

## HFC-134a REFRIGERANT SERVICE INFORMATION

The 600 Series sealed systems contain HFC-134a refrigerant. This section provides general rules for working with 134a, and explains procedures to be followed while servicing the sealed system. This is followed by diagrams which illustrate sealed system operation, then model-specific refrigerant flow diagrams.

### CAUTION

**134a refrigerant requires Synthetic Ester oil in the compressor, and does not tolerate contamination from other refrigerants, moisture, petroleum-based lubricants, silicone lubricants, cleaning compounds, rust inhibitors, leak detection dyes, or any other type of additive.**

### General Rules for Working with 134a Refrigerant

- Use equipment dedicated to 134a sealed system service only.
- Use only 134a refrigerant for back-flushing and sweep charging.
- Always replace the filter-drier when servicing the sealed system.
- The filter-drier must be cut from the sealed system. Never un-braze the drier as the heat will drive moisture back into the sealed system.
- Do not leave sealed system nor replacement compressor open to the atmosphere for more than 10 minutes.
- When the rubber plugs are pulled from the service compressor, a release of pressure should be heard. If no release of pressure is heard, do not use the compressor.
- Use ONLY virgin 134a refrigerant when recharging the sealed system.



600 SERIES SEALED SYSTEM REPAIR PROCEDURES	
Problem	Service Procedures
<b>Non-Operating, Inefficient, Noisy Compressor</b>	<ul style="list-style-type: none"><li>a. Capture refrigerant</li><li>b. Replace Compressor</li><li>c. Replace filter-drier</li><li>d. Evacuate or sweep charge system</li><li>e. Recharge system with Virgin 134a refrigerant.</li></ul> <p><b>NOTE:</b> To check for a non-operating compressor, a hard start kit can be used.</p>
<b>High Side leak</b>	<ul style="list-style-type: none"><li>a. Capture refrigerant.</li><li>b. Repair leak.</li><li>c. Replace filter-drier.</li><li>d. Evacuate or sweep charge system.</li><li>e. Recharge system with Virgin 134a refrigerant.</li></ul>
<b>Low Side Leak</b>	<ul style="list-style-type: none"><li>a. Capture refrigerant.</li><li>b. Repair leak (if at solder joint) or replace part.</li><li>c. Back flush high side of sealed system.</li><li>d. Replace compressor.</li><li>e. Replace filter-drier.</li><li>f. Evacuate or sweep charge system.</li><li>g. Recharge system with Virgin 134a refrigerant.</li></ul>
<b>Contaminated Sealed System</b> <i>Examples:</i> <ul style="list-style-type: none"><li>&gt; Burned out compressor</li><li>&gt; Excessive moisture from leak in condensate loop or in low side</li><li>&gt; Plugged capillary tube</li></ul>	<ul style="list-style-type: none"><li>a. Capture refrigerant.</li><li>b. Repair leak (if at solder joint) or replace part.</li><li>c. Back flush high side of sealed system.</li><li>d. Replace compressor.</li><li>e. Replace filter-drier.</li><li>f. Replace heat exchanger if cap tube is clogged.</li><li>g. Install a low side drier on suction line.</li><li>h. Evacuate or sweep charge sealed system.</li><li>i. Recharge with Virgin 134a refrigerant.</li></ul>
<b>Restriction</b> <p><b>NOTE:</b> If restriction is due to sealed system being contaminated, see Contaminated Sealed System above.</p>	<ul style="list-style-type: none"><li>a. Capture refrigerant.</li><li>b. Locate and remove restriction or locate and replace part.</li><li>c. Back flush high side of sealed system.</li><li>d. Replace filter-drier.</li><li>e. Evacuate or sweep charge system.</li><li>f. Recharge system with Virgin 134a refrigerant.</li></ul>
<b>Overcharge</b>	<ul style="list-style-type: none"><li>a. Capture refrigerant.</li><li>b. Replace filter-drier.</li><li>c. Evacuate or sweep charge system.</li><li>d. Recharge system with Virgin 134a refrigerant.</li></ul>

## SEALED SYSTEM OPERATION

The following six diagrams illustrate a basic sealed system. The components are listed in order of refrigerant flow, with an explanation of their fundamental role as part of a sealed system. **NOTE:** These illustrations do not represent any specific 600 Series sealed system.

### Compressor (Figure 4-1)

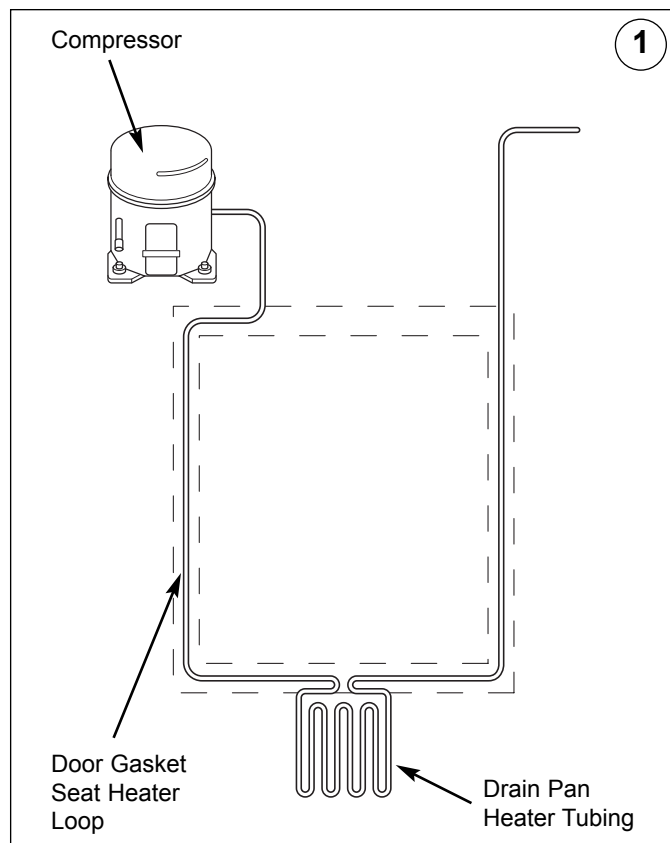
The compressor creates a high side and low side pressure difference in the sealed system by compressing the refrigerant gas, thus raising the pressure and temperature. The compressor pushes this high-pressure/high-heat gas through the door gasket seat heater loop to prevent sweating (on most units the gas also travels through drain pan heater tubing to help evaporate water in the drain pan). The high-pressure/high-heat gas then travels to the condenser.

### Condenser (Figure 4-2)

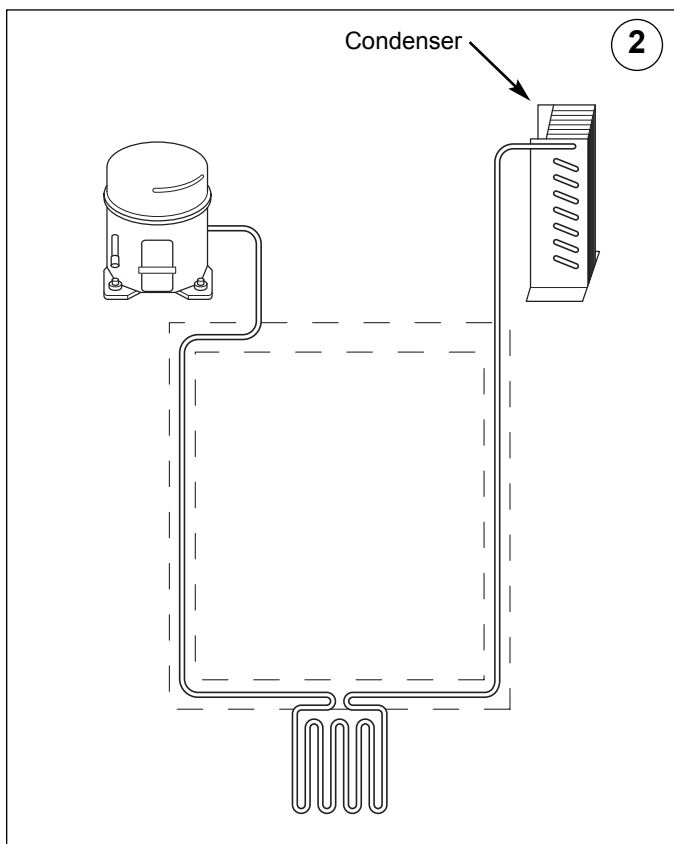
The high-pressure/high-heat gas travels through the condenser, where the heat is dissipated by cooler air being drawn over the condenser tubing by the condenser fan. This changes the gas into a high-pressure/warm liquid that then enters the high-side filter-drier.

### High-Side Filter-Drier (Figure 4-3)

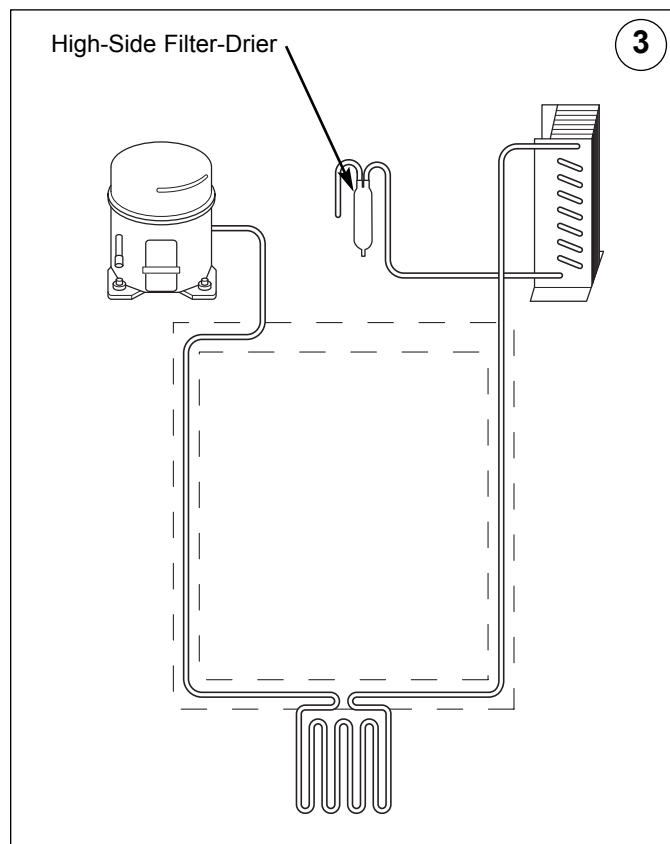
The high-pressure/warm liquid travels through the high-side filter-drier, which removes moisture from the refrigerant before it enters the capillary tube.



**Figure 4-1. Compressor**



**Figure 4-2. Condenser**



**Figure 4-3. High-Side Filter-Drier**

**Capillary Tube (Part of Heat Exchanger) (Figure 4-4)**

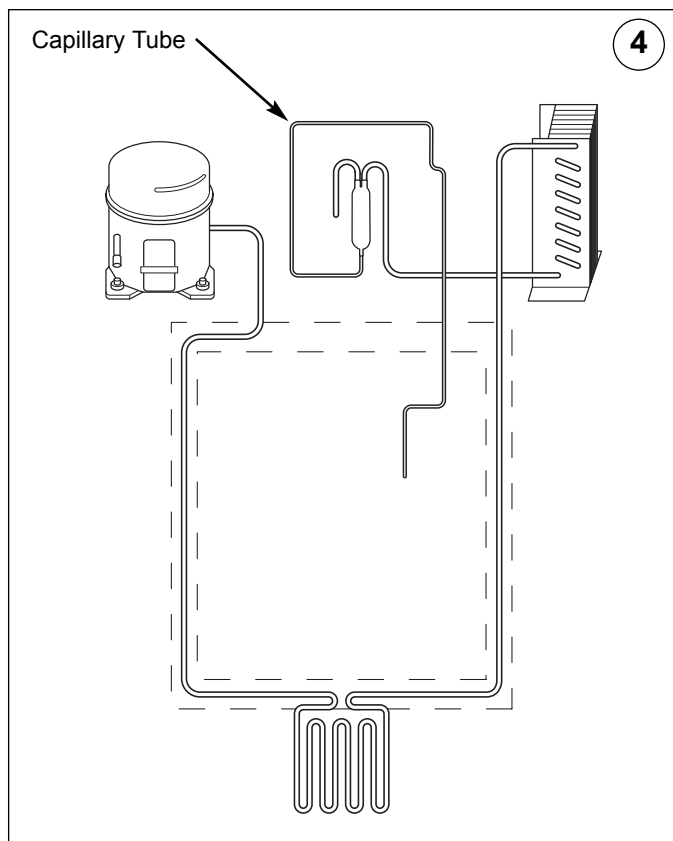
The high-pressure/warm liquid refrigerant travels through the long skinny capillary tube which is attached to the suction line. (These two tubes soldered together create the heat exchanger.) As the high-pressure/warm liquid refrigerant travels through the capillary tube it gives up heat to the cool refrigerant gas traveling through the suction line and the pressure drops, so it is a low-pressure/cool liquid before it enters the evaporator.

**Evaporator (Figure 4-5)**

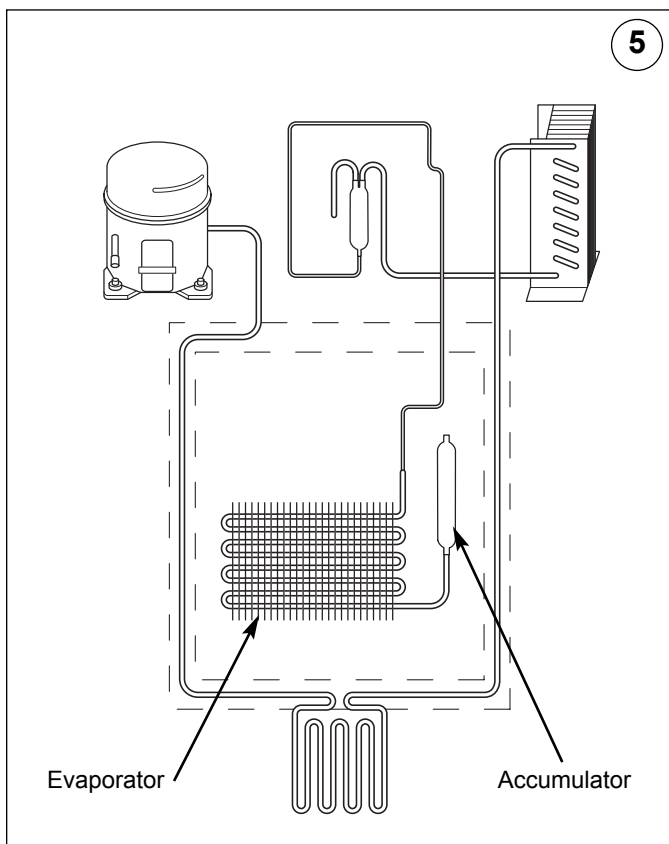
As the low-pressure/cool liquid refrigerant enters the evaporator, it vaporizes. This is caused by a dramatic pressure change which occurs when the refrigerant enters the larger diameter evaporator tubing from the smaller diameter capillary tubing. This vapor travels through the evaporator absorbing heat from the compartment, gradually converting it to a cool gas. This cool gas then enters the suction line.

**Suction Line (& Heat Exchanger) (Figure 4-6)**

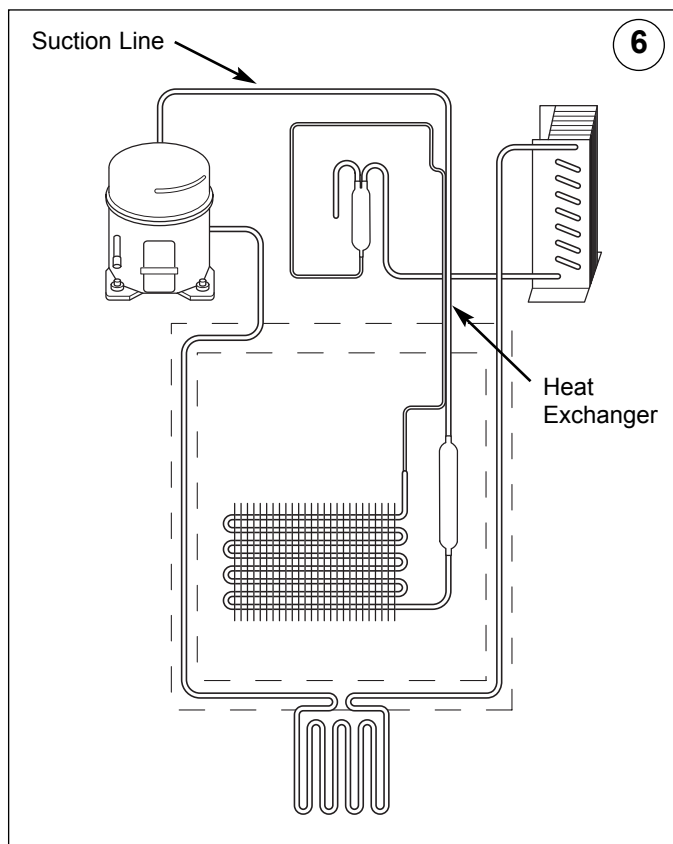
The cool gas travels through the suction line which is attached to the capillary tube. (As mentioned earlier, these two tubes soldered together create the heat exchanger.) As this cool refrigerant gas travels through the suction line it absorbs heat from the warm liquid refrigerant traveling through the capillary tube, making it a lukewarm gas. The lukewarm refrigerant gas returns to the compressor where the process begins again.



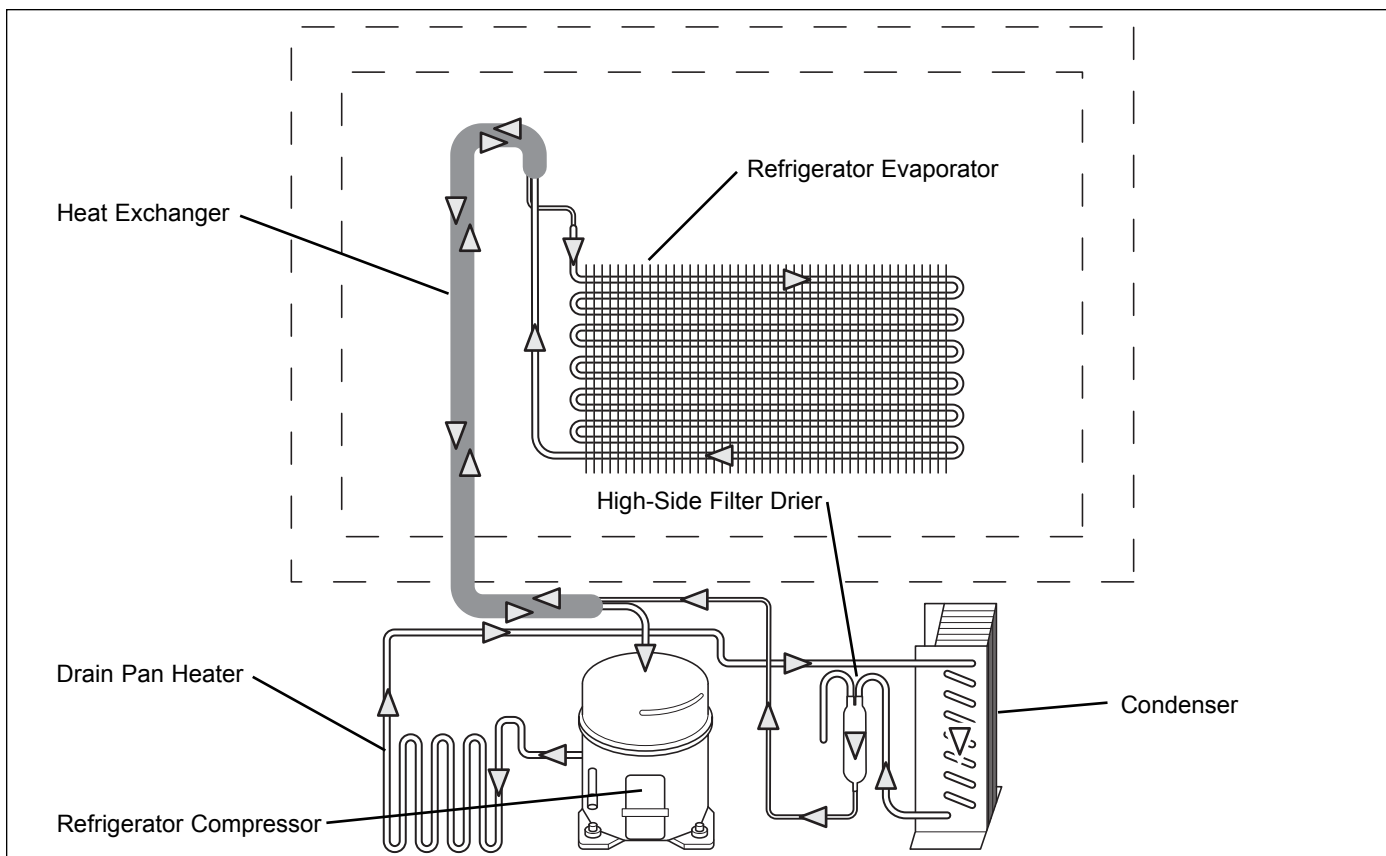
**Figure 4-4. Capillary Tube (Part of Heat Exchanger)**



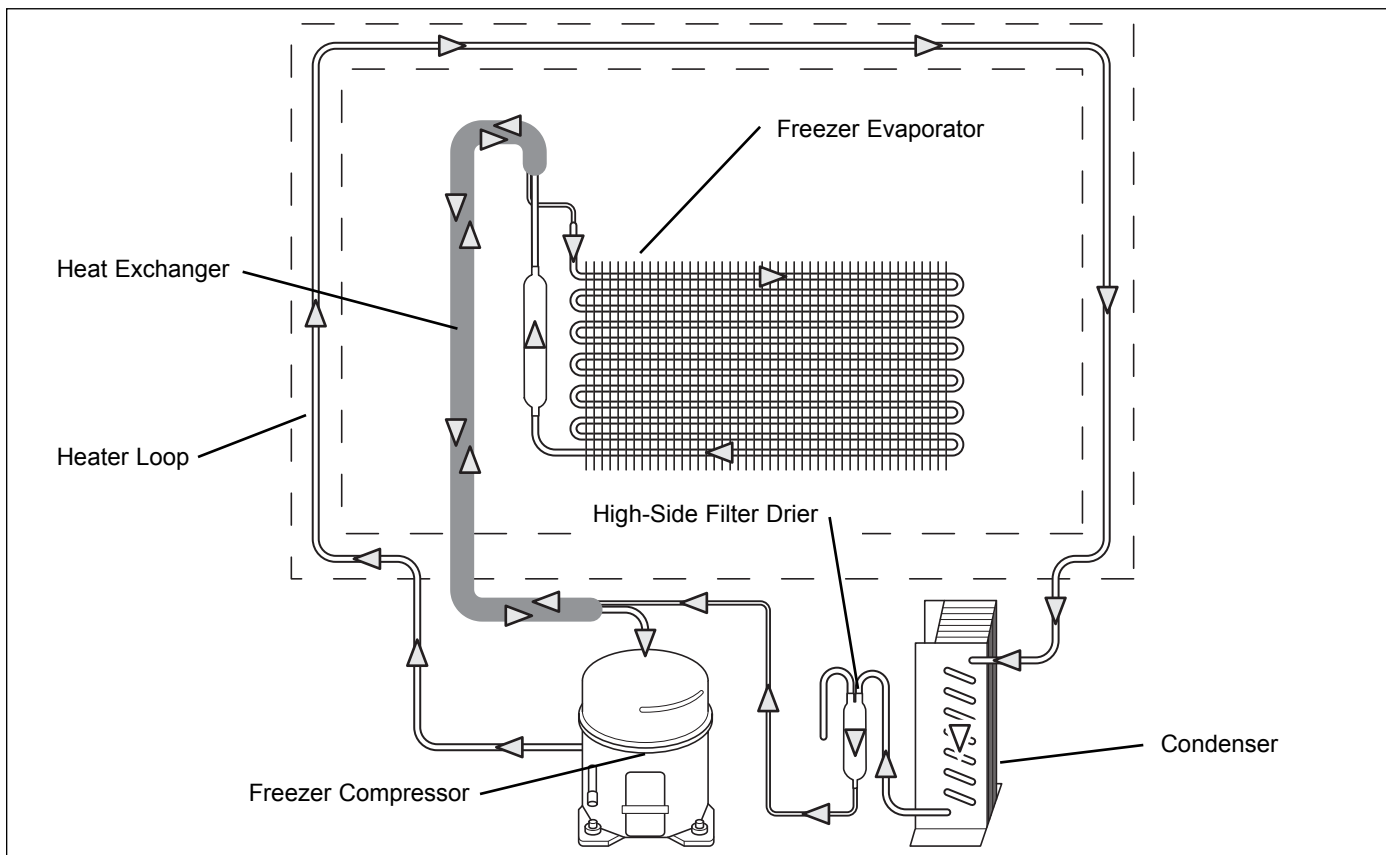
**Figure 4-5. Evaporator**



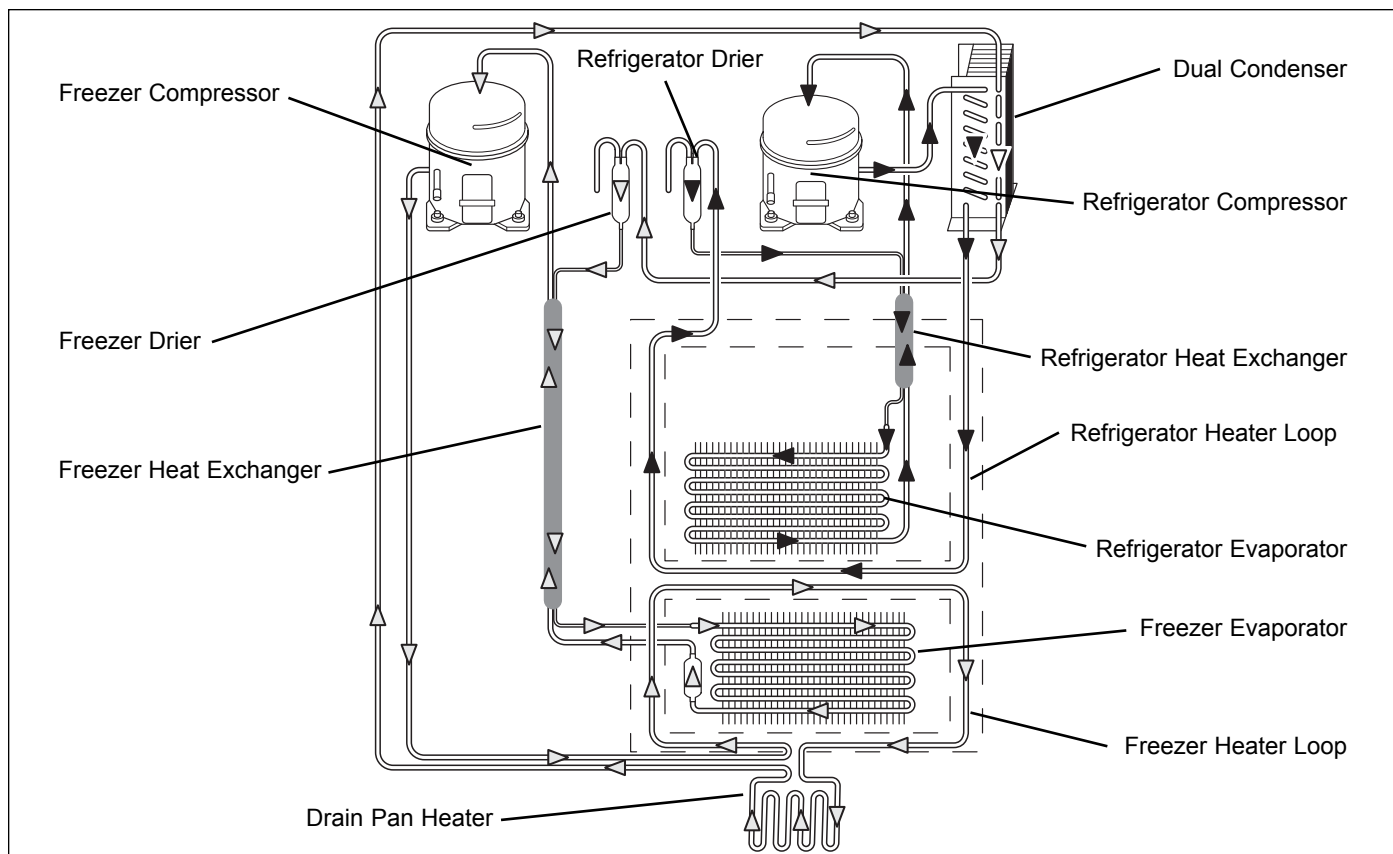
**Figure 4-6. Suction Line (Part of Heat Exchanger)**



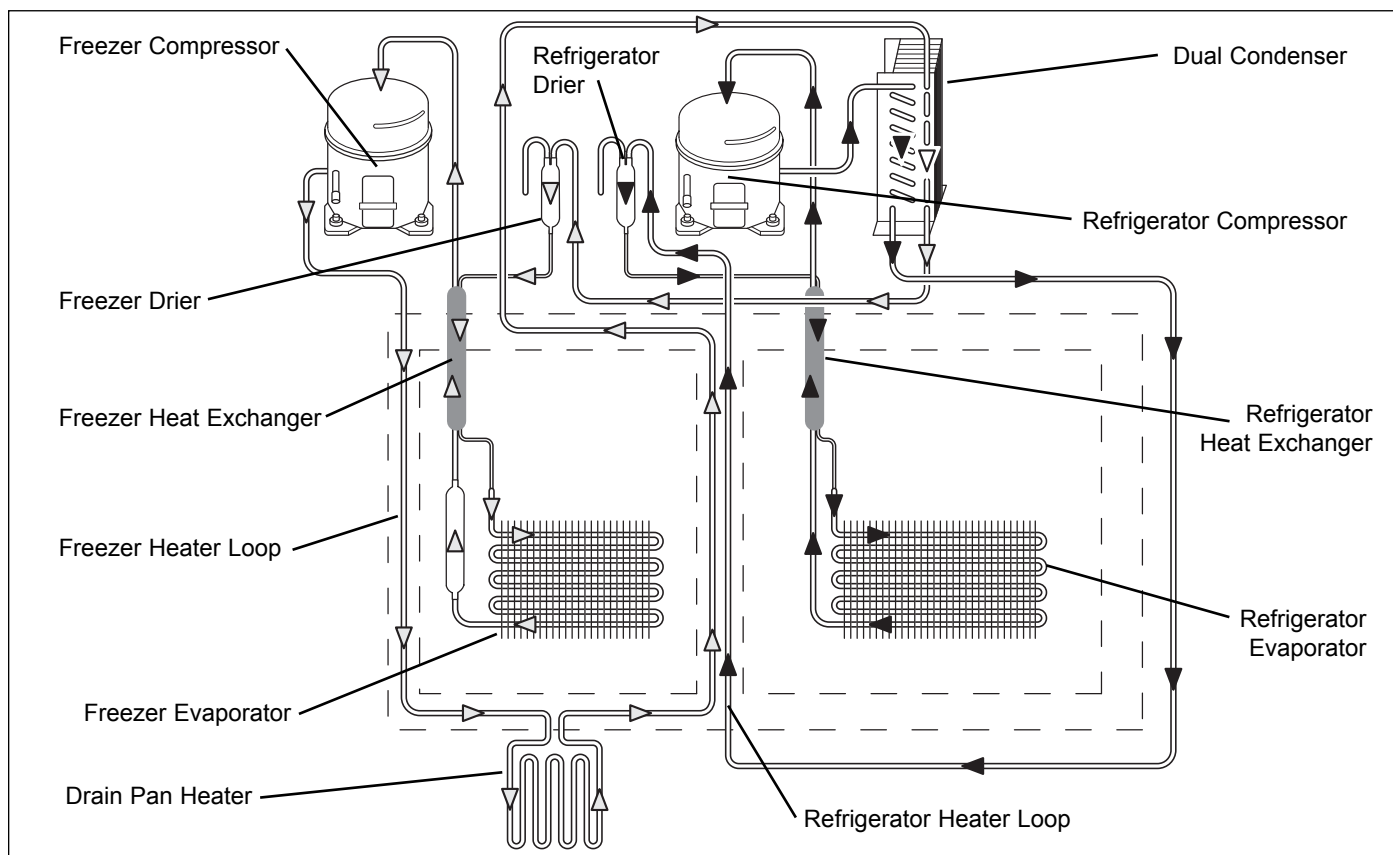
**Figure 4-7. Models 601R, 601RG Refrigerant Flow**



**Figure 4-8. Model 601F Refrigerant Flow**



**Figure 4-9. Models 611, 611G, 650, 650G Refrigerant Flow**



**Figure 4-10. Models 632, 642, 680, 690 Refrigerant Flow**