REFRIGERATION

Basics

BUILDING THE FINEST COMMERCIAL REFRIGERATION-TRUE, "The Best of the Cold Ones"

GOOD REFRIGERATION PRACTICES

Good refrigeration practices will always start with good detective work to find out what caused the failure so we can eliminate the possibility of a repeat failure. Below is a step by step set of procedures we would recommend is followed when repairing a refrigeration system.

- Before opening the refrigeration system remember that the POE oil is very hygroscopic and absorbs moisture very quickly. You should not leave the system open to the atmosphere for more than 15 minutes. Any vacuum that exists before any repair should be broken with nitrogen to avoid moisture being pulled into the system.
- When accessing the system do not remove process tube ends. Use Temporary bolt on access valves for diagnosing and repair.
- When repair is complete valves need to be removed.
- For your manifold gauges, use as short as hose as possible. We recommend a maximum length of 12".
- The introduction to the refrigeration system of anything other than a flushing agent, nitrogen, refrigerant, or oil is prohibited.
- If you are changing a component keep the system closed up with plugs or caps to reduce moisture contamination.
- Recover the refrigerant from the system. Note R-290 can be vented in a well ventilated area with no source of ignition.
- Remove the faulty refrigeration component and filter drier by cutting them out with a tubing cutter.
- Take a look at the filter drier and the components that have been removed for signs of oil breakdown, foreign objects like desiccant from drier, metal pieces from valves, etc.
- Be sure and test the oil from the refrigeration system for contamination using the proper test kit for the type of oil.
- When replacing a compressor make sure to also remove all the old oil from the system.
- If the oil shows signs of contamination. Flush the system.
- While purging nitrogen through the system drill (approximately 1/8") (3.18 mm) hole in the bottom of the accumulator **(IF EQUIPPED)** so we do not leave contaminated oil in the system. After blowing this out with nitrogen, be sure to braze the hole closed.
- Always replace the drier with the exact OEM size.
- When brazing on R-290 system always purge nitrogen through the system.
- Place a nitrogen charge in the system to check for any leaks.
- Release the nitrogen down to 2 PSI.
- Change vacuum pump oil regularly to ensure the deepest vacuum your pump is capable of.
- Start pulling a vacuum as soon as possible to help remove moisture.
- Using a micron gauge pull down to 500 microns.
- See if the system will hold this micron with the gauges closed and the pump switched off to test for leaks of moisture.
- Once the system is evacuated, weigh in the listed refrigerant charge located on the serial tag inside the cabinet. R-290 can be added as a liquid or vapor. Refrigerant 134a/404A charge as a liquid only. Refrigerant should be charged through the high side.
- Test run unit and check for proper operation.
- Remove access valves.

ANY NITROGEN ADDED TO THE SYSTEM SHOULD NOT EXCEED 200 PSI (13.8 BAR).

PLEASE CALL TRUE TECHNICAL SERVICE WITH ANY QUESTIONS REGARDING THE ABOVE PRACTICES.

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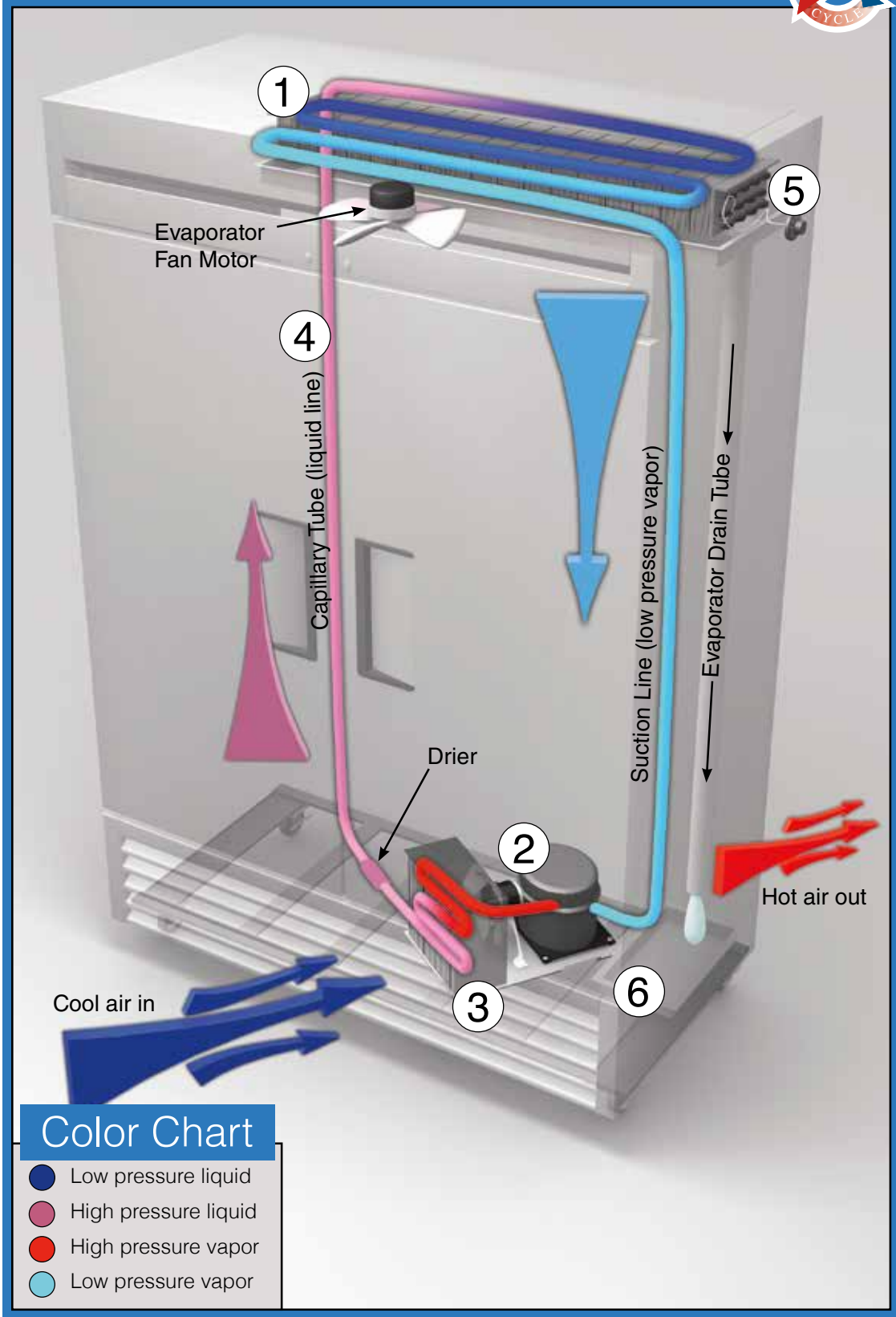
The Refrigeration Cycle



Color Chart

- Low pressure liquid
- High pressure liquid
- High pressure vapor
- Low pressure vapor

1 Evaporator

While the evaporator fan motor(s) circulate air over the evaporator coil; liquid refrigerant running within the evaporator coil tubing absorbs heat through the walls of the evaporator coil. This causes a change of state in the refrigerant from a low pressure liquid to a low pressure vapor.

2 Compressor

Low pressure vapor refrigerant is compressed, combining the heat absorbed in the evaporator with the heat of compression from the piston stroke before being pumped into the condenser.

3 Condenser

While the condenser fan motor(s) circulate cool ambient air over the condenser coil; heat absorbed by the refrigerant in the evaporator coil is removed. This causes a change of state in the refrigerant from a high pressure vapor to a high pressure liquid.

4 Capillary Tube

The capillary tube meters the volume of high pressure liquid refrigerant entering the evaporator coil.

5 Thermostat

The thermostat cycles the compressor on and off.

6 Condensate Pan

The condensate pan collects moisture that has condensed on the outside of the evaporator coil and drained through the evaporator drain tube. Warm air from the condenser coil is utilized to evaporate the water in the condensate pan.

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COMPRESSOR RUNNING AND CABINET IS WARM

This Troubleshooting/Diagnosing advisement should be performed by a Qualified/Licensed Service Provider.

NOTE: This diagnosis starts after verifying that the issue is not defrost or thermostat related.

Verify the condensing coil is clean.

Refer to the Maintenance and Cleaning section of the Installation Manual for proper cleaning procedures.

Verify all openings of the cabinet are sealed.

Doors and drawers should be closed.

Gaskets should be in good condition and sealing.

Open Top Prep Units should have no product pans missing and the pans should be positioned flat in the compartment opening. (No double stack pans.)

Verify the operation of the condenser fan motor.

Check if the fan is running and at proper speed.

Repair any wire connections or replace a defective fan motor with OEM.

Verify proper exterior cabinet clearances to allow good airflow.

Refer to the Owner's Booklet for proper clearances

Verify proper interior product clearances to allow good airflow.

The unit needs to be correctly loaded with product which will allow airflow with sufficient clearances inside the unit. This is critical for proper cabinet operation and consistent cabinet temperatures.

Check the coil conditions.

The evaporator coil should be cold and not have excessive frost or ice.

The condensing coil should be hot at the inlet and warm on the outlet.

Check refrigeration lines/components for any kinks, sign of oil, rubbing, etc.

Check filter drier temperatures (inlet vs outlet). Temperatures should be the same, warm.

REVIEW THE GOOD REFRIGERATION PRACTICES INFORMATION PRIOR TO PROCEEDING.

Check system operating pressures (both high and low side) to diagnose refrigeration issue.

Higher suction pressure, lower head pressure.

Compressor may have bad valves.

Lower suction pressure, lower head pressure.

Recover the refrigerant charge, weigh in with a scale the exact charge amount as listed on the data sticker.

- If the pressures are now correct, the system may have a leak.

  Follow Good Refrigeration Practices to complete repair.

- If pressures did not change or are still low, the system has a restriction.

  Change filter drier and cut up to 3" from inlet of capillary tube and recharge.

  If pressures did not change, the capillary tube may have a restriction.

  Follow Good Refrigeration Practices to complete repair.

COMPRESSOR NOT RUNNING AND / OR NOT STARTING

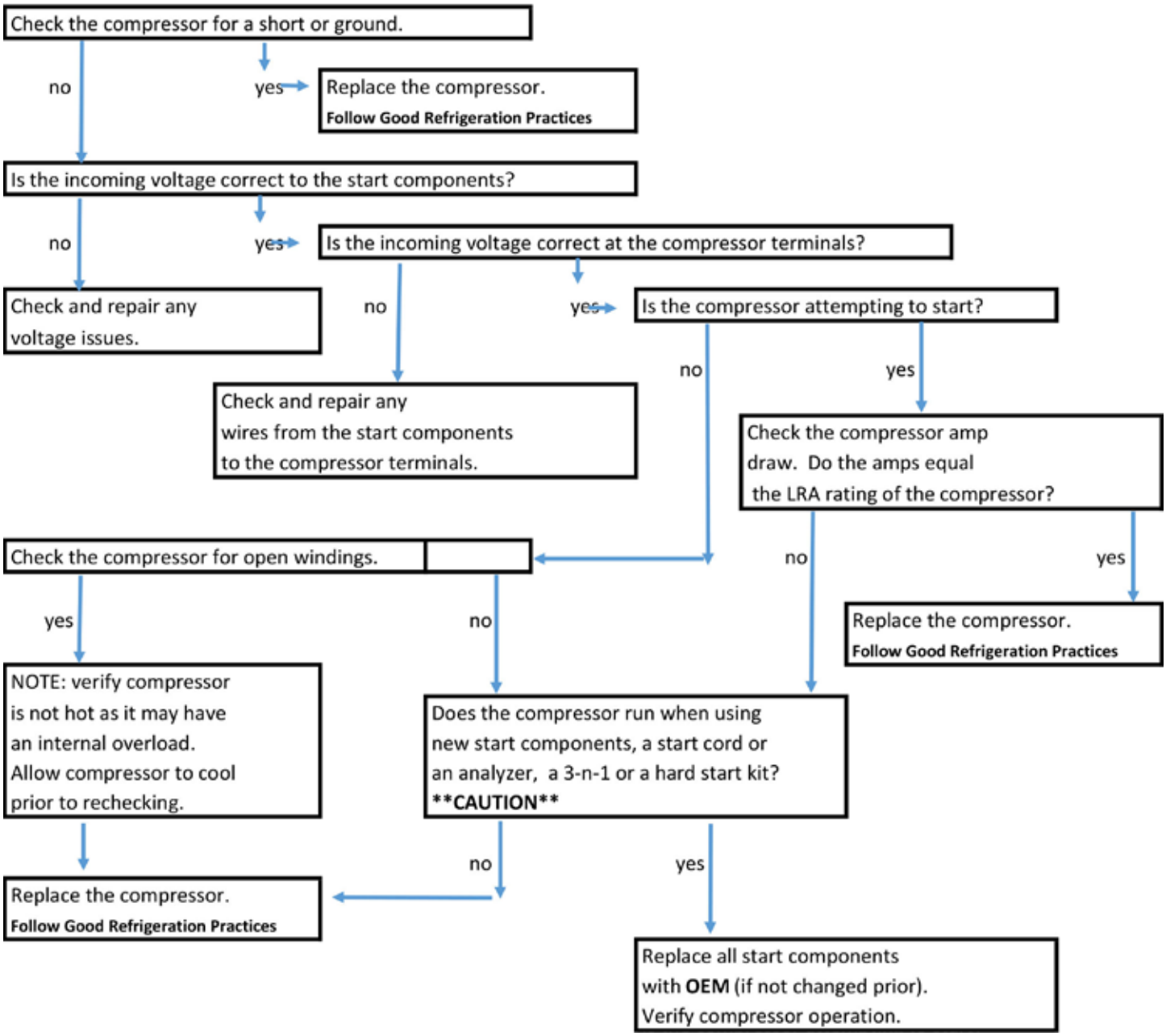
Compressor Not Running and / or Not Starting

This Troubleshooting / Diagnosing advisement should be performed by a Qualified / Licensed Service Provider.

Diagnosing MUST start with safety first.

Cabinet must be on a dedicated circuit.

No extension cords or plug adaptors can be used.



CAUTION:

A 3n1 or hard start kit cannot remain on a Hydrocarbon (R-290) unit and must be removed immediately after testing.

NOTES