8	5/8	3/4	3/4	7/8	1-1/8	1-1/8	1-1/8	3/4	7/8	15
17.5	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3/4	7/8	3/4	7/8	7/8	1-1/8	1-1/8	5/8	3/4	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3/4	7/8	17.5
20	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3/4	7/8	3/4	7/8	7/8	1-1/8	1-1/8	5/8	3/4	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3/4	7/8	20
30	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	7/8	1-1/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	3/4	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	7/8	1-1/8	30
40	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7/8	1-3/8	40
50	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	7/8	1-3/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	2-1/8	1-1/8	1-3/8	50
60	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-1/8	1-3/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	7/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	1-1/8	1-5/8	60
75	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-1/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-1/8	1-5/8	75
90	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-1/8	1-5/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-1/8	1-5/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	1-3/8	1-5/8	90
105	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-3/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-3/8	2-1/8	105
120	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-3/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	1-3/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-3/8	2-1/8	120
140	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	1-3/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-3/8	2-1/8	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	1-3/8	2-1/8	140
160	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	1-3/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-3/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	1-5/8	2-5/8	160
180	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1-3/8	2-5/8	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	1-3/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	1-5/8	2-5/8	180
200	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1-5/8	2-5/8	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	1-3/8	2-5/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1-5/8	3-1/8	200
240	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	1-5/8	2-5/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	1-3/8	2-5/8	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	1-5/8	3-1/8	240
260	2-1/8	2-5/8	2-5/8	3-1/8	4-1/8	1-5/8	3-1/8	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8	1-5/8	2-5/8	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	1-5/8	3-1/8	260
280	2-1/8	2-5/8	2-5/8	3-1/8	4-1/8	1-5/8	3-1/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1-5/8	3-1/8	2-1/8	2-5/8	2-5/8	3-1/8	4-1/8	2-1/8	3-1/8	280
300	2-5/8	2-5/8	3-1/8	3-1/8	4-1/8	1-5/8	3-1/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1-5/8	3-1/8	2-1/8	2-5/8	3-1/8	3-1/8	4-1/8	2-1/8	3-1/8	300

**Notes:**

- (1) This chart has been based on ASHRAE (1998) for type "L" refrigeration grade copper pipe.
- (2) Lengths are "total equivalent lengths" including valves and fittings. Refer to TABLE - 5 for estimates of "equivalent lengths of some of the more common valves and fittings used in our industry today.
- (3) This chart has been formulated to assist the reader only and does is not intended to be a substitute for good pipe work system design and practice.
- (4) Use these sizes for condenser to receiver drain lines when additional gas balance lines are installed (to avoid "liquid hang-up" in the condenser). These are based on 0.02K/m of pipe run.
- (5) Use these sizes for condenser to receiver drain lines which are "self venting" (no additional gas balance line req'd).

**EQUIVALENT PIPE LENGTHS for VALVES and FITTINGS (m)**

Valves / Fittings	PIPE SIZE (Inch)													
	1/4	3/8	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
<b>VALVES</b>														
Ball Valve	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.6	0.8		
Rotolock Valve	1.3	1.5	2.6	3.3	3.7	4.5	5.6	6.7	7.8	10.4	12.6	15.6		
Angle Receiver Valve	1.1	1.2	2.1	2.7	3.1	3.7	4.6	5.5	6.4	8.5	10.4	12.8	14.9	17.4
Flanged Service Valve		2.3	4.0	4.6	5.7	6.9	8.6	10.3	12.0	16.0	19.4	24.0	28.0	32.6
Angle Check		1.9	1.4	1.4	3.4	7.0	9.4	24.4	51.6					
<b>FITTINGS (Copper sweat)</b>														
45° Elbow	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.4	1.7
90° Elbow	0.2	0.2	0.3	0.6	0.7	0.8	0.9	1.2	1.4	1.5	2.1	2.4	3.1	3.7
180° Return Bend	0.4	0.5	0.6	0.8	1.1	1.2	1.5	1.8	2.1	3.4	4.0	4.9	5.5	6.4
Tee (from side branch)	0.5	0.6	0.9	1.2	1.4	1.5	1.8	2.4	2.7	3.7	4.3	5.2	6.1	6.7
"P" trap	0.6	0.7	0.9	1.4	1.7	2.0	2.4	3.1	3.5	4.9	6.1	7.3	8.5	10.1
<b>CHANGING FITTINGS (Reducers) (eg; 1/2" to 3/8" [one size] or 1-3/8"to 7/8 [two sizes])</b>														
One size change		0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8
Two size changes			0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.9	0.9
Three size changes				0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.9	0.9	1.0

**Notes:**

1. This chart has been produced to assist refrigeration pipe system design using the "equivalent pipe length" method. Add the total equivalent length for each fitting to each particular line type and then combine with line lengths and enter in at the applicable point on the "Recommended Line Sizes" chart.

**COMPENSATION REQUIRED (By Subcooling) FOR VERTICAL LIFT IN LIQUID LINES.**
**Deg K @ LIFT SHOWN.**

Liquid Temperature	R134a		R22 & R417a		R404a & R507	
	Vertical lift		Vertical lift		Vertical lift	
	3 mtrs	6 mtrs	3 mtrs	6 mtrs	3 mtrs	6 mtrs
20° C	2.0	3.9	1.4	2.7	1.2	2.3
30° C	1.6	3.1	1.1	2.2	0.9	1.9
40° C	1.3	2.5	0.9	1.8	0.8	1.6
50° C	1.0	2.1	0.8	1.5	0.7	1.5
60° C	0.9	1.8	0.7	1.3	0.6	1.1

**Notes :**

- 1) This chart is to assist in allowance for vertical lift in liquid line runs. Figures show the degree of subcooling required (K) in order to compensate for the effect of the vertical lift. (Compensation can be achieved thru the installation of a suction to liquid line heat exchanger).
- 2) For lifts other than listed proportion figures accordingly.
- 3) Figures are "net effects", meaning a net loss thru vertical rise may be offset by a net gain thru vertical fall in liquid line.

**TABLE 7**
**REFRIGERANT PIPE CAPACITIES. (Kg / m)**

	Temp. °C	PIPE SIZE (Inch)														
		1/4	3/8	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	
<b>R134a</b>	<b>SUCTION</b>	-10°	0.0002	0.0005	0.0010	0.0016	0.0024	0.0032	0.0055	0.0084	0.0119	0.0208	0.0320	0.0457	0.0618	0.0804
		-5°	0.0002	0.0006	0.0012	0.0019	0.0028	0.0038	0.0064	0.0098	0.0138	0.0241	0.0371	0.0530	0.0717	0.0932
		0°	0.0003	0.0007	0.0014	0.0023	0.0034	0.0045	0.0077	0.0117	0.0166	0.0288	0.0444	0.0634	0.0857	0.1114
		5°	0.0003	0.0009	0.0017	0.0027	0.0040	0.0053	0.0091	0.0139	0.0196	0.0342	0.0527	0.0752	0.1017	0.1322
		10°	0.0004	0.0010	0.0020	0.0032	0.0047	0.0063	0.0108	0.0164	0.0232	0.0404	0.0622	0.0888	0.1201	0.1562
	<b>DISCH.</b>	60°	0.0017	0.0045	0.0087	0.0136	0.0205	0.0273	0.0465	0.0708	0.1002	0.1743	0.2688	0.3837	0.5190	0.6746
<b>LIQUID</b>	35°	0.0223	0.0602	0.1167	0.1822	0.2735	0.3648	0.6215	0.9463	1.3405	2.3309	3.5944	5.1306	6.9393	9.0207	
<b>R22 &amp; R417a</b>	<b>SUCTION</b>	-40°	0.0001	0.0003	0.0005	0.0008	0.0011	0.0015	0.0026	0.0039	0.0056	0.0097	0.0150	0.0214	0.0290	0.0376
		-30°	0.0001	0.0004	0.0007	0.0012	0.0017	0.0023	0.0039	0.0060	0.0085	0.0147	0.0227	0.0324	0.0439	0.0570
		-20°	0.0002	0.0006	0.0011	0.0017	0.0025	0.0034	0.0057	0.0088	0.0124	0.0216	0.0332	0.0475	0.0642	0.0834
		-5°	0.0003	0.0009	0.0018	0.0028	0.0043	0.0057	0.0097	0.0147	0.0209	0.0363	0.0560	0.0799	0.1081	0.1405
		5°	0.0005	0.0013	0.0025	0.0039	0.0059	0.0078	0.0133	0.0203	0.0287	0.0499	0.0770	0.1099	0.1486	0.1932
	<b>DISCH.</b>	60°	0.0021	0.0058	0.0112	0.0174	0.0262	0.0349	0.0595	0.0906	0.1283	0.2231	0.3440	0.4911	0.6642	0.8634
<b>LIQUID</b>	35°	0.0220	0.0593	0.1149	0.1795	0.2694	0.3593	0.6123	0.9322	1.3205	2.2962	3.5410	5.0543	6.8362	8.8866	
<b>R404a &amp; R507</b>	<b>SUCTION</b>	-40°	0.0001	0.0004	0.0007	0.0011	0.0016	0.0022	0.0037	0.0056	0.0079	0.0138	0.0212	0.0303	0.0410	0.0532
		-30°	0.0002	0.0006	0.0011	0.0017	0.0026	0.0034	0.0058	0.0088	0.0125	0.0218	0.0336	0.0479	0.0648	0.0842
		-20°	0.0003	0.0008	0.0015	0.0024	0.0036	0.0048	0.0082	0.0125	0.0177	0.0308	0.0474	0.0680	0.0915	0.1190
		-5°	0.0005	0.0013	0.0026	0.0040	0.0060	0.0080	0.0137	0.0208	0.0294	0.0512	0.0790	0.1127	0.1524	0.1981
		5°	0.0007	0.0018	0.0036	0.0056	0.0084	0.0112	0.0190	0.0289	0.0410	0.0713	0.1100	0.1570	0.2123	0.2760
	<b>DISCH.</b>	60°	0.0037	0.0101	0.0196	0.0305	0.0458	0.0612	0.1042	0.1586	0.2247	0.3908	0.6026	0.8602	1.1634	1.5123
<b>LIQUID</b>	35°	0.0190	0.0515	0.0997	0.1557	0.2337	0.3117	0.5311	0.8086	1.1455	1.9918	3.0716	4.3843	5.9299	7.7085	

**CORRECTION FACTORS FOR LIQUID & DISCHARGE LINES**
**TABLE 8**

	DISCHARGE GAS TEMPERATURE (°C)							LIQUID TEMPERATURE (°C)						
	30°	35°	40°	45°	50°	65°	70°	20°	25°	30°	40°	45°	50°	55°
<b>R134a</b>	0.43	0.50	0.57	0.66	0.76	1.15	1.32	1.05	1.03	1.02	0.98	0.96	0.94	0.92
<b>R22 &amp; R417a</b>	0.45	0.52	0.59	0.68	0.77	1.14	1.31	1.05	1.04	1.02	0.98	0.96	0.94	0.92
<b>R404a &amp; R507</b>	0.38	0.44	0.51	0.60	0.70	1.21	1.89	1.07	1.04	1.02	0.97	0.94	0.90	0.86

**Note:**

1. Use these charts to estimate system refrigerant charge by adding these pipe holding capacities to the estimated holding capacities of all evaporator(s) & condenser(s) in the system.