



For more free Tecumseh literature please visit

www.HVACRinfo.com

5

INSTALLATION AND REPLACEMENT INFORMATION

I.	Compressor Tube Connections	86
II.	Refrigerant Line Sizes	88
III.	Refrigerant Line Pressure Drops	93
IV.	Refrigerant Line Velocities	98
V.	Service Valves	103
VI.	Processing the System	103
VII.	System Cleanup and Compressor Replacement After Compressor Failure.	104
VIII.	Replacing Compressors in Water- Utilizing Systems: Preventing Explosions.	108

I. Compressor Tube Connections

Tecumseh Products Company supplies compressors to hundreds of manufacturers requiring different tubing sizes and arrangements. Because of this the same compressor model may be found in the field in many suction and discharge tube variations, each depending upon the specific application in which it is installed.

Suction connections can usually be identified as the largest diameter stub tube in the housing. If 2 stubs have the same outer diameter (OD), then the one with the heavier wall will be the suction connection. If both of the largest stub tubes are the same OD and wall thickness, then either can be used as the suction connection. Whenever possible, suction connections should be kept away from the hermetic terminal area so that condensation will not drip on hermetic terminals, causing corrosion.

The stub tube, not chosen for the suction connection, may be used for processing the system.

Identification of compressor connections can usually be accomplished without difficulty; however, occasionally some question arises concerning oil cooler tubes and process tubes.

Oil cooler tubes are found only in low temperature refrigeration models. These tubes connect to a coil or hairpin bend within the compressor oil sump. This coil or hairpin bend is not open inside the compressor and its only function is to cool the compressor sump oil. The oil cooler tubes are most generally connected to a separated tubing circuit in the air cooled condenser.

Process tubes are installed in compressor housings during manufacture as an aid in factory dehydration and charging.

Standard discharge tubing arrangements for Tecumseh hermetic compressors are outlined below. Discharge tubes are generally in the same position within any model family. Suction and process tube positions may vary substantially.

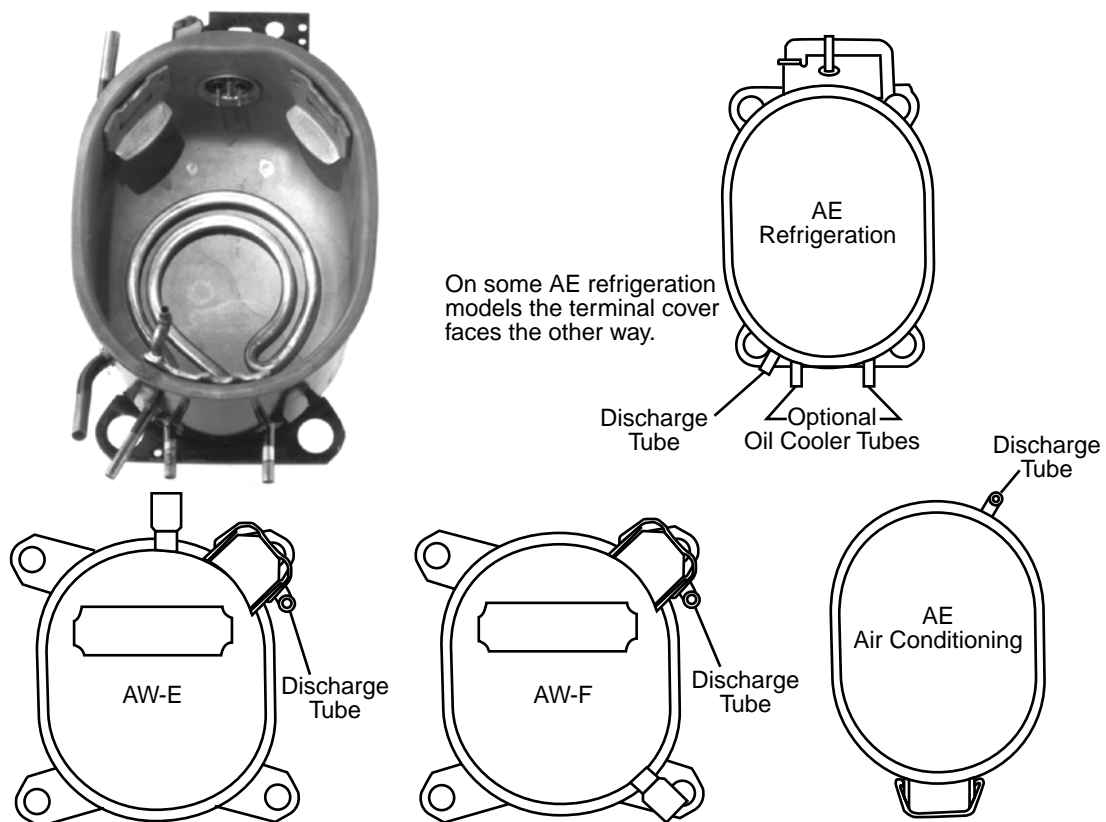


Figure 5-1. Standard discharge tubing arrangements.

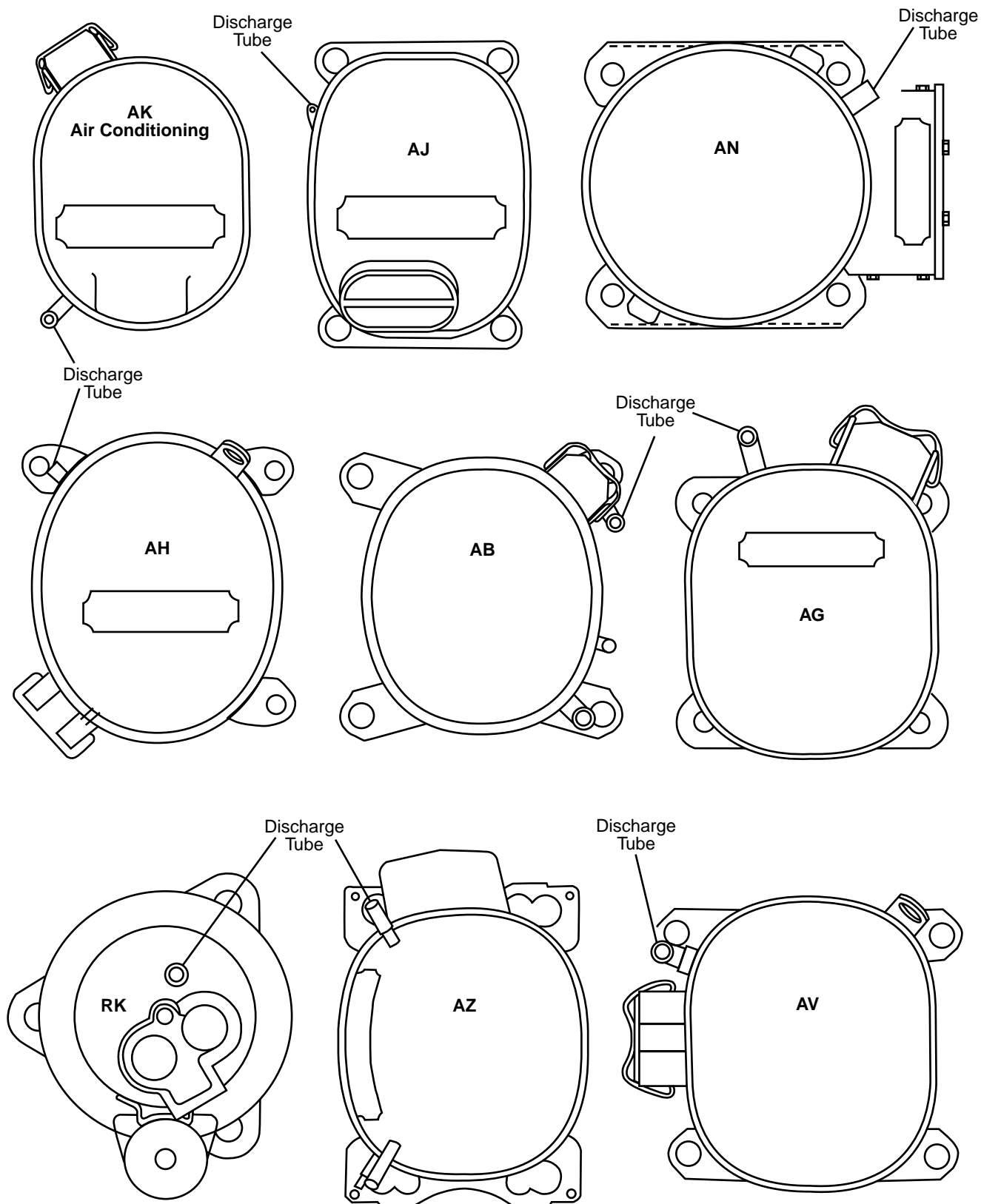


Figure 5-1. Standard discharge tubing arrangements - continued.

II. Refrigerant Line Sizes

A. R-12 and R-22 Refrigerant Line Sizes for Remote Systems Commercial Refrigeration

The recommended suction line sizes are based primarily on the velocities necessary for good oil return. In most instances, the resulting pressure drop will be acceptable for suction lines up to 100' in length.

Refer to these installation considerations for good oil return on commercial systems:

- Slope horizontal suction line downwards in the direction of the compressor at least 1/2" fall per 10 feet of line.
- The setting of the refrigerant control device (expansion valve) should maintain a minimum of superheat. This is typical of the usual direct expansion evaporators where the oil is returned by refrigerant vapor.
- In the case of a flooded type evaporator (bottom feed, top suction header, large internal volume, low refrigerant/oil velocities), it is necessary to maintain a liquid spillover into the suction line so as to return the oil with the liquid refrigerant and to minimize oil trapping in the evaporator. If because of the spillover, the

return gas is "wet" at the compressor, a suction line accumulator should be installed adjacent to the compressor.

- On systems with evaporators below -10°F, the oil/refrigerant mixture reaches a maximum viscosity when the refrigerant superheat is about 30°F on R-22 and R-502 and when about 45°F to 60°F superheat on R-12 systems. Oil may return sluggishly in such cases because of the high viscosity. Two solutions should be considered:
 - a. Reduce superheat.
 - b. Add a liquid to suction gas heat exchanger close to the evaporator but outside the refrigerated space.
- On multiple evaporator systems, prevent the oil (and refrigerant) from collecting in an idle coil. If the evaporator coils are to operate independently of each other, each should have its own suction riser sized to the coil's capacity.
- Insulate suction lines.

Tables 5-1 and 5-2 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 that table for horizontal or down flow, the recommended size for up flow would be 3/4" diameter.



Table 5-1: R-12 Refrigerant Line Sizes for Remote Systems Commercial Refrigeration

Cond. Unit CAPACITY (BTU/Hr.)	SUCTION LINE SIZES AT SYSTEM EVAPORATOR DESIGN TEMPERATURE					Liquid Line Size
	-40°F	-20°F	0°F	+20°F	+40°F	
1200	5/8	1/2	3/8	3/8	3/8	1/4
2400	3/4	5/8	1/2	1/2	3/8	1/4
3600	7/8	3/4	5/8	1/2	1/2	1/4
4800	1 1/8	7/8	5/8	5/8	1/2	1/4
6000	1 1/8	7/8	3/4	5/8	1/2	1/4
7200	1 1/8	1 1/8	7/8	3/4	5/8	1/4
8400	1 3/8	1 1/8	7/8	3/4	5/8	3/8
9600	1 5/8	1 1/8	7/8	3/4	5/8	3/8
10800	1 5/8	1 1/8	1 1/8	7/8	5/8	3/8
12000	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
18000	2 1/8	1 5/8	1 1/8	1 1/8	7/8	3/8
24000	2 5/8	2 1/8	1 3/8	1 1/8	1 1/8	1/2
36000	3 1/8	2 1/8	1 5/8	1 3/8	1 1/8	1/2
48000	3 5/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2
60000	3 5/8	2 5/8	2 5/8	1 5/8	1 3/8	1/2
72000	4 1/8	3 1/8	2 5/8	2 1/8	1 5/8	1/2

Table 5-2: R-22 Refrigerant Line Sizes for Remote Systems Commercial Refrigeration

Cond. Unit CAPACITY (BTU/Hr.)	SUCTION LINE SIZES AT SYSTEM EVAPORATOR DESIGN TEMPERATURE					Liquid Line Size
	-40°F	-20°F	0°F	+20°F	+40°F	
1200		3/8	3/8	3/8	3/8	1/4
2400		1/2	1/2	3/8	3/8	1/4
3600		5/8	1/2	1/2	3/8	1/4
4800		3/4	5/8	1/2	3/8	1/4
6000		3/4	5/8	1/2	1/2	1/4
7200		7/8	3/4	5/8	1/2	1/4
8400		7/8	3/4	5/8	1/2	1/4
9600		1 1/8	3/4	5/8	5/8	1/4
10800		1 1/8	7/8	3/4	5/8	3/8
12000		1 1/8	7/8	3/4	5/8	3/8
18000		1 3/8	1 1/8	7/8	3/4	3/8
24000		1 3/8	1 1/8	1 1/8	7/8	3/8
36000		1 5/8	1 3/8	1 3/8	1 1/8	1/2
48000		2 1/8	1 5/8	1 3/8	1 1/8	1/2
60000		2 1/8	2 1/8	1 5/8	1 3/8	1/2
72000		2 5/8	2 1/8	1 5/8	1 3/8	1/2

B. R-22 Refrigerant Line Sizes for Remote Systems Air Conditioning and Heat Pumps

Condensers and evaporators should be designed and circuited to maintain adequate velocity to prevent oil trapping.

The tube sizes suggested below are for connecting lines of remote systems. The basis for selection is to maintain adequate velocity which assures oil return to the compressor, an acceptable pressure drop to assure compressor capacity and minimum tubing cost.

To assure adequate oil return, suction line velocities should be minimum of 750 fpm for horizontal or down flow and 1500 fpm for up flow. Gas velocities of 3000 fpm or more will create noise problems and should be avoided.

Where a choice of line sizes is possible because of the overlap in the compressor capacity table, the larger sized lines are suggested to minimize the system pressure drop.

Consider these installation notes:

- Suction line sizes (up flow) provide adequate gas velocities to assure oil return to the compressor and, therefore, remain constant in size regardless of the vertical lift. Suction line traps are not required. Horizontal suction lines are sized larger to reduce pressure drop.
- Suction line lengths in excess of 100' are not recommended.
- On heat pump systems, the lines serving as both a discharge line and suction line, should be sized as a suction line.
- Liquid line sizes are based on pressure drops that will not permit gas formation for horizontal lengths up to 100'.

The recommendations shown in Table 5-3 are based on the use of standard refrigeration grade tubing and do not include considerations for additional pressure drop due to elbows, valves, or reduced joint sizes.

Table 5-3: R-22 Refrigerant Line Sizes for Remote Systems Air Conditioning and Heat Pumps

Nominal Compressor Cooling Capacity (BTU/Hr.)		SUCTION LINE OUTER DIAMETER					
		Vertical Up Flow	Vertical Down Flow or Horizontal	Liquid Line Outer Diameter	Discharge Line Length & Outer Diameter		
1500 FPM	2500 FPM					25'	50'
5700	9400	3/8	1/2	1/4	5/16	5/16	3/8
8000	13000	1/2	1/2	1/4	5/16	3/8	3/8
11200	18500	1/2	5/8	5/16	3/8	3/8	1/2
17000	30000	5/8	3/4	5/16	3/8	1/2	1/2
27000	44000	3/4	7/8	3/8	3/8	1/2	5/8
38000	51000	7/8	1 1/8	3/8	1/2	5/8	5/8
38000	67000	7/8	1 1/8	1/2	1/2	5/8	5/8
60000	102000	1 1/8	1 3/8	1/2	5/8	3/4	3/4
96000	156000	1 3/8	1 5/8	5/8	3/4	3/4	7/8
144000	228000	1 5/8	2 1/8	5/8	3/4	7/8	1 1/8



C. R-502 and R-134a Refrigerant Line Sizes for Remote Systems Commercial Refrigeration

The selection of suction gas line sizes should be guided by the following criteria:

- **Assurance of adequate velocity thus insuring oil return capability.** (The tube size must be limited to maintain velocities no less than 750 fpm for horizontal and down flow and no less than 1500 fpm for up flow.)
- **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.

- **Assurance of satisfactory sound level.** (The tube size should be limited to maintain velocities no greater than 3000 fpm.)
- **Assurance of minimum tubing cost.** (The tube size should be as small as possible while satisfying the three points mentioned above.)

Tables 5-4 and 5-5 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 that table for horizontal or down flow, the recommended size for up flow would be 3/4” diameter.

Table 5-4: R-502 Refrigerant Line Sizes for Remote Systems Commercial Refrigeration

Cond. Unit CAPACITY BTU/HR.	SUCTION LINE SIZES AT SYSTEMS EVAPORATOR DESIGN TEMPERATURE					Liquid Line Size
	-40°F	-20°F	0°F	+20°F	+40°F	
1200	1/2	3/8	3/8	3/8	3/8	1/4
2400	5/8	1/2	1/2	3/8	3/8	1/4
3600	3/4	5/8	1/2	1/2	3/8	1/4
4800	7/8	3/4	5/8	1/2	1/2	1/4
6000	1 1/8	7/8	5/8	5/8	1/2	1/4
7200	1 1/8	7/8	3/4	5/8	1/2	1/4
8400	1 1/8	7/8	3/4	5/8	1/2	1/4
9600	1 1/8	1 1/8	7/8	3/4	5/8	1/4
10800	1 3/8	1 1/8	7/8	3/4	5/8	3/8
12000	1 3/8	1 1/8	7/8	3/4	5/8	3/8
18000	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
24000	2 1/8	1 5/8	1 3/8	1 1/8	7/8	3/8
36000	2 5/8	2 1/8	1 5/8	1 3/8	1 1/8	1/2
48000	2 5/8	2 1/8	1 5/8	1 3/8	1 1/8	1/2
60000	3 1/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2
72000	3 5/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2

Table 5-5: R-134a Refrigerant Line Sizes for Remote Systems Commercial Refrigeration

Cond. Unit CAPACITY (BTU/Hr.)	SUCTION LINE SIZES AT SYSTEMS EVAPORATOR DESIGN TEMPERATURE					Liquid Line Size
	-40°F	-20°F	0°F	+20°F	+40°F	
1200	5/8	1/2	3/8	3/8	3/8	1/4
2400	3/4	5/8	1/2	1/2	3/8	1/4
3600	7/8	3/4	5/8	1/2	1/2	1/4
4800	1 1/8	7/8	3/4	5/8	1/2	1/4
6000	1 1/8	7/8	3/4	5/8	1/2	1/4
7200	1 3/8	1 1/8	7/8	3/4	5/8	1/4
8400	1 3/8	1 1/8	7/8	3/4	5/8	3/8
9600	1 5/8	1 1/8	7/8	3/4	5/8	3/8
10800	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
12000	1 5/8	1 3/8	1 1/8	7/8	3/4	3/8
18000	2 1/8	1 5/8	1 3/8	1 1/8	7/8	3/8
24000	2 5/8	2 1/8	1 3/8	1 3/8	1 1/8	1/2
36000	3 1/8	2 1/8	2 1/8	1 3/8	1 1/8	1/2
48000	3 5/8	2 5/8	2 1/8	1 5/8	1 3/8	1/2
60000	3 5/8	3 1/8	2 5/8	2 1/8	1 5/8	1/2
72000	4 1/8	3 1/8	2 5/8	2 1/8	1 5/8	1/2



III. Refrigerant Line Pressure Drops

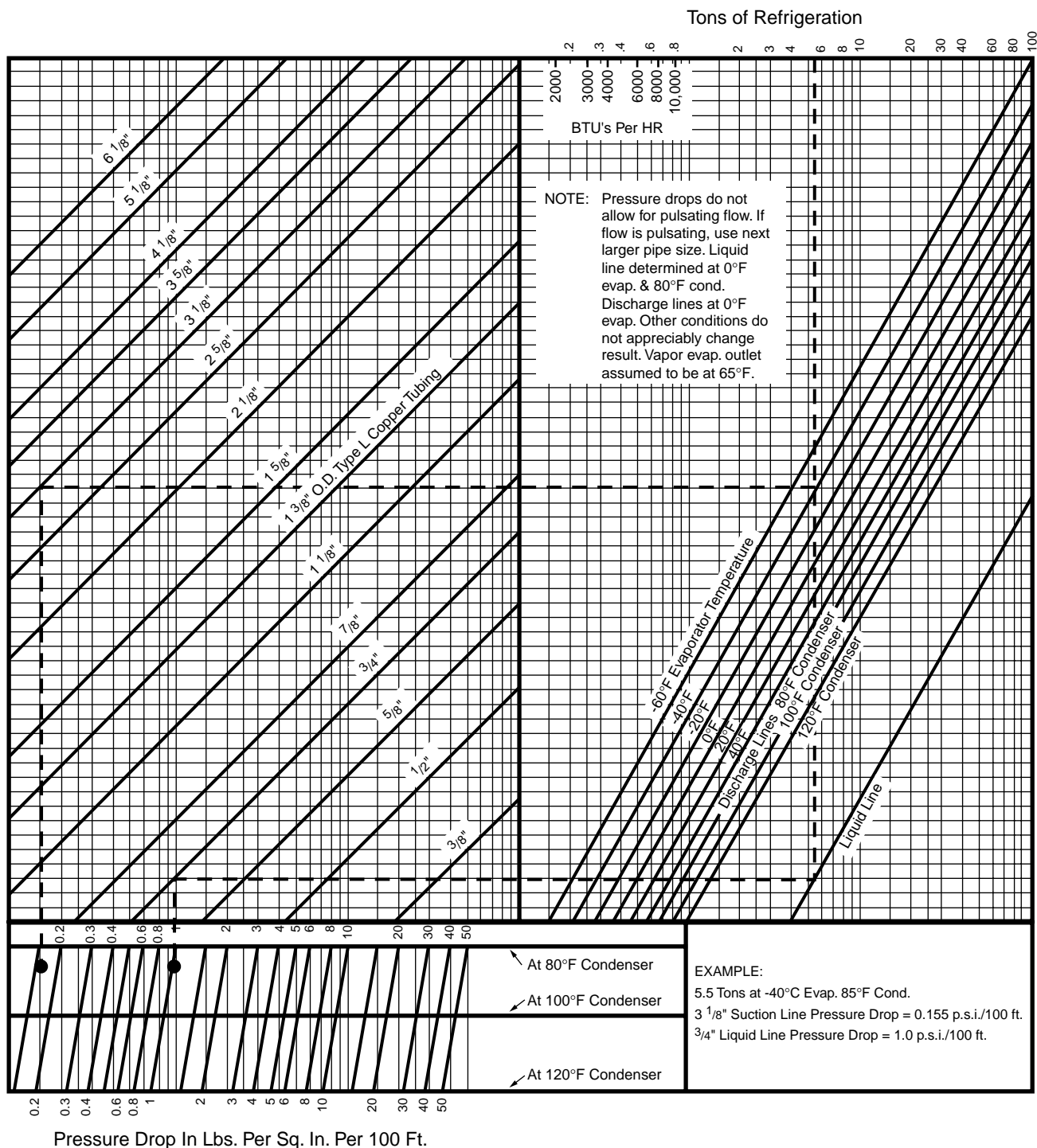


Figure 5-2. Refrigerant line pressure drops for "Freon" 12 refrigerant (reprinted by permission of DuPont Fluorochemicals).

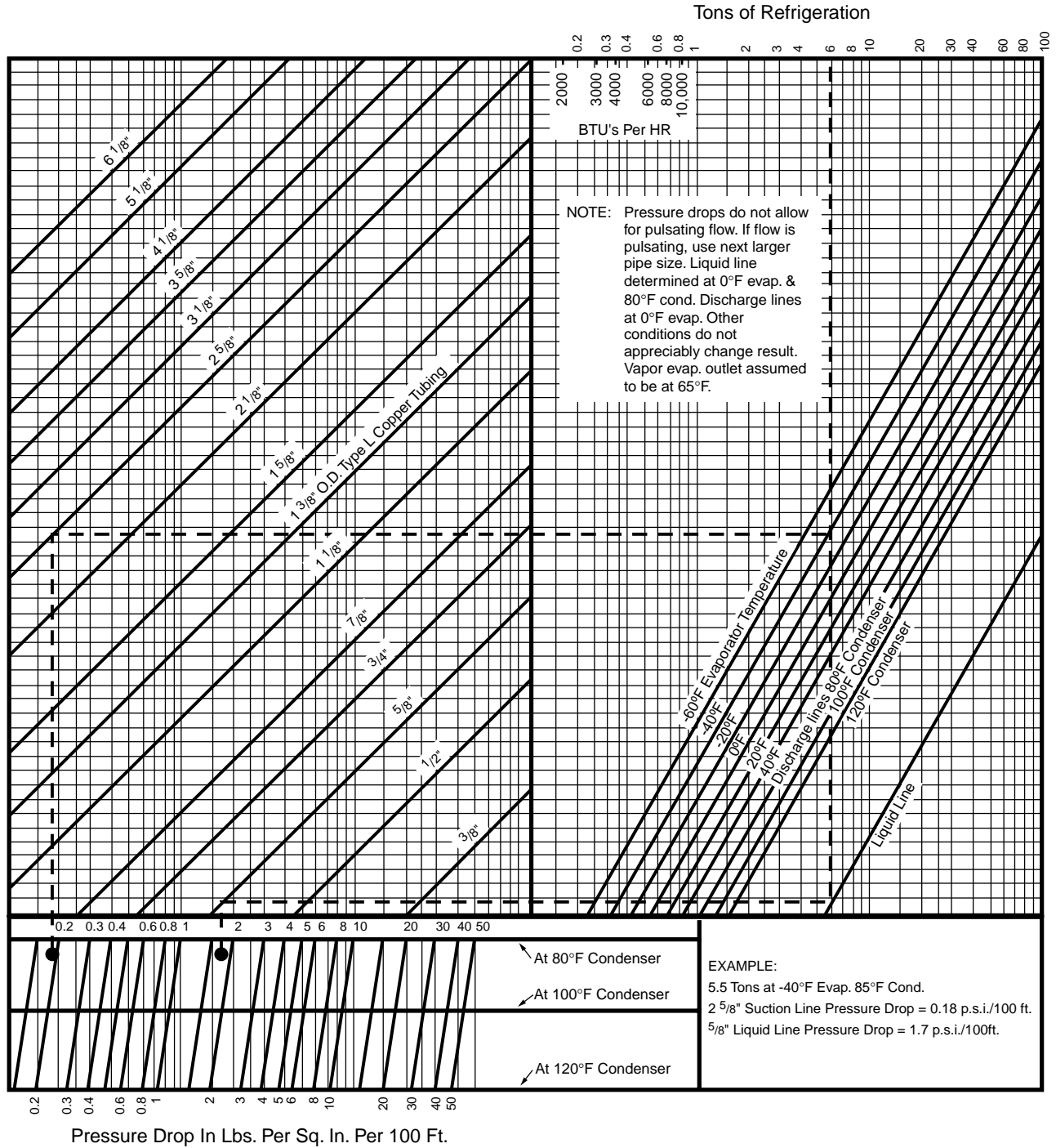


Figure 5-3. Refrigerant line pressure drops for “Freon” 22 refrigerant (reprinted by permission of DuPont Fluorochemicals).

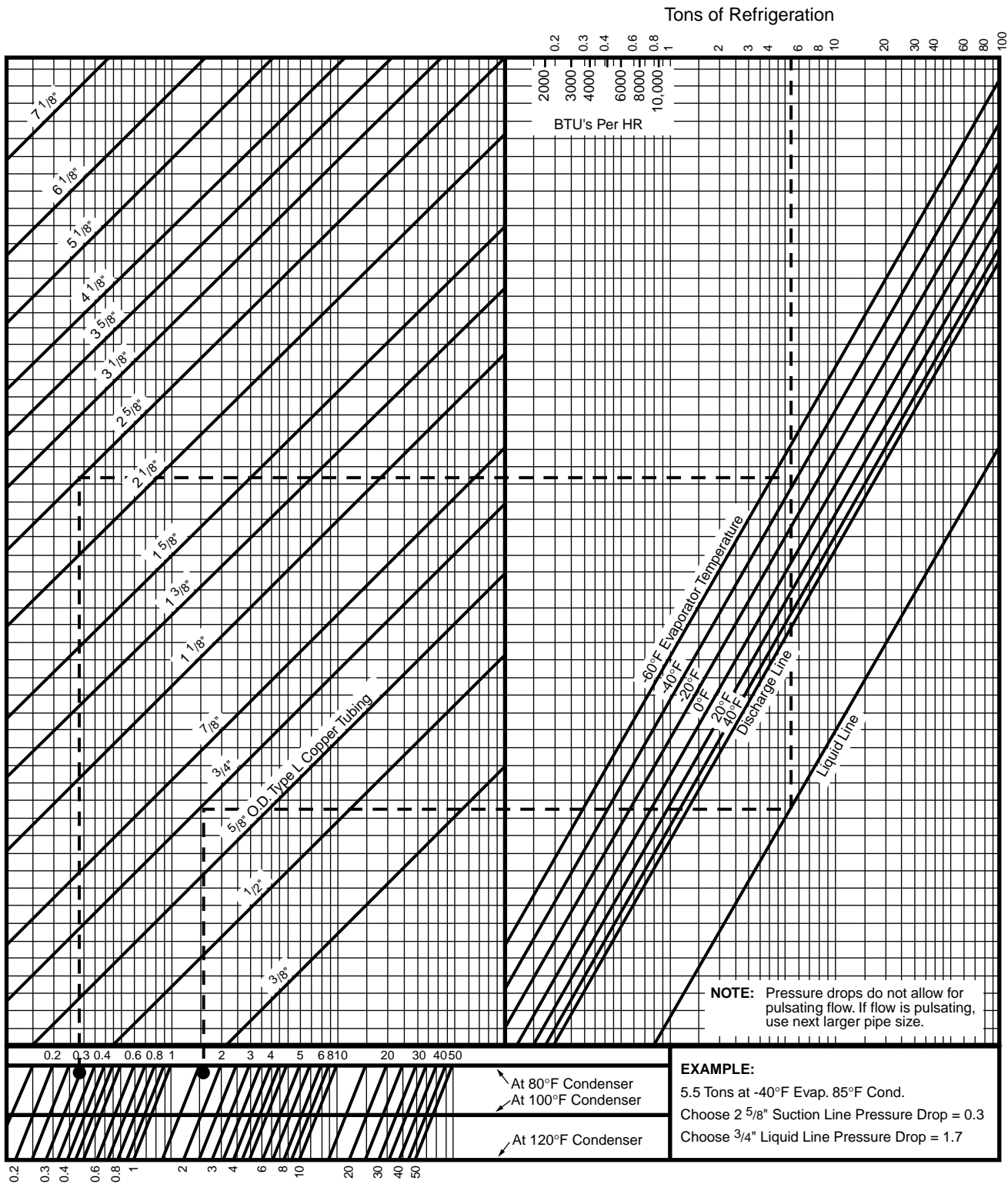


Figure 5-4. Refrigerant line pressure drops for "Freon" 502 refrigerant (reprinted by permission of DuPont)

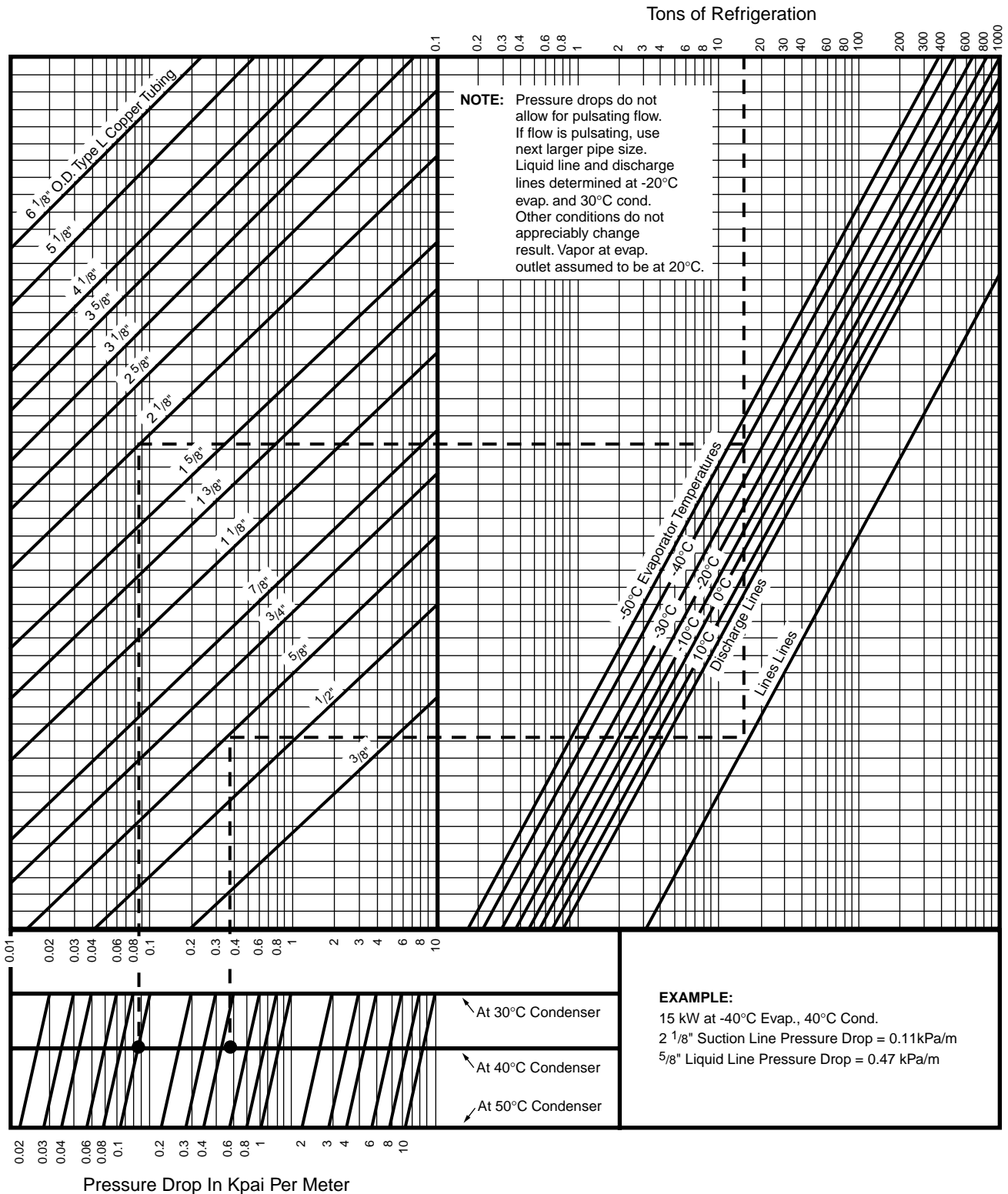


Figure 5-5. Refrigerant line pressure drops for HP62 (404A) refrigerant (reprinted by permission of DuPont Fluorochemicals).

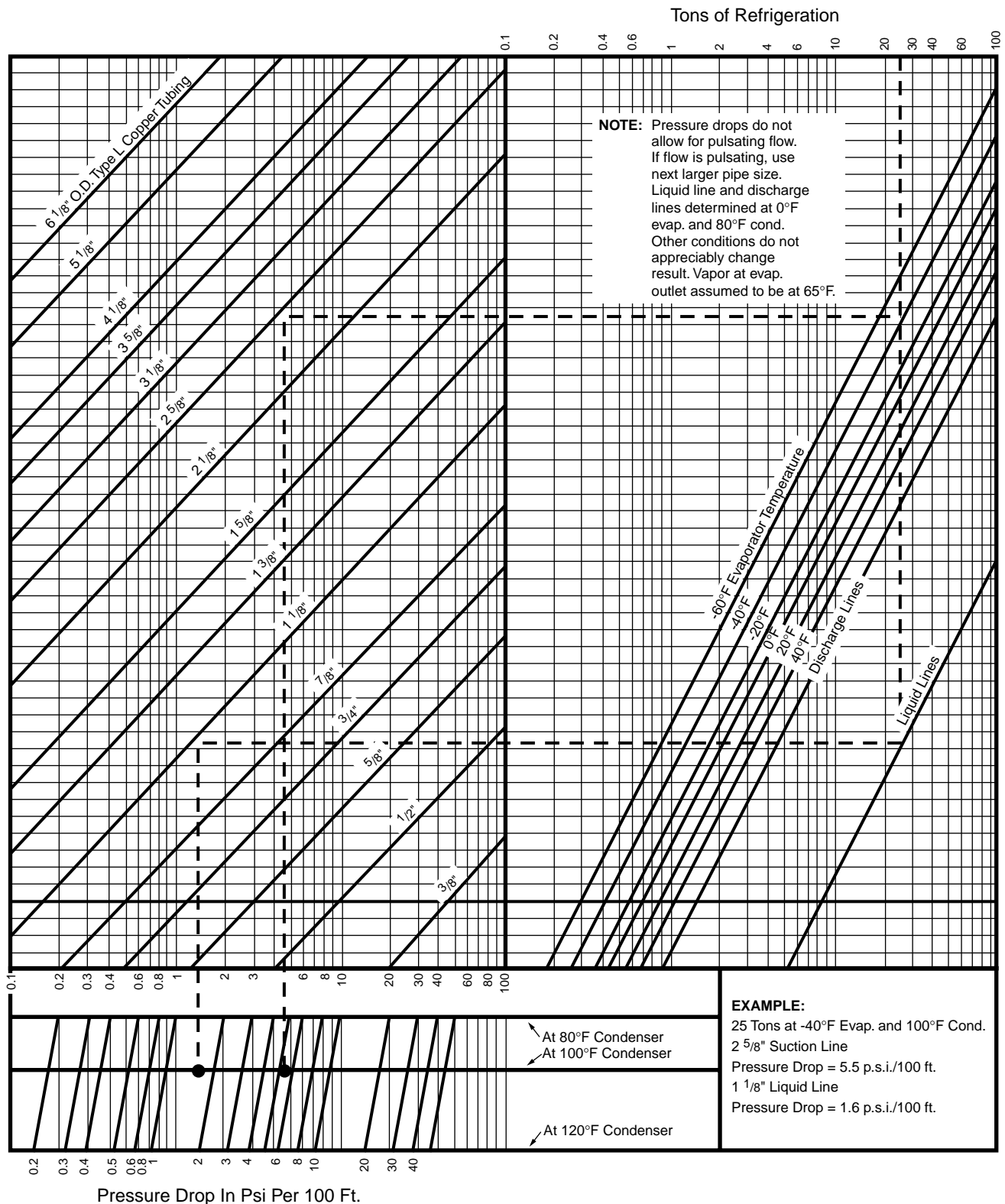


Figure 5-6. Refrigerant line pressure drops for HFC-134a refrigerant (reprinted by permission of DuPont Fluorochemicals).

IV. Refrigerant Line Velocities

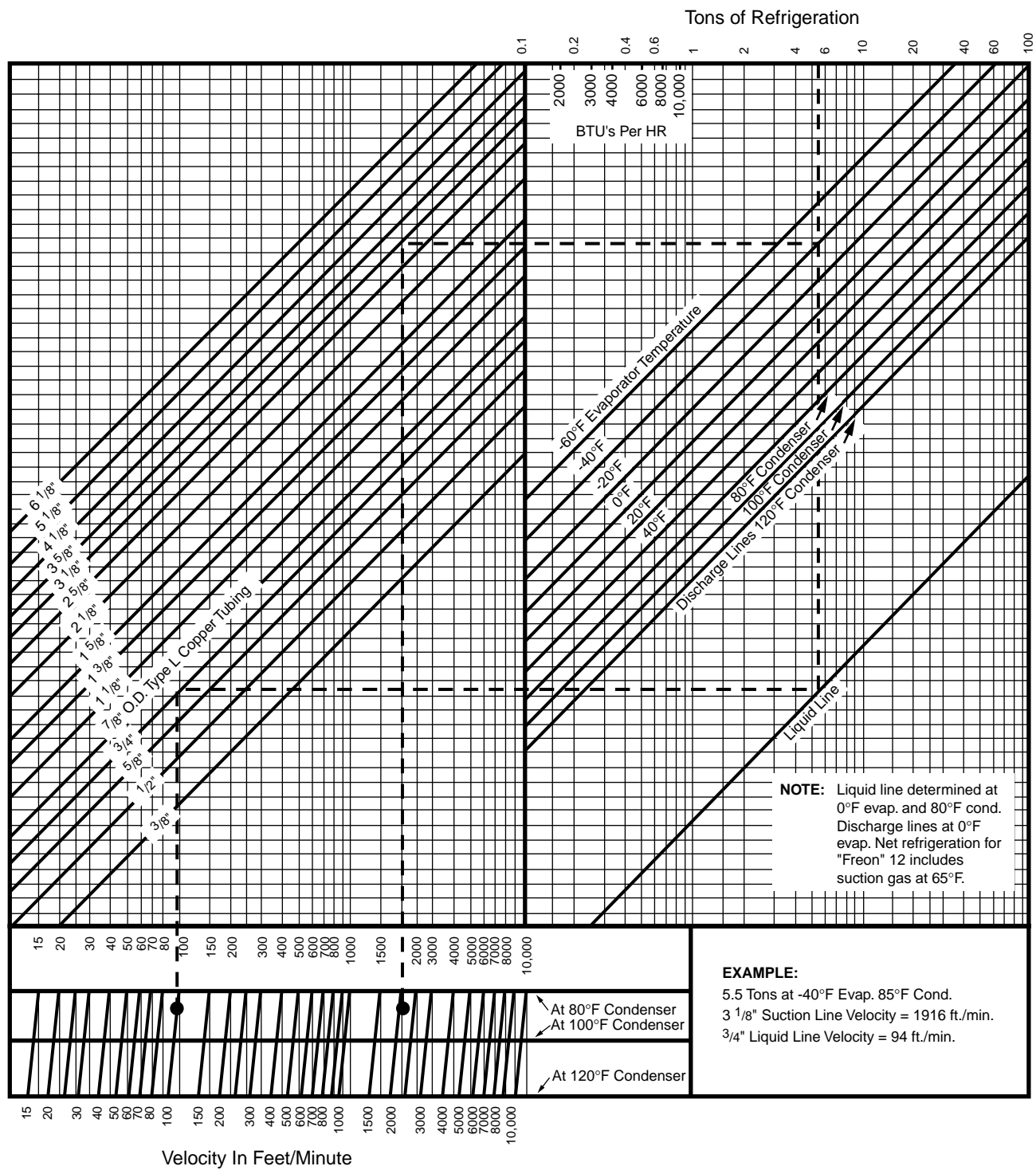


Figure 5-7. Refrigerant line velocities for "Freon" 12 refrigerant (reprinted by permission of DuPont Fluorochemicals).

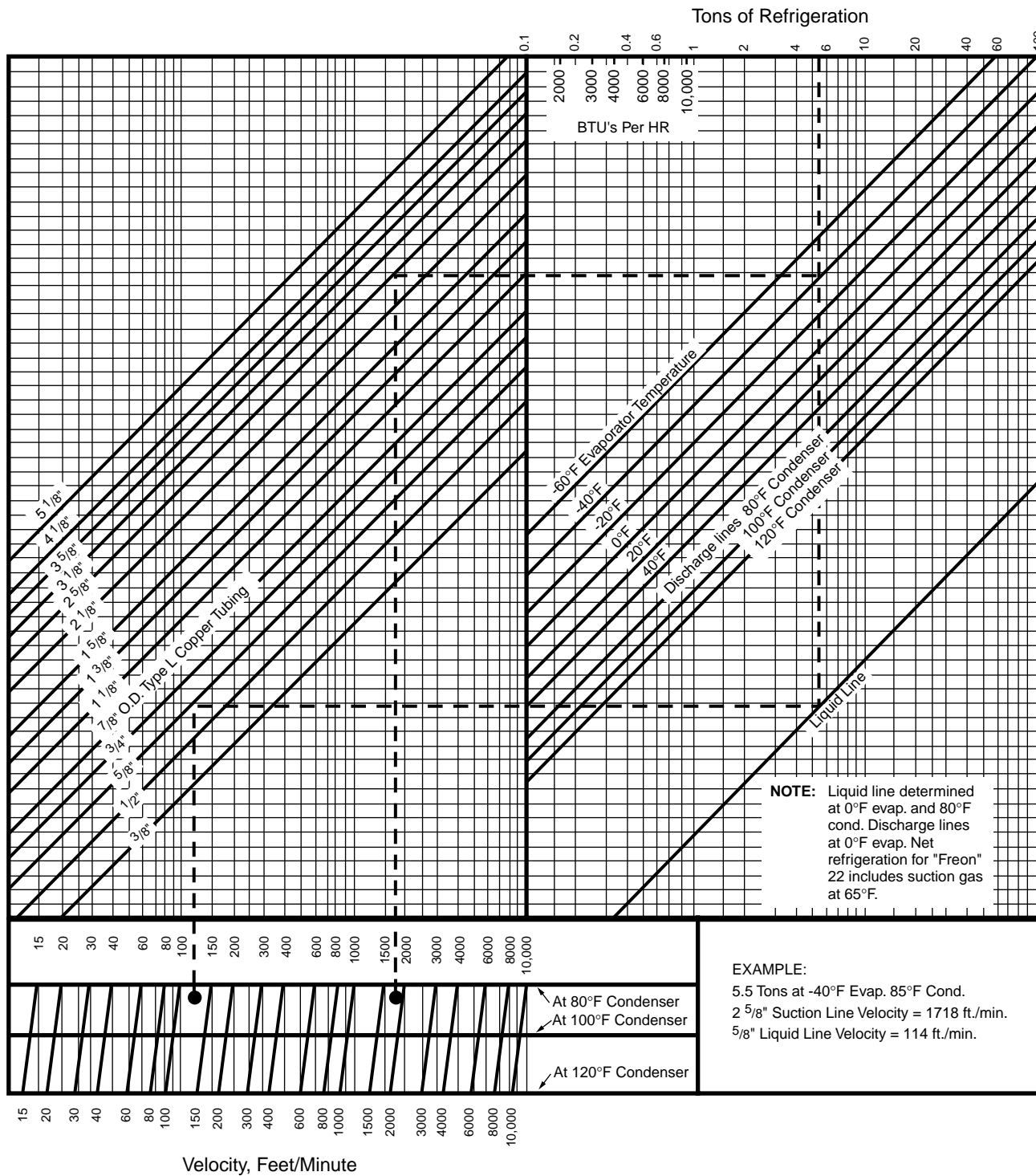


Figure 5-8. Refrigerant line velocities for "Freon" 22 refrigerant (reprinted by permission of DuPont Fluorochemicals).

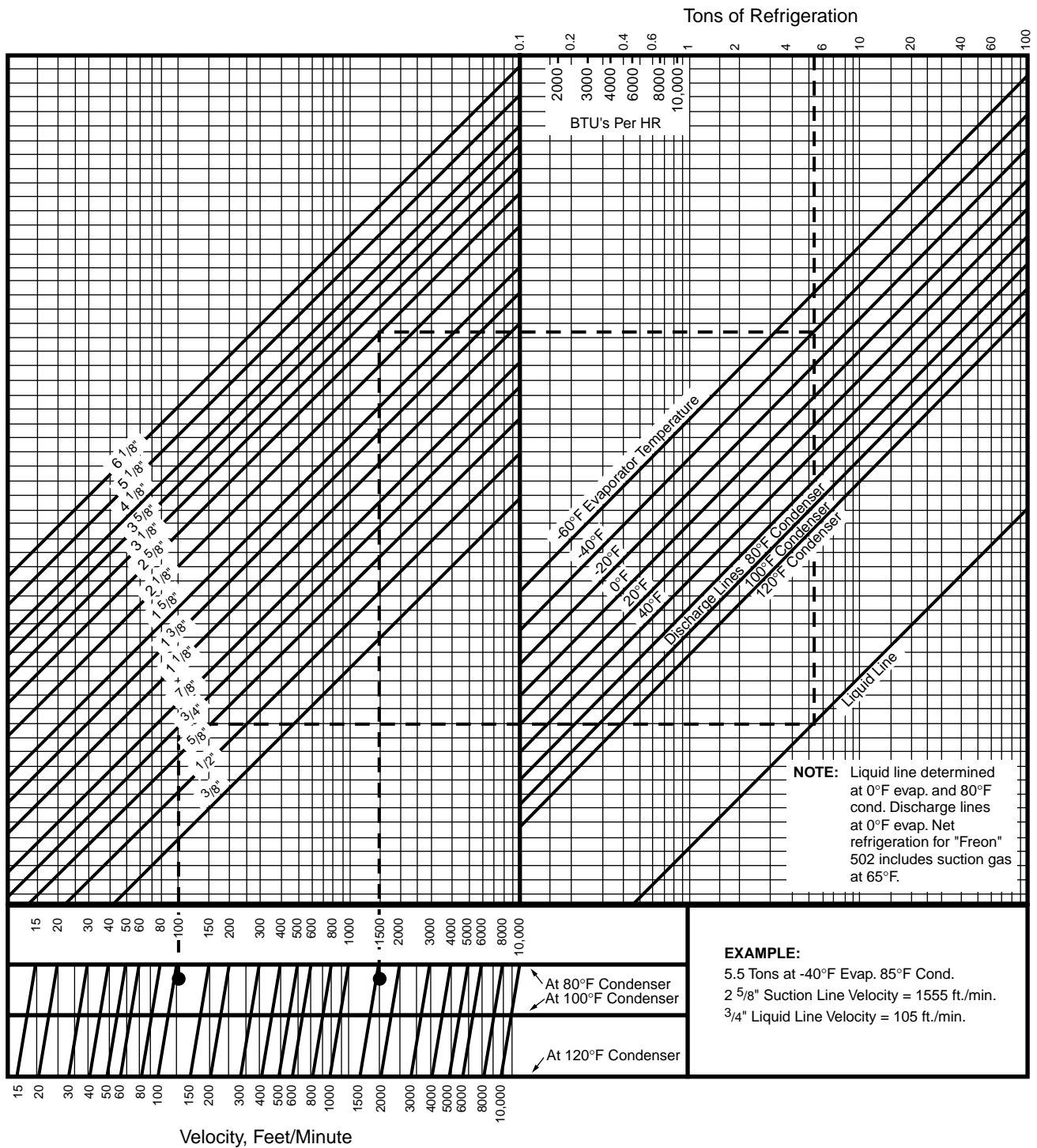


Figure 5-9. Refrigerant line velocities for "Freon" 502 refrigerant (reprinted by permission of DuPont Fluorochemicals).

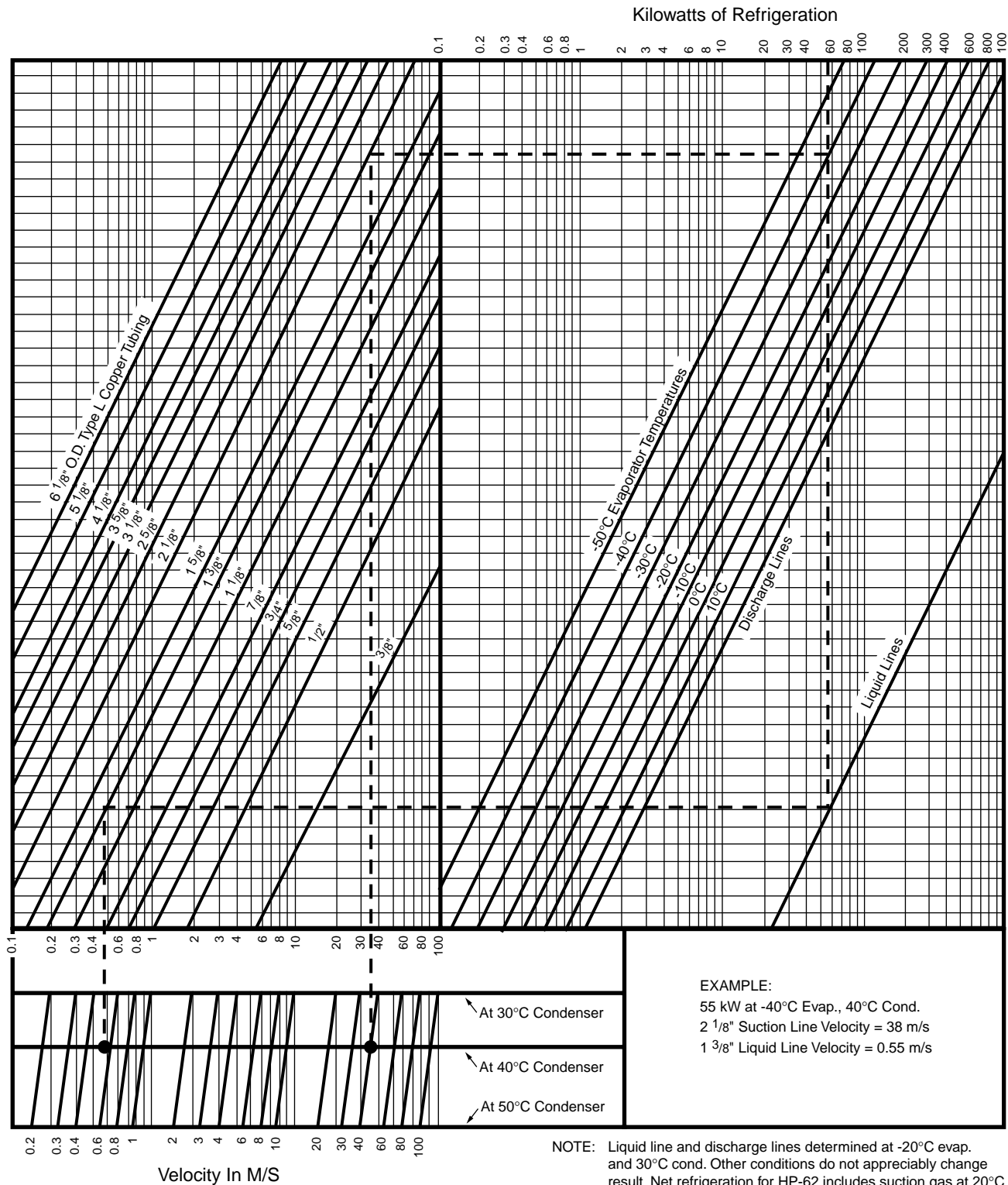


Figure 5-10. Refrigerant line velocities for HP62 (404A) refrigerant (reprinted by permission of DuPont Fluorochemicals).

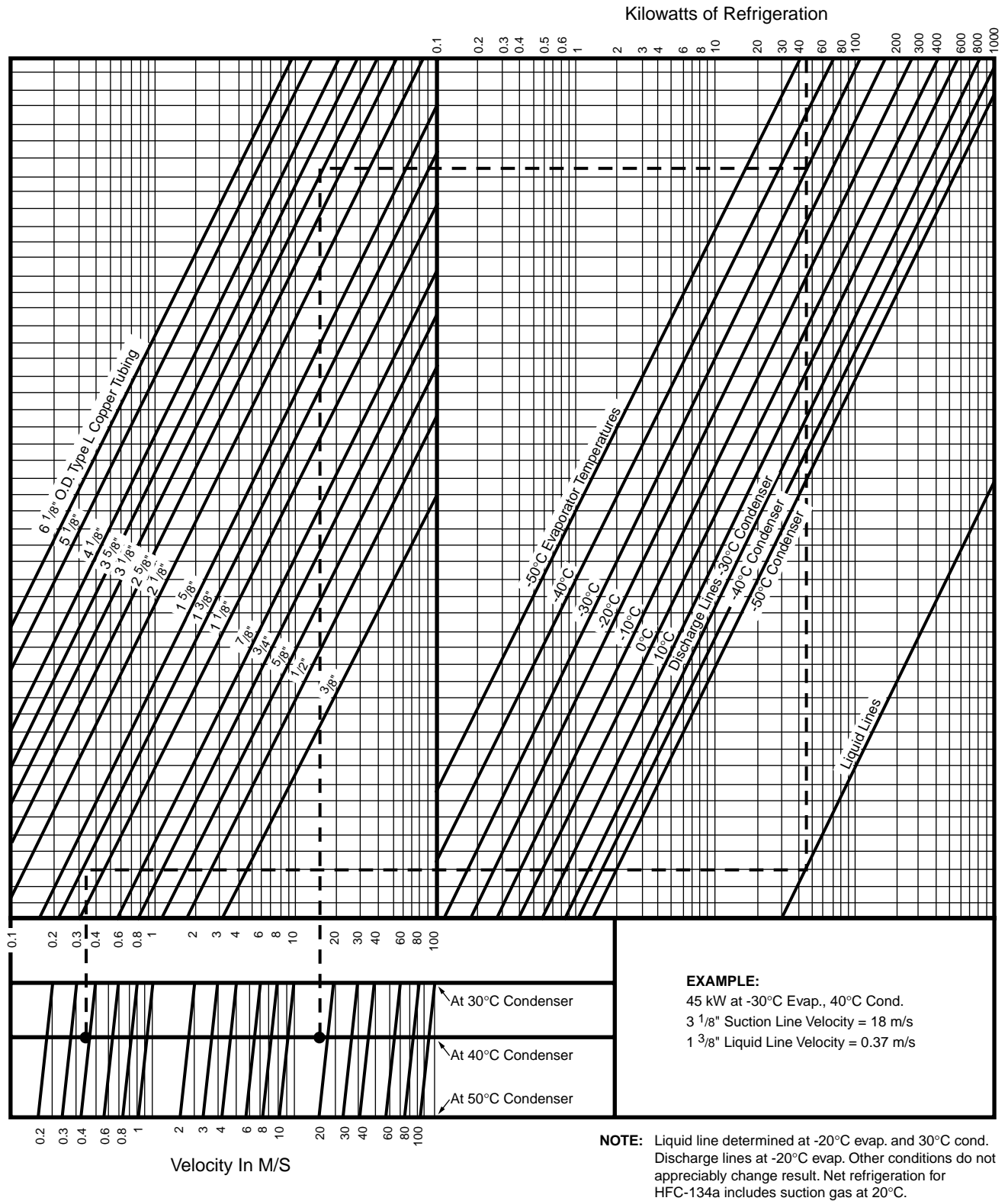


Figure 5-11. Refrigerant line velocities for HFC-134a refrigerant (reprinted by permission of DuPont Fluorochemicals).



V. Service Valves

As shipped with the compressors, the rotolock service valves have a small plastic dust plug inside the threaded end. Be sure to remove this plug before installing.

Service valves on Tecumseh systems are “front seated” by turning the valve stem clockwise. This closes the valve and opens the gauge port.

Turning the stem counter-clockwise “back seats” the valve and thus opens the system and closes the gauge port.

If present, the valve port to the system control (high pressure cutout, low pressure control, fan control etc.) is always open regardless of the position of the valve stem.

If it is desired to operate the system with the service gauge operating, it is necessary to “crack” the valve from its back seated position for the gauges to perform. Before removing the gauges, close the gauge port by returning the valves to their fully open position (back seated).

Remember to check the packing gland nut (if present) on the stem for snugness before leaving the job. Install the cover nut over the valve stem as a secondary safeguard against leaks at the stem.

VI. Processing the System

The performance and longevity of a refrigeration system is strongly influenced by how the system was “processed,” that is, how the system was prepared for operation at the time of installation. The procedure is:

1. On split systems, install the liquid and suction line. See “Refrigerant Line Sizes” on pages 88-92 for recommended line sizes. A properly sized suction line accumulator is recommended. See “Accumulator Selection Data” on page 118 for accumulator sizing. Insulate the suction line to reduce heat exchange and excessive return gas temperatures to the compressor.
2. To prevent oxidation and scale forming inside the tubes, it is good practice to flow dry nitrogen through the tubing during the soldering

operations. A light flow of about 1/4 cubic feet per minute is sufficient.

3. Install a filter in the liquid line immediately ahead of the capillary tube or expansion valve. A liquid line drier should also be installed.
4. A suction line filter/drier is recommended to protect the compressor. A suction accumulator must be installed on those systems having defrost cycles (heat pumps, low temperature refrigeration) or the likelihood of periodic floodbacks (bulk milk coolers, ice machines). See “Accumulator Selection Data” on page 118 for accumulator sizing.
5. Pressure test the system for leaks using the safety precautions outlined in “System Flushing, Purging, and Pressure Testing for Leaks” on pages 4-5. Do not pressurize the system beyond 150 PSIG field leak test pressure.
6. Use a vacuum pump (not a compressor) to draw a vacuum of 1000 microns or less from both sides of the system. It is a waste of time to attempt to draw a vacuum on a system with the pump connected only to the low side. Entry must be made directly into the high pressure side to properly evacuate that portion of the system. Use a good electronic gauge to measure the vacuum. An accurate reading cannot be made with a refrigeration gauge. Remember 29” of mercury as read on a compound gauge equals 23,368 microns of vacuum.

WARNING! *Never use a compressor to evacuate a system. Instead, use a high vacuum pump specifically designed for that purpose.*

Never start the compressor while it is under deep vacuum. Always break a vacuum with refrigerant charge before energizing the compressor.

Failure to follow these instructions can damage the hermetic terminal and may result in terminal venting. As always, to reduce the risk of serious injury or death from fire due to terminal venting, never energize the compressor unless the protective terminal cover is securely fastened.

7. If a suction line accumulator is present, charge into the accumulator to prevent liquid refrigerant from reaching the compressor. If this is not possible, then break the vacuum by allowing refrigerant vapor to enter the low side at the suction service valve. When the system pressure reaches 60 psig for R-22 (70 psig for R-502, 35 psig for R-12), start the compressor and continue charging at rate not more than 5 pounds per minutes for the larger systems and somewhat less for smaller systems. Follow the safety precautions outlined in "System Charging" on pages 5-6.
8. Check fans and blowers for correct direction of rotation, belt tension, and proper air flow (CFM).
9. With the protective terminal cover securely fastened, run the compressor and allow the system pressures and temperatures to stabilize. Systems vary in their operating characteristics but generally these approximations will apply:

Table 5-6: Pressure and Temperature Stabilization

Pressure	Temperature
Saturated Head Pressure	Ambient temperature °F + 25°F for air cooled condenser.
Water cooled	Discharge water °F + 10°F
Saturated evaporator pressure	
Air Conditioning	Discharge air °F - 20°F
Medium Temperature	Product temperature -10°F to -12°F
Low Temperature	Product temperature -6° to -8°F

10. Before leaving the job run the system for awhile. Listen for abnormal noises. Feel the bottom crankcase housing and determine that it is warm. Is the compressor upper housing sweating indicating that liquid refrigerant is reaching the compressor? Is the return gas temperature at the compressor 65°F or less and not more than 80°F? Recheck pressures, amps, fan motors, belts, CFM, etc.

VII. System Cleanup and Compressor Replacement After Compressor Failure

Once you determine that a compressor needs to be replaced you must then determine whether the system has been contaminated. Compressor motor failure can lead to such contamination. (While compressor motor failure is sometimes referred to as motor "burnout," it does not mean that a fire actually occurs inside a hermetic compressor.) Even small amounts of contamination must be removed from the system to avoid damaging the replacement compressor. Therefore, it is important to thoroughly clean a refrigeration/air conditioning system if system contamination is present.

WARNING

If a compressor motor failure has occurred, refrigerant or mixtures of refrigerant and oil in the system can be acidic and cause chemical burns. As always, to avoid injury, wear appropriate protective eyewear, gloves and clothing when servicing an air conditioning or refrigeration system. If refrigerant or mixtures of refrigerant and oil come in contact with skin or eyes, flush the exposed area with water and get medical attention immediately.

The following outlines a process for compressor replacement and system clean-up for a system equipped with a Tecumseh compressor. You should refer to the original equipment manufacturers (OEM) service information.

A. Determine Extent of System Contamination

Following the precautions in "Refrigerants and Other Chemicals" and "Compressor Removal" on page 4, remove the compressor.

Use the following guidelines to determine whether contamination, if any, is limited to the compressor or extends to the system.

If the discharge line shows no evidence of contamination and the suction stub is clean or has only light carbon deposits, then the contaminants are limited to the compressor housing (Compressor Housing



Contamination). A single installation of liquid and suction line filter-driers should cleanup the system.

If, however, the discharge line or the suction line shows evidence of contamination, the compressor was running at the time of the motor failure and contaminants were pumped throughout the system (System Contamination). If System Contamination has occurred, several changes of the liquid and suction line filter-driers will be needed to cleanup the system. In addition, the expansion device will need to be replaced. If the system is a heat pump, the four way valve should be replaced.

B. Install Replacement Compressor and Components

1. Install the replacement compressor with new external electrical components (capacitors, relay, overload, etc., where applicable). Check the contacts of the starting control or contactor.
2. Install an oversized liquid line filter-drier.
3. Install a generously sized suction line filter-drier immediately upstream of the compressor. The drier when permanently installed in a clean system, or as initially installed in a dirty system, must have a pressure drop not more than that of Table 5-3. Pressure taps must be supplied immediately before and after the suction filter-drier to permit the pressure drop to be measured.

If a suction line accumulator is present and System Contamination has occurred, it must be thoroughly flushed to remove any trapped sludge and thus prevent it from plugging the oil return hole. The filter-drier should be installed upstream of the accumulator and the compressor.

In the case of Compressor Housing Contamination, the filter-drier should be installed between the compressor and the suction line accumulator.

Rubber refrigeration hoses are not satisfactory for temporarily hooking up the suction line filter-drier to the system since the acid quickly breaks down the rubber and plastic.

4. Follow the precautions in "System Flushing, Purging, and Pressure Testing for Leaks" on pages 4-5, to purge the system and pressure test for leaks.

C. Evacuate the System

Evacuate the system to less than 1000 microns, using a good vacuum pump (not a compressor) and an accurate high vacuum gauge. Operate the pump at 1000 microns, or less, for several hours to be sure the vacuum is maintained.

An alternate method of removing moisture and non-condensables from the system is:

1. Evacuate the system to 29 inches vacuum. Break vacuum with refrigerant to be used for final charging of system and vapor charge to 35-50 pounds gauge pressure. Leave vapor charge in system for a minimum of five minutes. Reduce pressure to 0 gauge pressure.
2. Repeat step 1.
3. Evacuate system to 29 inches vacuum. Charge system with the specified kind and quantity of refrigerant.

WARNING! *Never use a compressor to evacuate a system. Instead, use a high vacuum pump specifically designed for that purpose.*

Never start the compressor while it is under deep vacuum. Always break a vacuum with refrigerant charge before energizing the compressor.

Failure to follow these instructions can damage the hermetic terminal and may result in terminal venting. As always, to reduce the risk of serious injury or death from fire due to terminal venting, never energize the compressor unless the protective terminal cover is securely fastened.

D. Charge the System and Check the Pressure Drop

Charge the system and place in operation. Follow the safety precautions outlined in “System Charging” on pages 5-6. Immediately after startup, check the pressure drop across the suction line filter-drier. This will serve two purposes:

- Verify that the drier selection was correct; that is, large enough.
- Serve as a base point to which subsequent pressure checks can be compared.

Because the permissible pressure drop across the drier is relatively small, it is suggested that a differential pressure gauge be used for the measurement.

E. Measure the Pressure Drop

After the system has been operating for an hour or so, measure the pressure drop across the suction line filter-drier.

In the case of Compressor Housing Contamination, little change should be noted. The pressure drop will, in most instances, be below that tolerable for a permanent installation (see Table 5-3).

On the other hand, where System Contamination occurred, an increased pressure drop will be measured. Change the suction filter-drier *and* the liquid line filter-drier whenever the pressure drop approaches or exceeds that allowed for temporary operation during cleanup (see Table 5-4).

Keep changing both the suction and liquid line filter-driers until the pressure drop stabilizes at a figure equal to or below that permitted for permanent operation in a system (see Table 5-3). At this point, it is the service person’s option as to whether to leave the suction drier in the system or remove it from operation.

If the system is to be opened to permit the permanent removal of the suction filter-drier then the liquid line filter-drier should be changed once more.

Table 5-3: Suggested Maximum Pressure Drop (PSI) for Permanent Suction Filter-Drier Installation

Application	Air Cond.	High	Medium	Low	Low
Evaporator Range, °F	+55 to +32	+55 to +20	+30 to -10	+10 to -20	-20 to -40
R-12	2	2	1 1/2	1/2	1/2
R-22	3	3	2	1	1/2
R-502	3	3	2	1	1/2

Table 5-4: Suggested Maximum Pressure Drop (PSI) for Temporary Suction Filter-Drier Installation During Cleanup

Application	Air Cond.	High	Medium	Low	Low
Evaporator Range, °F	+55 to +32	+55 to +20	+30 to -10	+10 to -20	-20 to -40
R-12	9	9	6	2	3/4
R-22	15	15	9	3	1 1/2
R-502	15	15	9	3	1 1/2



F. Test for Acidity If Multiple Motor Failures Have Occurred

If the system has suffered multiple motor failures, it is advisable that the oil of the replacement be tested after Section E and judged acid free before the system is considered satisfactorily cleaned. An oil sample may be taken from a hermetic system if at the time the replacement compressor was installed an oil trap is installed in the suction line (see Figure 5-12). When the trapped oil level appears in the sight glass (less than an ounce is needed) the oil may be *slowly* transferred to the beaker of the acid test kit as available from several manufacturers. A reading of less than 0.05 acid number is an indication that the sys-

tem is free of acid. A reading of higher than 0.05 means continued cleaning is required. Return to B2 on page 105.

G. Monitor the System

The above procedure for the cleanup of hermetic systems after motor failure through the use of suction line filter-drier will prove satisfactory in most instances *provided* the system is monitored and kept clean by repeated drier changes, if such are needed. The failure to follow these *minimum cleanup recommendations* will result in an excessive risk of repeat motor failure.

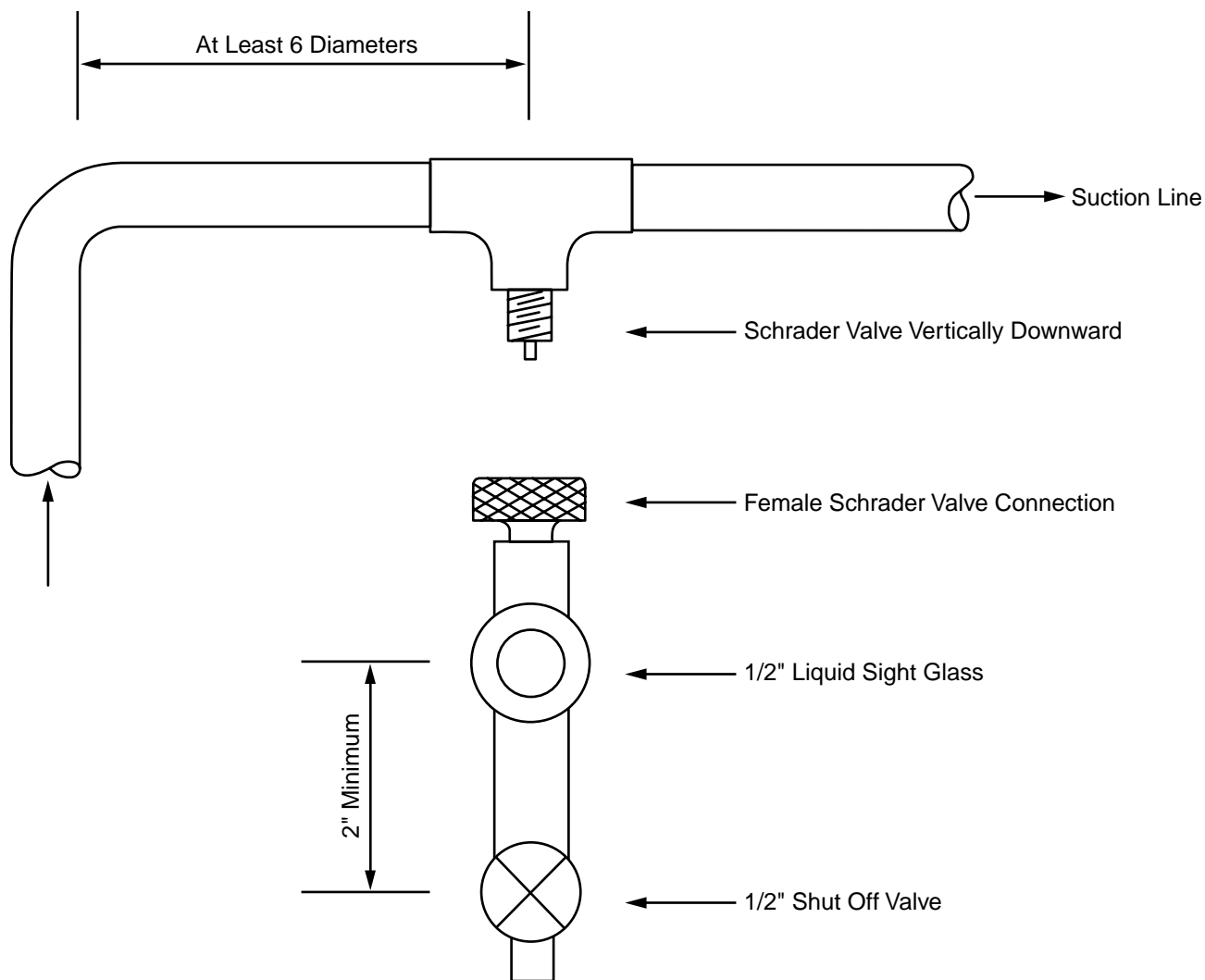


Figure 5-12. Method of obtaining oil sample on hermetic system. After satisfactory oil test, Schrader valve may be capped and the oil sampler taken to next job.

VIII. Replacing Compressors in Water-Utilizing Systems: Preventing Explosions

In certain water-utilizing refrigeration systems, water can leak into the refrigerant side of the system. This can lead to an explosion of system components, including but not limited to, the compressor. If such an explosion occurs, the resulting blast can kill or seriously injure anyone in the vicinity.

Water-utilizing systems that have single-wall heat exchangers may present a risk of explosion. Such systems may include:

- water source heat pump/air conditioning systems, and
- water cooling systems, such as icemakers, water coolers, and juice dispensers.

Water-utilizing systems that have single-wall heat exchangers present a risk of explosion unless they have either:

- a high pressure cut-out which interrupts power to ALL leads to the compressor or
- an external pressure relief valve.

Before replacing a compressor in a water-utilizing system, read and follow “Prevention of Water-Utilizing System Explosions” on pages 6-7.