



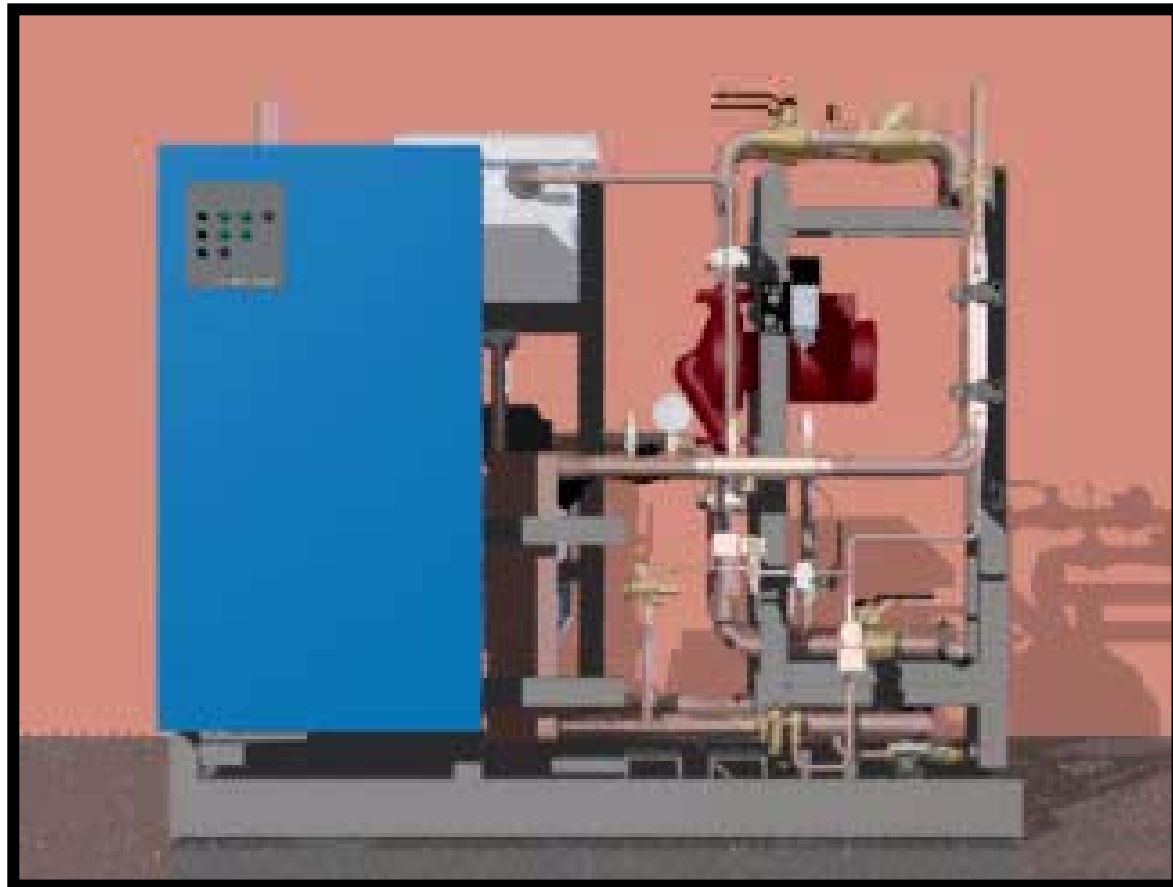
Secondary Coolant 301

Instructor

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Learning Center

Secondary Coolant 301 Start-Up Procedures

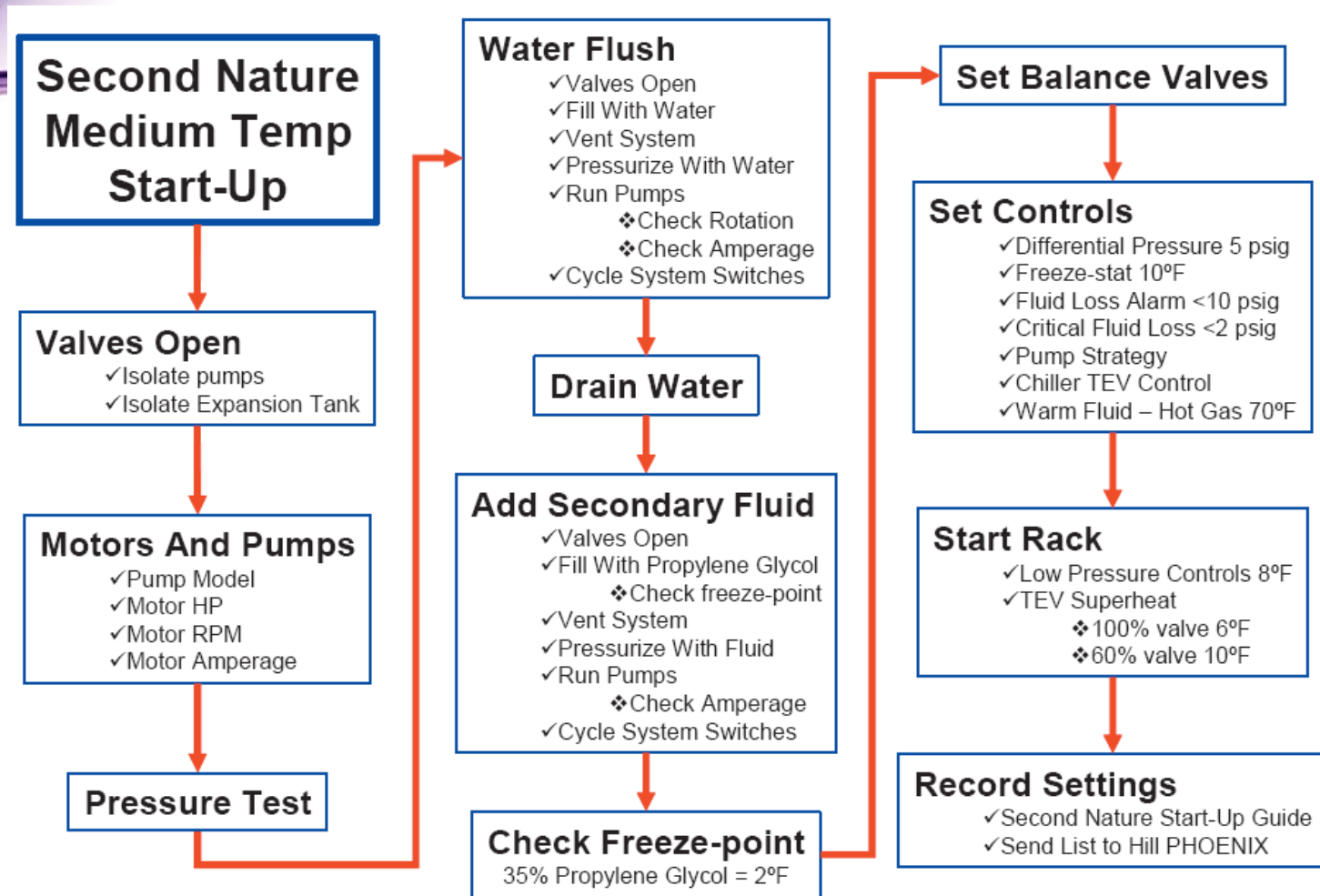


Secondary Coolant 301 Objectives

- Describe the initial startup procedures for a medium temperature secondary coolant system
- List the steps for adding fluid to the system
- Describe the controls strategy for the system



Secondary Coolant Startup Flow Chart



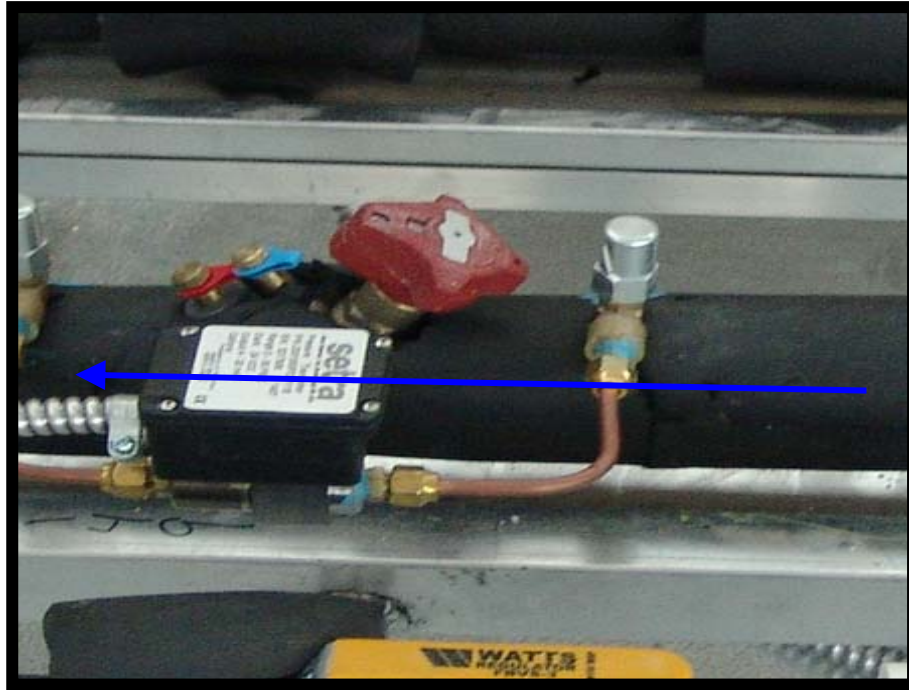
Note that these procedures are intended as guidelines only to be followed as closely as the specifics of each installation allow

End of Loop Balance Valve

- Set all $\frac{3}{4}$ " end of loop balance valves
- Valve setting should be set at 1.0
- End of loop balance valve maintains the system's constant flow even when there is no call for cooling



End of Loop Balance Valve



Fully Open all System Valves

- Balance valves except for the “End of Loop”
- Ball valves
- Circuit solenoids (Verify all electrical work is complete and correct)



Close all Vents and Drains



Expansion Tank

Verify that the expansion tank is pre-charged

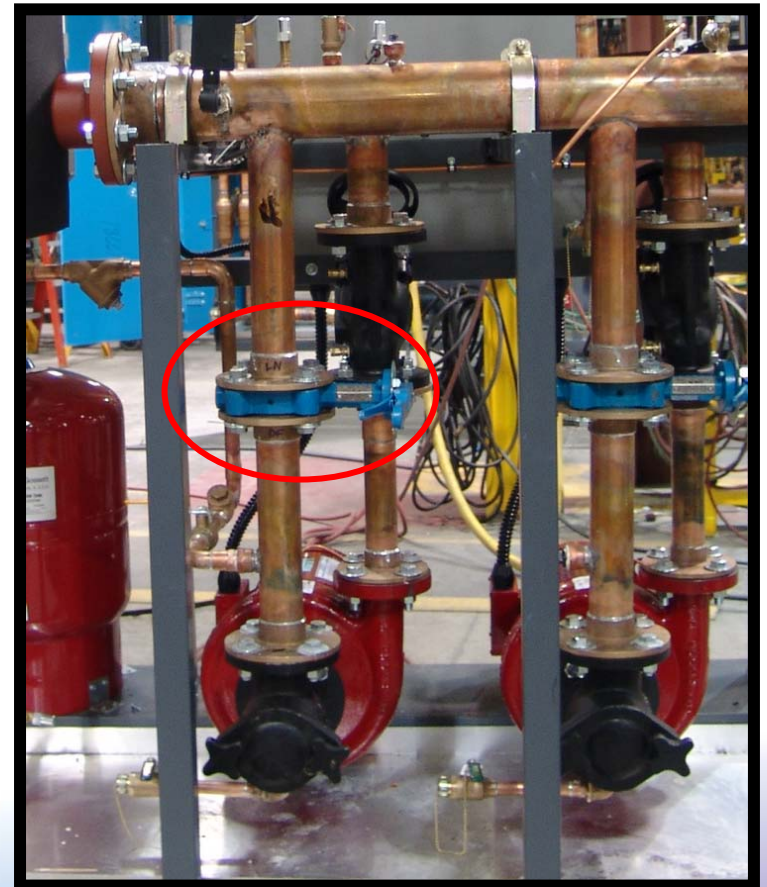


Pressure Testing

- Isolate the expansion tank, pumps, and non-pressure test-rated cases and components
- Use dry nitrogen, at the following durations and settings:
 - 15 psig - 30 minutes
 - 30 psig - 30 minutes
 - 60 psig - 1 to 3 hours
- If the system is not going to be flushed and charged right away reduce pressure to 15 PSIG

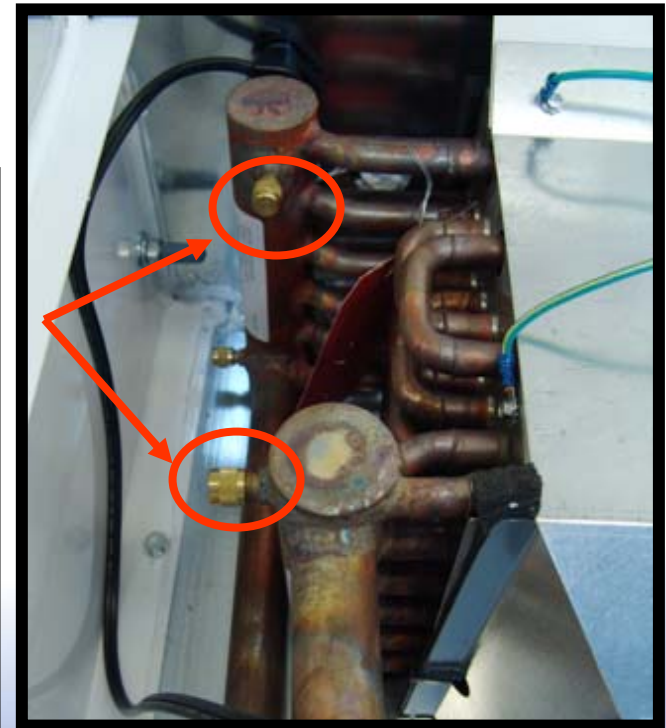
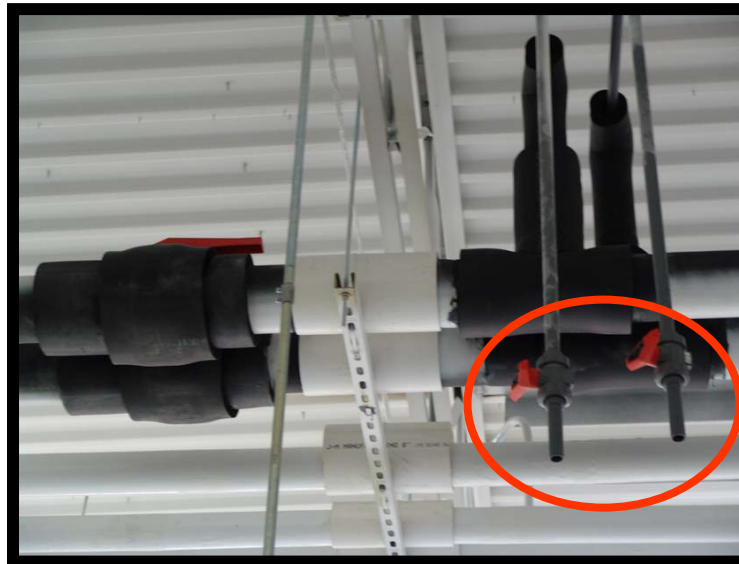
Flushing the System

1. Reopen all system valves
2. Close the valve between the return and the supply on the pump skid
3. Fill the system with water and allow water to flush through until water runs clear
4. Once the water is clear, stop draining
5. Open the valve closed in step two (2.)



Flushing the System (cont.)

6. Pressurize the system to ~30 PSIG
7. Vent air from main loop lines
8. Vent air from the system starting at the lowest point and moving upward
9. Turn off water supply



Pump Start-Up

- Start the pumps one at a time and check rotation and amp draw
- If the amperage is too high reduce it by closing the pump outlet balancing valve until the proper amperage is reached
- Start and run all pumps



Cleaning the System

- From this point forward maintain proper manufacturer's return fluid pressure
- Cycle the circuit switches on one at a time and allow them to run for ~1 minute
- Cycle the warm fluid defrost solenoids
- Turn on all circuits
- Run system for 2 hours to fully flush all coils
- Shut off pumps



Draining the System

1. Shut off the pumps
2. Drain all of the water in the system
 - Use nitrogen to force out any water that maybe trapped in the system
3. While water is draining check for cleanliness, repeat flushing if necessary
4. Open the pump strainers and remove the fine-mesh startup screen



Removing Startup Strainer





Filling the System with Glycol

1. Open all valves except for the vents and drains
2. Check the freeze point of each drum before pumping into the system
3. Pump in 2 drums of 35% propylene glycol
4. Pump in 1 drum of 100%
5. Finish filling the system with secondary fluid
6. Purge all of the air from the system, starting at low and working up





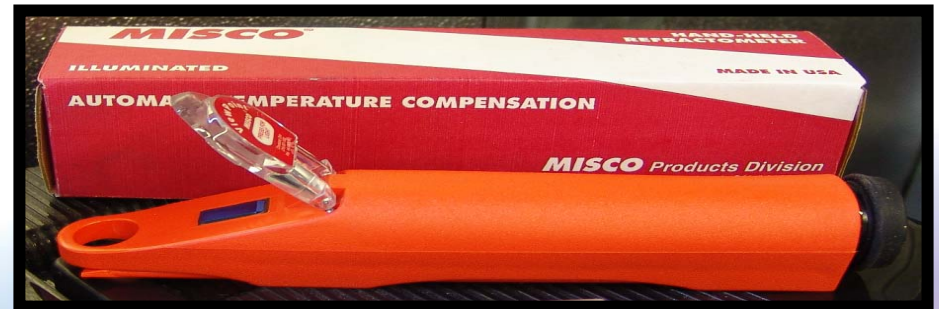
Starting Up the System

1. Make certain the pumps are full of fluid and all air is removed
2. Verify that the pump balance valves are 100% opened
3. Start the pumps one at a time and check the amperage of each pump
4. Turn on all pumps
5. Verify a proper manufacturer's return fluid pressure and add fluid if necessary
6. Allow fluid to circulate through the system



Starting up the system (cont.)

7. Using the refractometer to check the freeze point
8. Cycle circuit switches one at a time and allow each circuit to run for ~1 minute
9. Check freeze point again
10. Turn on all of the system circuits and allow them to circulate for 1 hour
11. Check freeze point again
12. Adjust freeze point if necessary

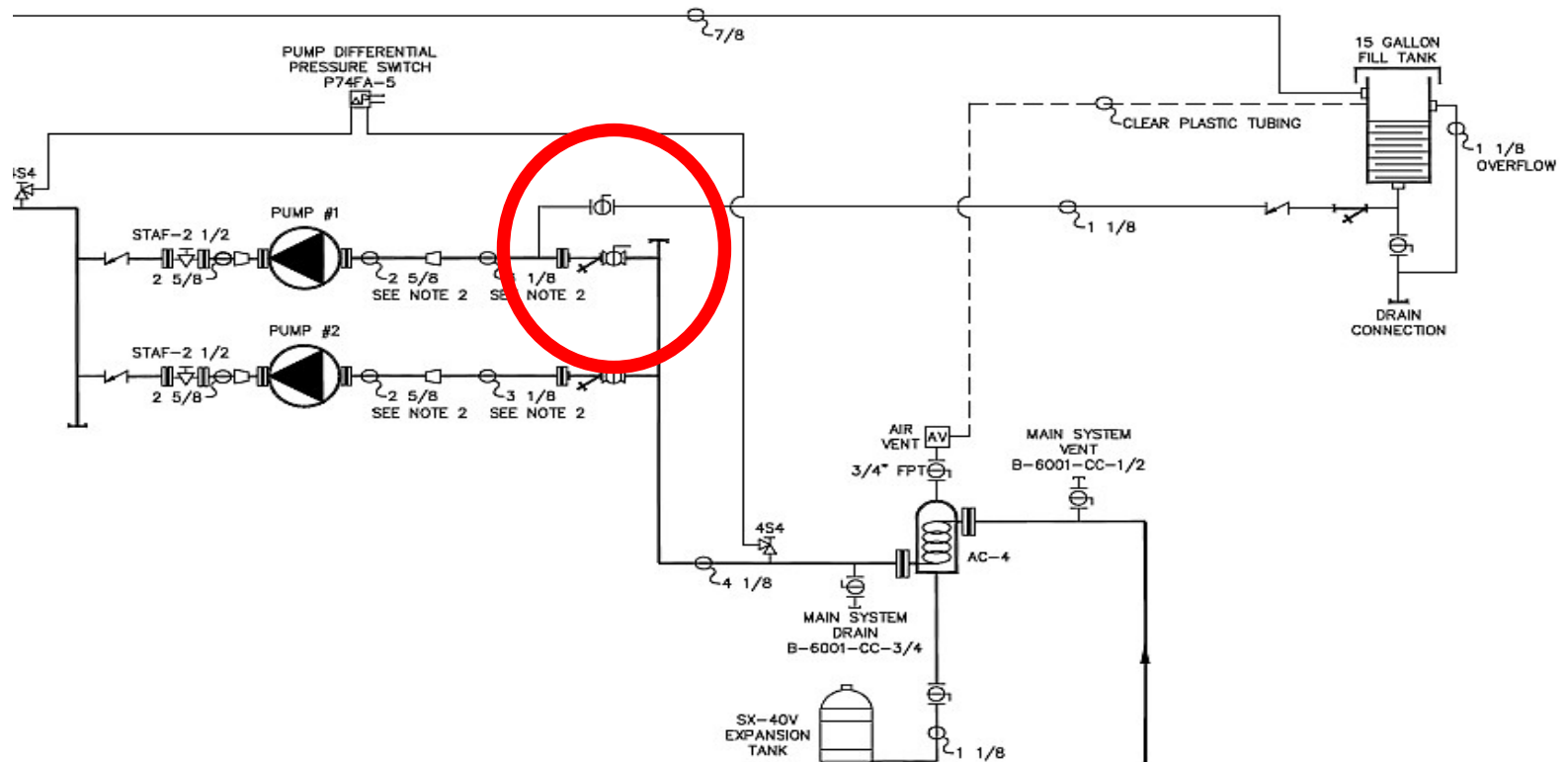


Adjusting the Freeze Point

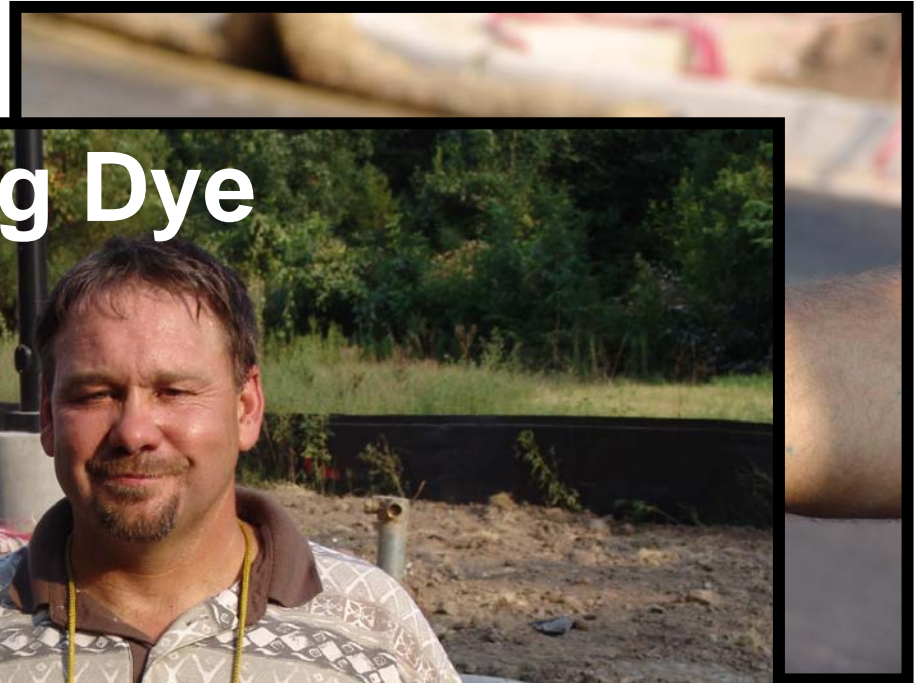
- If the freeze point is too high, add 100% Propylene Glycol
Do not mix manufacturers
- If the freeze point is too low, add distilled water
- Add additional coolant (if necessary) through the fill tank after the system is charged
- Record the final freeze point



Adding Propylene Glycol



Adding Dye



Setting the Balancing Valves

- Calculate individual valve set points using the legend
- Go to each display case and walk-in and set the valve
- Adjust setting as need for proper discharge air temperature
- After setting valves to the proper flow rate lock in place



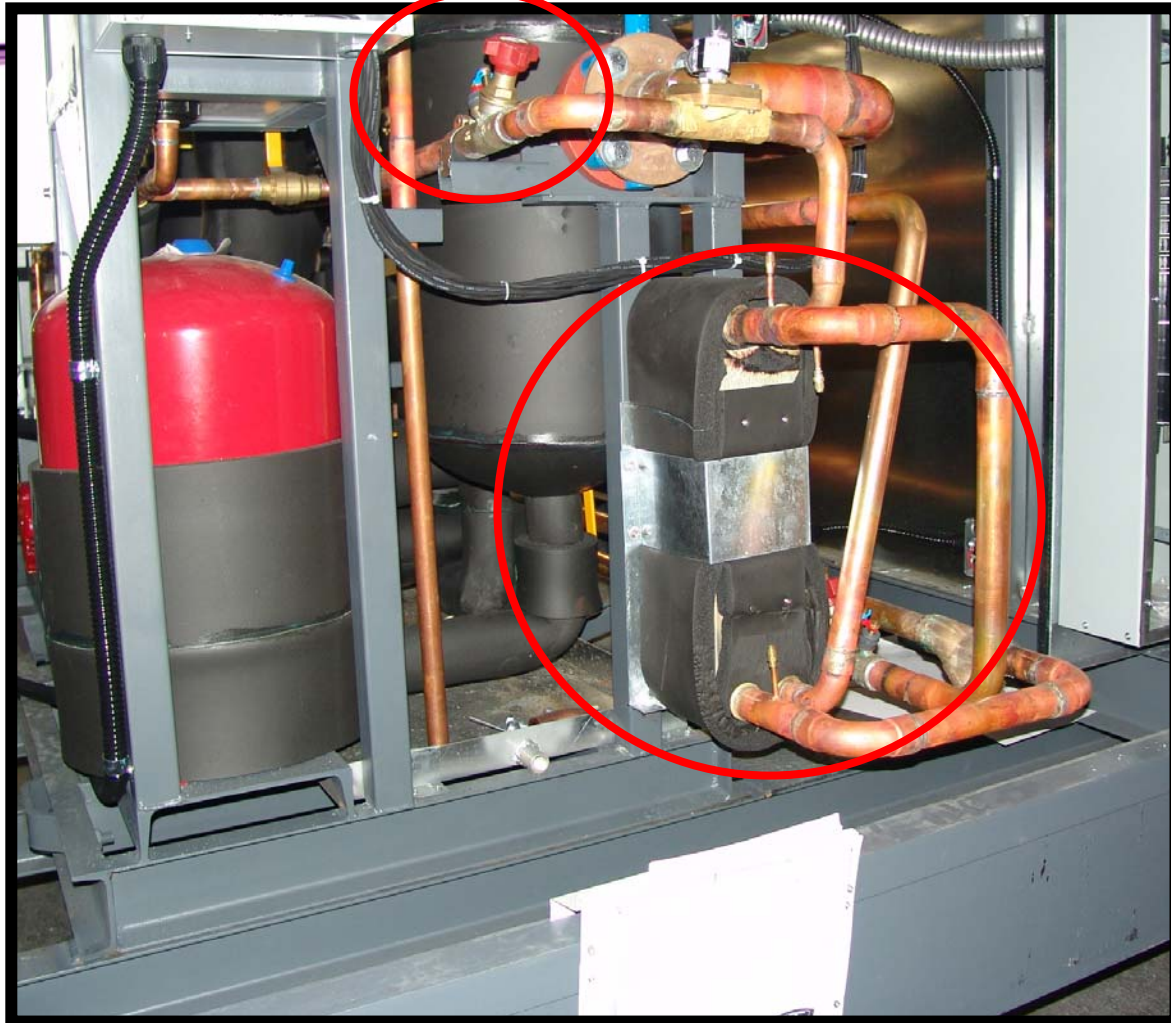
System Set Points

- Case Temperatures – Customer Specified
- TXV Superheat – per manufacturer
- Pressure Differential Lockout – per manufacturer
- Pump Cycling – as determined by system operation and pump strategy
- Low Return Pressure Alarm – per manufacturer

System Set Points (cont.)

- Freeze Point (measured) – per manufacturer
- Balance Valves – case/load specified (adjust as needed)
- Compressor Low Pressure Control – normal DX setting
- Chiller “off” Temperature
- Freeze Stat – per manufacturer
- Verify that there's thermal grease in the probe well
- Amount of dye (tsp/drum) for color

Defrost Heat Exchanger



Chiller Freeze Stat



Pump Strategy

Set up duplex and triplex pump control strategies per customer and manufacturer's specifications



System Final Checks

- After a couple of days of operation check all high vents for any trapped air
- Adjust balance valves inside individual display cases to give equal discharge air temperature
- Adjust the system to find the warmest fluid required to satisfy all cases (raise the saturated suction temp)
- Check super heat setting on the chiller TXV



Secondary 301

Secondary Coolant Maintenance and Troubleshooting



Objectives

- Check safety and operating controls
- Perform visual inspections on secondary coolant systems
- Explain cleaning secondary coolant fixture coils
- List troubleshooting procedures for secondary coolant systems

Pump Safety and Operational Controls

- Low temperature thermostats
- Pump differential pressure switches
- Liquid line solenoid valves
- System relief valves
- Pump cycling sequence
- Pump return fluid pressure
- Compressor oil levels
- Clean condenser coils



Reasons for Loss of Flow

- Pump motor or impeller failure
- Closed discharge or suction valves
- A blocked strainer



Direct Expansion (DX) Controls

- Thermostatic control (T-stat)
- High pressure control
- Compressor low pressure switch
- Oil failure switch
- Condenser fan cycling
- Receiver levels
- Superheat setting

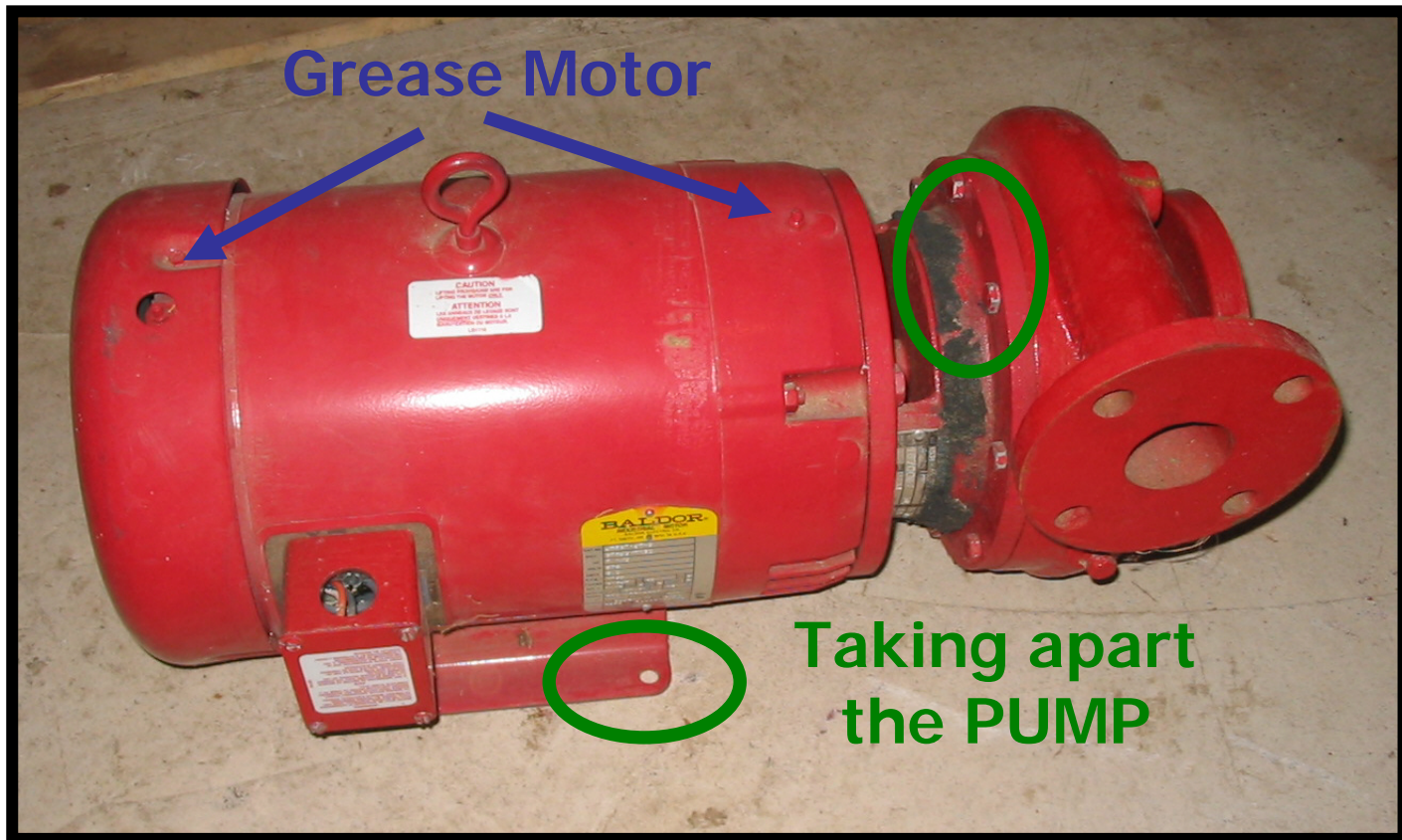


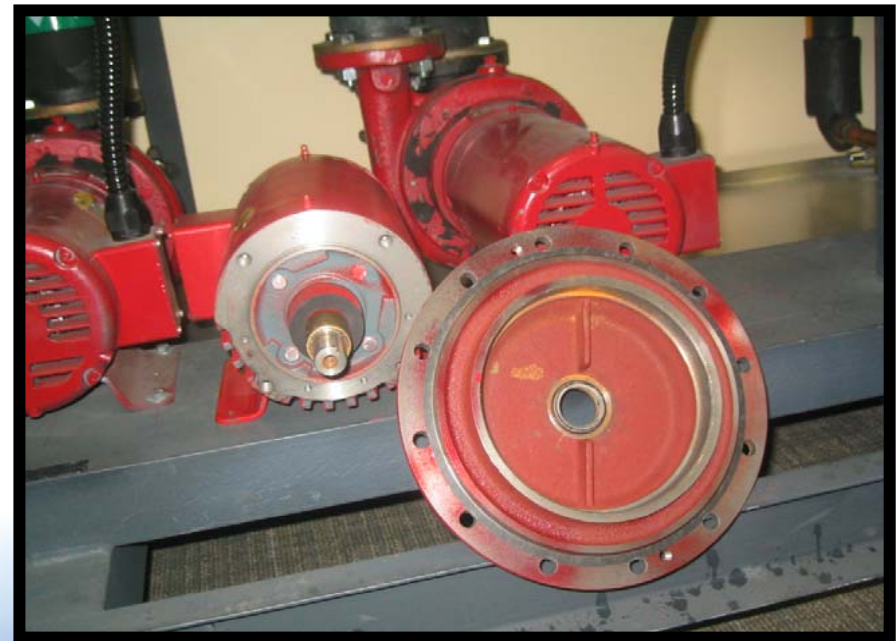
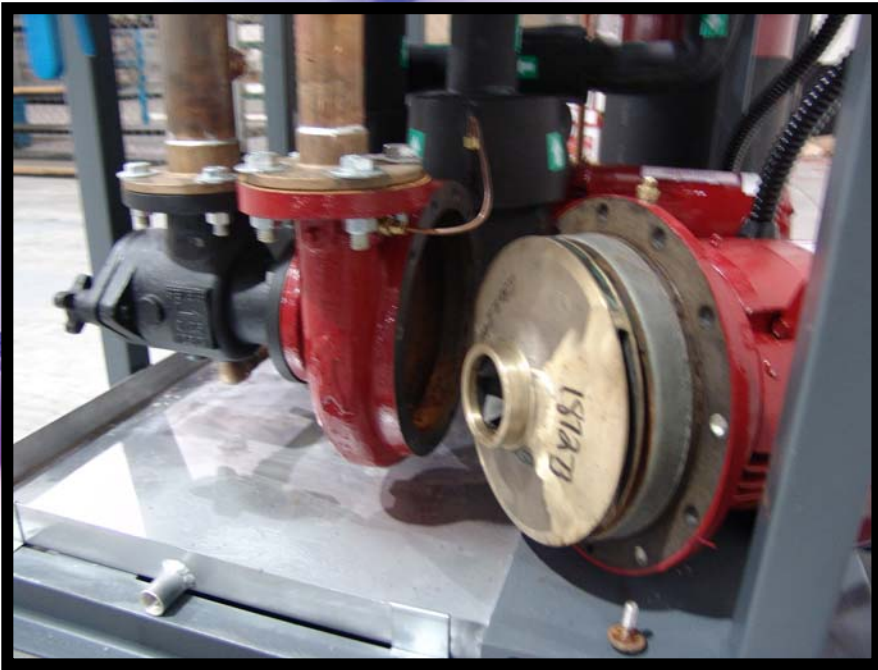
Visual Inspection

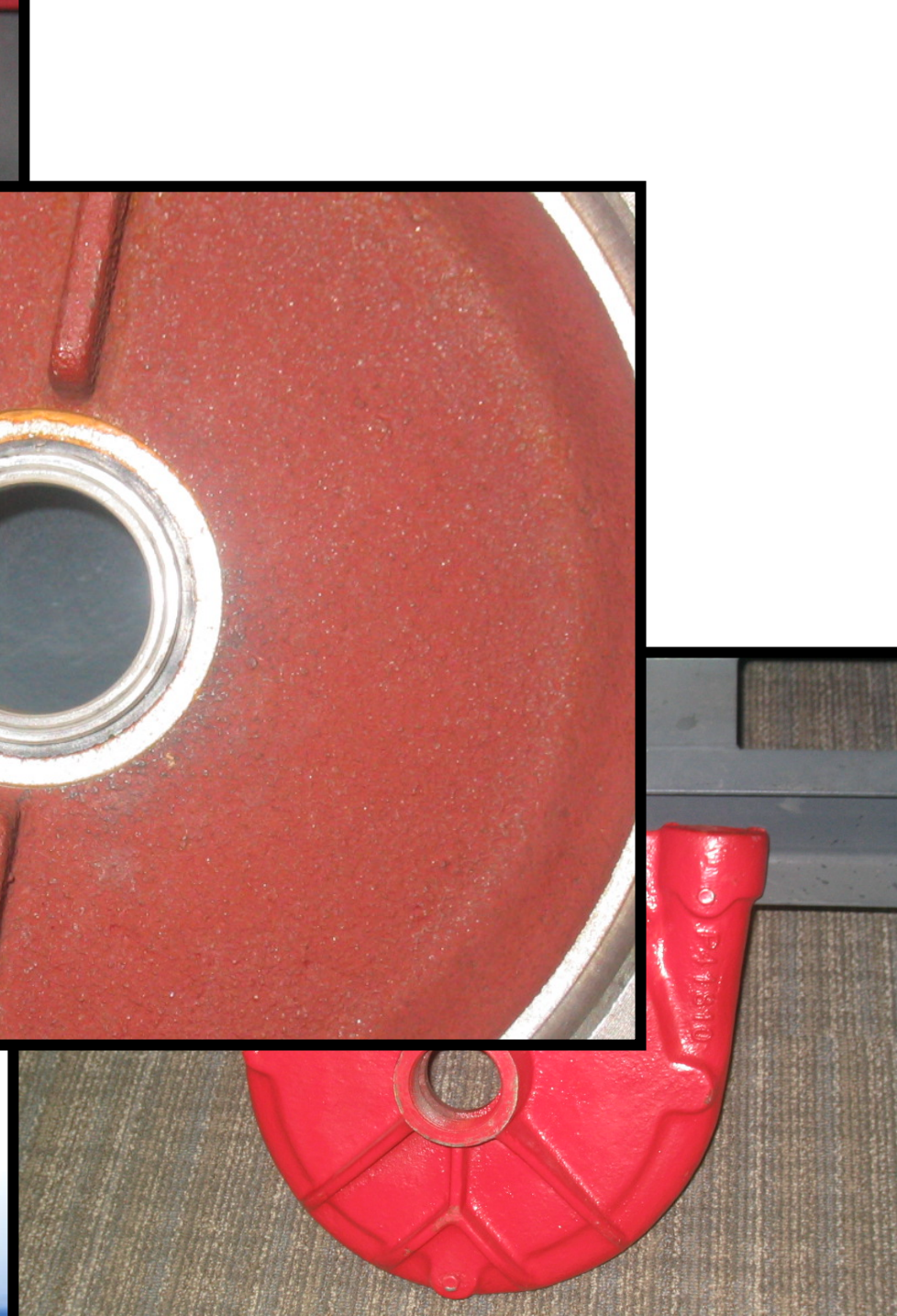
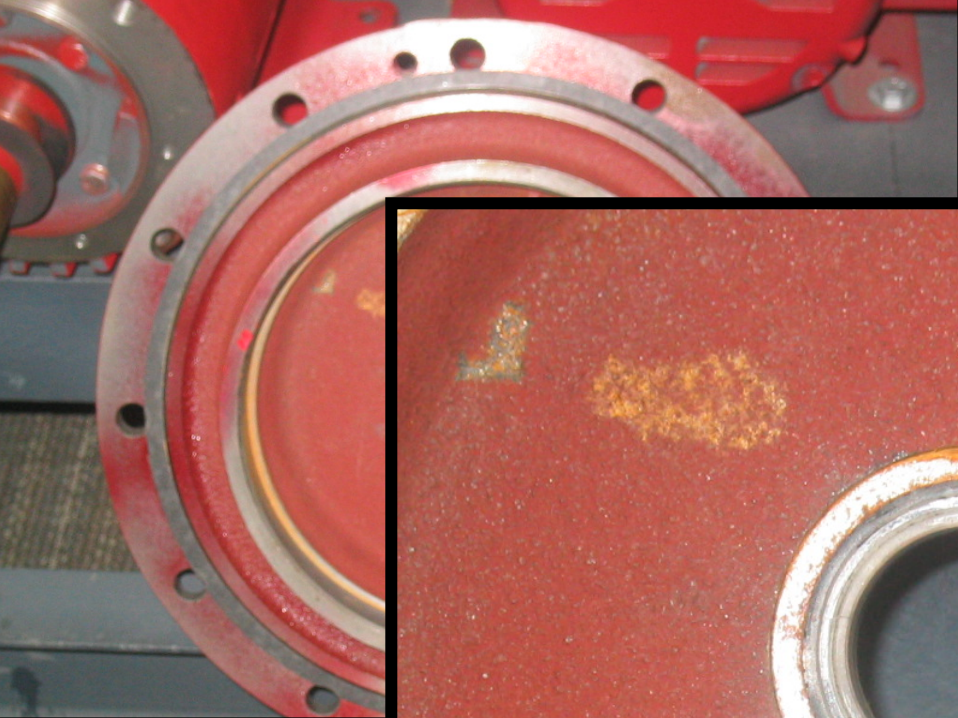
- Electrical and mechanical components of the system
- Case coils
- Condensers
- Inspect DX system for leaks
- Compressor oil levels
- Check grease fittings on pump for proper lubrication



Pump Maintenance







Case Preventive Maintenance

- Check discharge air flow
- Check fan operation make sure fan blade turn freely
- Check defrost operation
- Wash case and clean out drains
- Check for blue dye, this is an indication of a leak
- Remember not to close both shut off valves at the heat exchanger



Incorrect Coolant Supply Temperature

- The glycol concentration
- The chiller approach
- Compressor operating mode
- Expansion valve
- Defrost system
- Check freeze point

Incorrect Case Temperature

- Perform regular DX case troubleshooting
- Check flow rate through the case
- Check for air in the coil and/or trapped air in lines feeding case
- Check the pump strategy (operation) for proper on/off cycling
- If the supply and return pipes are reversed then the solenoid will not shut off the case but the case will always have fluid flow since a solenoid valve will flow in reverse whether it is energized or not

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Questions