Warm Case Troubleshooting Guide

9/18/2014

Introduction

Warm cases can be caused by various problems which require thorough troubleshooting. Begin the investigation with questions to store personnel asking for information such as when the last product stocking occurred, any unusual noises or abnormal operation. Ensure that all doors open freely and spring closed when released. Prior to loosening and removing condensing unit service valve caps to install refrigeration service gauges, leak check the valves to identify any refrigerant leaks from them which otherwise might not get addressed. Be prepared with the proper equipment to measure discharge pressure, suction pressure, and superheat. Measure and record the operating data requested below and determine any anomalies with the values compared to the acceptable ranges in parenthesis. Refer to the Warm Case Troubleshooting Table found on Page #2. Using the top row of the table which names each column, identify the column(s) which correspond to the appropriate abnormal reading. Then, observe the components of the case and condensing unit listed in the left vertical column of the same table. Use the table to match the measurements and observations to potential equipment problems explained in the paragraphs below. Evaluate all potential problems in the table before making a final diagnosis. In these systems, subcooling is typically not used for troubleshooting.

Measurements: (Fill in blanks)

Suction Pressure (Cooler: 60-65 psig; Freezer: 16-22 psig): ______________ psig

Discharge Pressure - Hybrid cases only (Cooler: 250-325 psig; Freezer: 175-250 psig): ______________ psig

Superheat (6°F - 14°F)

*Note: Superheat readings shall be taken near the end of the operating cycle with the case operating at 1-2°F above the set point cut-out of the Carel controller.

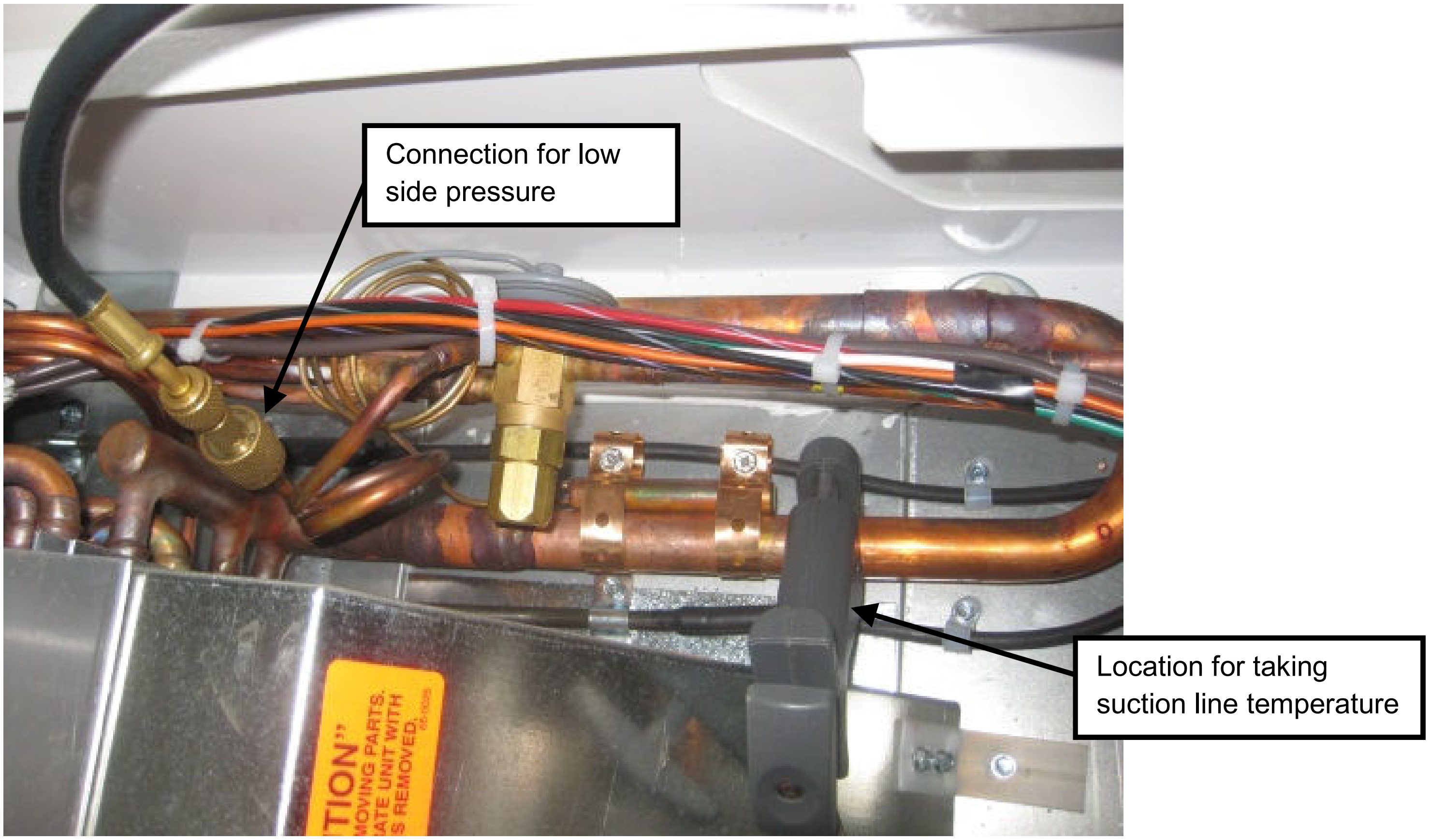
1) Suction pressure reading: _______________ psig

2) Convert the pressure recorded in step #1 above to the R-404a saturation temperature using a refrigerant pressure/temperature chart: _______________ °F

3) Measure and record the suction line temperature within 3" downstream of the TXV bulb: __________°F

4) Calculate the evaporator superheat:

______________________ °F - _____________________ °F = _________________ °F
(Suct line temp – Step #3) (Saturation Temp (Step #2) (Evap Superheat)



Warm Case Troubleshooting Table

Observations:	Superheat Low	Superheat High	Suction Pressure Low	Suction Pressure High	Discharge Pressure Low	Discharge Pressure High
Iced Coil	1.3		1.3		1.3	
Short Cycling		1.1/1.6	1.1/1.4/1.6	1.6	1.1/1.4	1.1/1.6
Site Glass Bubbling (Low Charge)		1.1	1.1		1.1	
Site Glass Flashing/Foaming		1.1	1.1		1.1	
Evap Fan Out	1.4		1.4		1.4	
Warm Ambient		1.5		1.5		1.5
Condenser Fan Out		1.6		1.6		1.6
Dirty Condenser		1.6		1.6		1.6
Site glass indicates moisture	1.2	1.2	1.2	1.2	1.2	1.2
None of the above	2.2	2.1	2.1	2.2	2.1/2.2	

Compressor not operating

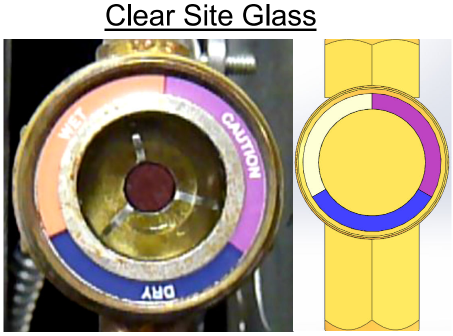
Verify correct voltage and trace the electrical circuit to contactor coil, controller (Carel), safety switches (low pressure, high pressure, and electronic unit controller – EUC) and compressor. Controller and safety switches send a signal to the contactor coil to energize the compressor. If the compressor doesn't start and there is proper voltage, you will need to refer to the condensing unit manufacturer's troubleshooting guide. If the compressor is replaced, verify proper operating parameters after installation of new compressor. For further information, please use the references listed below;

1) Emerson Troubleshooting website:
   http://www.emersonclimate.com/en-us/Resources/Troubleshooting/Pages/default.aspx
2) Emerson Fault Finder app:
   http://www.emersonclimate.com/en-US/resources/mobile_apps/Pages/mobileapps.aspx.
3) Heatcraft manuals:
   http://www.heatcraftrpd.com/literature/literature.aspx?andfid=956.

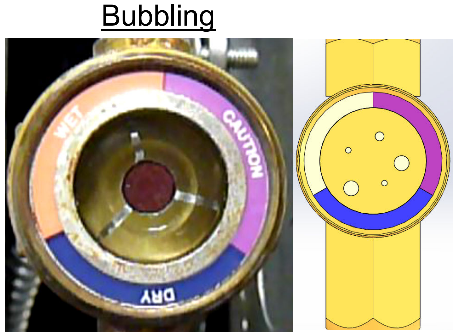
Correction to System:

1.1) A site glass which displays flashing or foaming can be the result of high superheat which could be caused by possibly a low refrigerant charge. Under normal operation, you will see occasional bubbles. If you see any constant bubbles and / or flashing or foaming, then the system might be low on refrigerant charge. Monitor the site glass to verify. Confirm that there are no restrictions in the liquid line (receiver valve partially closed, plugged drier, kinked liquid line, etc.). Low suction pressure, as a result of low refrigerant, will make the TXV look as though it is malfunctioning, when it is not. The TXV may be seeing a combination of liquid and vapor entering the valve, and replacing the TXV will not correct the issue in the system. Other checks for low charge are if the compressor amp draw is low or if there is a small condenser split (condensing temperature – ambient temperature). Correction: Repair any leaks in the system. Add refrigerant to system to properly charge it. For Hybrid cases, the case nameplate lists the correct refrigerant charge. For Remote cases, calculate the refrigerant charge required for the line set run and add 1-1/2 pound per door for VC/VZ cases. **Installers** - Do not exceed receiver capacity needed for pump down operation. This is critical in situations where the liquid line solenoid valve is at the CNDU.

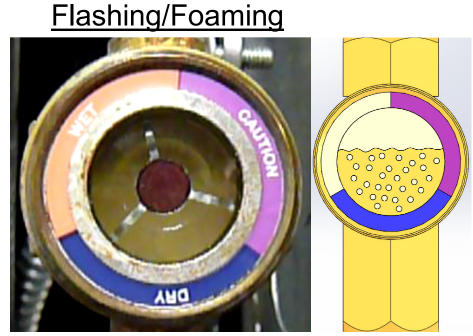
Clear Site Glass



Bubbling



Flashing/Foaming



1.2) A pink center eye on the site glass indicates the moisture level is high in the refrigerant system. Moisture can cause the expansion valve to stick and warm the expansion valve body. Correction: Replace filter/drier.

1.3) A coil that is plugged with ice may result in low superheat and might have had an insufficient defrost. Correction: The coil will need to be de-iced. Running the case through an additional defrost may de-ice a partially ice plugged coil. Water washing is generally required. Manual methods or water removal will be required for cases that use pumps and condensate evaporating pans to avoid water overflow. Troubleshoot the case defrost to ensure the case defrost is functioning properly, is programmed correctly, and has proper heater voltage. Check that all evaporator fans are functioning properly and that the evaporator has the correct superheat.

1.4) An evaporator fan that is not operating will cause the case to have low superheat and improper air flow across the evaporator. Correction: Check that the fan is plugged into the harness. Check voltage on fan harness receptacle. If no voltage is present at the harness and the other fans are operating, replace the harness. If voltage is ok on the harness, replace the fan motor. If no fans are running, troubleshoot the electrical system.

1.5) Warm ambient conditions will cause high superheat, high discharge pressure, and reduced compressor capacity. Correction: If an indoor condensing unit, verify that the store A/C unit is functioning properly and proper store conditions are maintained. Check placement of ductwork in reference to the case condensing unit. If an outdoor condensing unit, be sure there is proper air flow across the condenser.

1.6) A condenser fan that is not operating or a dirty condenser will cause high discharge pressure, reduced compressor capacity, and high superheat and improper air flow across the condenser. Correction: If the condenser is dirty, clean it and remove any obstructions from it. Check the fan blade and tighten holding screws, if required. If the condenser fan is not running, check the wiring to the condenser fan. If power is correct to the condenser fan, then replace the condenser fan motor.

Expansion Valve Information:

2.1) High superheat: Insufficient liquid refrigerant is being fed to the evaporator. Suction pressure will be low. High superheat will cause the case temperature to be too high. Correction: Before making any adjustments, verify proper bulb attachment, bulb location, and that the TXV is not incased in ice. Also, inspect the equalizer line location and that there are no restrictions to the equalizer line. Test the TXV to make sure it is working properly. Wrap the bulb with a warm rag and verify that TXV adjusts. If the TXV does not adjust, the TXV bulb and/or valve need to be replaced. Only an experienced technician should inspect the TXV for any dirt or foreign material & if present, replace the TXV. To attempt to adjust the superheat, turn the TXV adjustment screw counterclockwise until the proper superheat is achieved. Use caution not to back out the valve past the adjustment stop. When you take the superheat readings, the case should be at 1-2°F above the set point cut-out on the Carel. Observe the case for 2 additional cycles to verify proper adjustments were made.

2.2) Low superheat: Too much refrigerant is being fed to the evaporator. Suction pressure can be higher than normal. Liquid can be returning to the accumulator or compressor (liquid slugging). Correction: Before making any adjustments, verify proper bulb attachment, bulb location, and that the TXV is not incased in ice. Also, inspect the equalizer line location and that there are no restrictions to the equalizer line. Test the TXV to make sure it is working properly. Wrap the bulb with a warm rag and verify that TXV adjusts. If the TXV does not adjust, the TXV bulb and/or valve need to be replaced. Only an experienced technician should inspect the TXV for any dirt or foreign material & if present, replace the TXV. To attempt to adjust the superheat, turn the TXV adjustment screw clockwise until the proper superheat is achieved. When you take the superheat readings, the case should be at 1-2°F above the set point cut-out on the Carel. Observe the case for 2 additional cycles to verify proper adjustments were made.

2.3) Hunting: Superheat and suction pressures fluctuate. The valve feeds too much refrigerant and then not enough refrigerant. System design and operating conditions may cause the system to “hunt” on occasion. If hunting is moderate and there is no floodback to the compressor, the system impact is minimal and no correction is needed. Verify proper bulb attachment, bulb location, and that the TXV is not incased in ice. Verify proper superheat setting on valve.

2.4) Standard operation of a TXV → The TXV meters the liquid refrigerant flow to the evaporator based on the evaporation rate of the liquid refrigerant in the evaporator. The sensing bulb on the TXV reacts to the temperature of the gas refrigerant leaving the evaporator and can adjust the liquid flow entering the evaporator. The TXV ends up controlling the superheat in the evaporator to a predetermined setting/superheat. The remote bulb pressure is equal to the evaporator pressure plus the pressure provided by the superheat spring.

2.5) Replacing a TXV → A water wet rag must be wrapped around the valve when brazing the valve. Failure to do so can cause excessive heat to the internals of the valve and powerhead causing the TXV to fail.

Zero Zone Service Information

Zero Zone Service Documentation & Support (including specs sheets & manuals):
http://www.zero-zone.com/service.php
Zero Zone Display Case Customer Service Tech:
262-392-1301 or Toll-Free 800-247-4496
Zero Zone Refrigeration Systems Customer Service Tech:
262-392-1302 or Toll-Free 800-708-3735