

Engineering Recommendation on:  
**REFRIGERANT LINE SIZES FOR REMOTE SYSTEMS**  
**(R12, R22, R502, R134a, and R404A**  
**Commercial Refrigeration)**

No. ER-8  
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In the selection of gas line sizes, the design engineer should be guided by the following criteria:

1. Assurance of adequate velocity thus insuring oil return capability. (The tube size must be limited to maintain velocities no lesser than 750 fpm for horizontal and down flow and no lesser than 1500 fpm for up flow.)
2. Assurance of acceptable pressure drop. (The tube size should be limited to maintain velocities no greater than 1500 fpm for horizontal and down flow and no greater than 2500 fpm for up flow.)
3. Assurance of satisfactory sound level. (The tube size should be limited to maintain velocities no greater than 3000 fpm.)
4. Assurance of minimum tubing cost. (The tube size should be as small as possible while satisfying the three points mentioned above.)

In an attempt to aid the engineer on this subject, we have prepared ready reference tables of suggested line sizes. These sizes have been selected in accordance with the above outlined rules.

These tables show recommended suction line sizes for installations where that line is horizontal or down flow. In the event the suction line is up flow, use "one standard size" smaller.

EXAMPLE: Where a 7/8" diameter tube is recommended on the table for horizontal or down flow, the recommended size for up flow would be 3/4" diameter.

(Continued)

**Table I - R12**

Cond Unit	Suction Line Sizes					Liquid Line Sizes
	Capacity At System Evaporator Design Temperature					
BTU/Hr.	-40° F	-20° F	0° F	+20° F	+40° F	
1,200	5/8	1/2	3/8	3/8	3/8	1/4
2,400	3/4	5/8	1/2	1/2	3/8	1/4
3,600	7/8	3/4	5/8	1/2	1/2	1/4
4,800	1 1/8	7/8	5/8	5/8	1/2	1/4
6,000	1 1/8	7/8	3/4	5/8	1/2	1/4
7,200	1 1/8	1 1/8	7/8	3/4	5/8	1/4
8,400	1 3/8	1 1/8	7/8	3/4	5/8	3/8
9,600	1 5/8	1 1/8	7/8	3/4	5/8	3/8
10,800	1 5/8	1 1/8	1 1/8	7/8	5/8	3/8
12,000	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
18,000	2 1/8	1 5/8	1 1/8	1 1/8	7/8	3/8
24,000	2 5/8	2 1/8	1 3/8	1 1/8	1 1/8	1/2
36,000	3 1/8	2 1/8	1 5/8	1 3/8	1 1/8	1/2
48,000	3 5/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2
60,000	3 5/8	2 5/8	2 5/8	1 5/8	1 3/8	1/2
72,000	4 1/8	3 1/8	2 5/8	2 1/8	1 5/8	1/2

**Table II R22**

Cond Unit Capacity At System Evaporator Design Temperature BTU/Hr.	Suction Line Sizes					Liquid Line Sizes
	-40° F	-20° F	0° F	+20° F	+40° F	
1,200	-----	3/8	3/8	3/8	3/8	1/4
2,400	-----	1/2	1/2	3/8	3/8	1/4
3,600	-----	5/8	1/2	1/2	3/8	1/4
4,800	-----	3/4	5/8	1/2	3/8	1/4
6,000	-----	3/4	5/8	1/2	1/2	1/4
7,200	-----	7/8	3/4	5/8	1/2	1/4
8,400	-----	7/8	3/4	5/8	1/2	1/4
9,600	-----	1 1/8	3/4	5/8	5/8	1/4
10,800	-----	1 1/8	7/8	3/4	5/8	3/8
12,000	-----	1 1/8	7/8	3/4	5/8	3/8
18,000	-----	1 3/8	1 1/8	7/8	3/4	3/8
24,000	-----	1 3/8	1 1/8	1 1/8	7/8	3/8
36,000	-----	1 5/8	1 3/8	1 3/8	1 1/8	1/2
48,000	-----	2 1/8	1 5/8	1 3/8	1 1/8	1/2
60,000	-----	2 1/8	2 1/8	1 5/8	1 3/8	1/2
72,000	-----	2 5/8	2 1/8	1 5/8	1 3/8	1/2

**Table III R502**

<b>Cond Unit</b>	<b>Suction Line Sizes</b>					<b>Liquid Line Sizes</b>
<b>Capacity At System Evaporator Design Temperature</b>						
<b>BTU/Hr.</b>	<b>-40° F</b>	<b>-20° F</b>	<b>0° F</b>	<b>+20° F</b>	<b>+40° F</b>	
1,200	1/2	3/8	3/8	3/8	3/8	1/4
2,400	5/8	1/2	1/2	3/8	3/8	1/4
3,600	3/4	5/8	5/8	1/2	3/8	1/4
4,800	7/8	3/4	5/8	1/2	1/2	1/4
6,000	1 1/8	7/8	3/4	5/8	1/2	1/4
7,200	1 1/8	7/8	3/4	5/8	1/2	1/4
8,400	1 1/8	7/8	7/8	5/8	1/2	1/4
9,600	1 1/8	1 1/8	7/8	3/4	5/8	1/4
10,800	1 3/8	1 1/8	7/8	3/4	5/8	3/8
12,000	1 3/8	1 1/8	7/8	3/4	5/8	3/8
18,000	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
24,000	2 1/8	1 5/8	1 3/8	1 1/8	7/8	3/8
36,000	2 5/8	2 1/8	1 5/8	1 3/8	1 1/8	1/2
48,000	2 5/8	2 1/8	1 5/8	1 3/8	1 1/8	1/2
60,000	3 1/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2
72,000	3 5/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2

**Table IV R134a**

Cond Unit	Suction Line Sizes					Liquid Line Sizes
	Capacity At System Evaporator Design Temperature					
BTU/Hr.	-40° F	-20° F	0° F	+20° F	+40° F	
1,200	5/8	1/2	3/8	3/8	3/8	1/4
2,400	3/4	5/8	1/2	1/2	3/8	1/4
3,600	7/8	3/4	5/8	1/2	1/2	1/4
4,800	1 1/8	7/8	3/4	5/8	1/2	1/4
6,000	1 1/8	7/8	3/4	5/8	1/2	1/4
7,200	1 3/8	1 1/8	7/8	3/4	5/8	1/4
8,400	1 3/8	1 1/8	7/8	3/4	5/8	3/8
9,600	1 5/8	1 1/8	7/8	3/4	5/8	3/8
10,800	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
12,000	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
18,000	2 1/8	1 5/8	1 3/8	1 1/8	7/8	3/8
24,000	2 5/8	2 1/8	1 3/8	1 3/8	1 1/8	1/2
36,000	3 1/8	2 1/8	2 1/8	1 3/8	1 1/8	1/2
48,000	3 5/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2
60,000	3 5/8	3 1/8	2 5/8	2 1/8	1 5/8	1/2
72,000	4 1/8	3 1/8	2 5/8	2 1/8	1 5/8	1/2

**Table V R404A**

Cond Unit	Suction Line Sizes					Liquid Line Sizes
	Capacity At System Evaporator Design Temperature					
BTU/Hr.	-40° F	-20° F	0° F	+20° F	+40° F	
1,200	1/2	3/8	3/8	3/8	3/8	1/4
2,400	5/8	1/2	1/2	3/8	3/8	1/4
3,600	3/4	5/8	1/2	1/2	3/8	1/4
4,800	7/8	3/4	5/8	1/2	1/2	1/4
6,000	1 1/8	7/8	3/4	5/8	1/2	1/4
7,200	1 1/8	7/8	3/4	5/8	1/2	1/4
8,400	1 1/8	7/8	3/4	5/8	1/2	1/4
9,600	1 3/8	1 1/8	7/8	3/4	5/8	1/4
10,800	1 3/8	1 1/8	7/8	3/4	5/8	3/8
12,000	1 3/8	1 1/8	7/8	3/4	5/8	3/8
18,000	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
24,000	2 1/8	1 5/8	1 3/8	1 1/8	7/8	1/2
36,000	2 5/8	2 1/8	1 5/8	1 3/8	1 1/8	1/2
48,000	2 5/8	2 1/8	2 1/8	1 5/8	1 1/8	1/2
60,000	3 1/8	2 5/8	2 1/8	1 5/8	1 3/8	5/8
72,000	3 5/8	2 5/8	2 5/8	2 1/8	1 5/8	5/8