METROPOLITAN NY CHAPTER

Refrigeration Service Engineers Society

Continued Education for the HVAC/R Industry

"Better Service Through Knowledge"

****

April 2009

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RSES® The HVACR Training Authority
Metropolitan New York Chapter

EMPIRE KEYSTONE ASSOCIATION BETTER SERVICE THROUGH KNOWLEDGE

Conversion Factors

Length

1 in = 2.54 cm
1 m = 39.37 ft
1 ft = 30.48 cm

1 km = 1,094 yd
1 yd = 91.44 cm
1 mi = 63,360 in

Area

1 in^2 = 6.452 cm^2
= 4,840 yd^2
1 acre = 43,560 ft^2
1 ft^2 = 929 cm^2
1 yd^2 = 8,361 cm^2
1 mi^2 = 3,097,600 yd^2

Volume

1 cm^3 = 1 ml
1 gal = 231 in^3
1 in^3 = 16.387 cm^3
1 ft^3 = 1728 in^3
1 L = 1,000 cm^3
1 m^3 = 35.031 ft^3

Mass (weight)

1 oz_m = 437.5 gr
1 slug = 32.174 lb_m
1 lb_m = 7,000 gr
1 ton = 2,000 lb_m
1 mton = 2,205 lb_m

Pressure

1 inH_2O = 5.202 psf
1 atm = 2,116 psf
1 inHg = 70.73 psf
1 psi = 144 psf
1 bar = 100 kPa

Power

1 W = 3.412 Btu/hr
1 ft-lb/s = 4.626 Btu/hr
= 1.356 W
1 hp = 42.41 Btu/min
= 550 ft-lb/s
= 745.7 W

YOU MAKE THE CALL ...

You are called out to service the below-listed equipment with the complaint and conditions observed. From the information given, determine what is the most likely cause of the problem.

Equipment to be serviced:	• 2-1/2 ton 12 SEER split system air conditioner connected to an 80,000 BTU (80% efficient) residential induced-draft gas-fired furnace with HSI ignition system.
Customer's complaint:	• No cooling
Conditions observed:	• House temperature 80°F. • Thermostat selector switch set to cooling. • Thermostat fan selector switch set to "ON". • Thermostat set point is 75°F. • Air filter is slightly dirty. • Indoor blower wheel is clean. • Indoor blower is running. • 24 volts measured at the "R" terminal of the low voltage terminal strip to the common terminal. • 0 volts measured at the "W" terminal of the low voltage terminal strip to the common terminal. • 24 volts measured at the "G" terminal of the low voltage terminal strip to the common terminal. • 24 volts measured at the "Y" terminal of the low voltage terminal strip to the common terminal. • 115 volts measured at the inlet of the door switch to ground. • 115 volts measured at the outlet of the door switch to ground. • 0 volts measured at the coil of the compressor contactor. • 211 volts measured at the line side of the compressor contactor. • 0 volts measured at the load side of the compressor contactor. • 0 volts measured at condenser fan motor.

Based on the above-listed information, what do you believe is the cause of the problem? *Answer on page 2.*

OIL PRESSURE CONTROLS

It is important that the bearings of an operating compressor are properly lubricated. Improper lubrication will surely lead to a compressor failure. Small refrigerant compressors will normally incorporate some type of splash lubrication system. Larger refrigeration compressors, however, will typically incorporate a forced oil lubricating system to pump oil to the bearings. These larger compressors will also have a safety control to monitor the oil pressure delivered by the oil pump. These oil pressure controls are designed to shut down the compressor in the event inadequate oil pressure is delivered.

These controls do not simply monitor the outlet pressure of the oil pump. They are designed to monitor the *net* oil pressure within the compressor. If the net oil pressure is below a predetermined value for a specific timeframe, a set of contacts open and shut down the compressor. Normally if the net oil pressure is below 9 psig for 90 to 120 seconds, the oil pressure control will stop the operation of the compressor. Once this occurs the control will need to be manually reset in order to operate the compressor again. This prevents the compressor from cycling repeatedly due to lack of proper oil pressure. It also alerts someone that the oil pressure within the compressor is not adequate and some type of corrective action needs to be performed.

The net oil pressure of a compressor is the outlet oil pump pressure minus the pressure of the refrigerant in the crankcase of the compressor. For example, if the outlet oil pressure is 60 psig and the refrigerant pressure in the crankcase is 20 psig, then the net oil pressure will be 40 psig (60 psig – 20 psig).

There are two types of oil pressure controls commonly used: mechanical and electronic.

A typical mechanical oil pressure control will use two bellows to control a linkage operating a set of contacts. One bellow will be exposed to the outlet oil pressure of the compressor and the other will be exposed to the refrigerant's crankcase pressure. When a difference between the two bellows falls below 9 psig, a set of contacts will close. These contacts will now energize a set of heaters located close to a bimetal switch. The heaters will warm the bimetal switch and after 90 to 120 seconds the switch will open. The bimetal switch is typically wired in the control circuit of the compressor and when it opens it will shut down the compressor.

An electronic oil pressure control performs the same function as a mechanical oil pressure control except instead of using bellows and a mechanical switch; a pressure transducer is used to measure the net oil pressure. The transducer sends a signal to an electronic control board which will open the contact of a relay after a 90 to 120 second time delay if the net oil pressure is not adequate. The contacts of the relay will be wired in series with the controls operating the compressor, so when the relay's contacts open the compressor will shut down.

Anytime an oil pressure control shuts down a compressor, the cause of the shut down must be determined. Simply resetting the control does not solve the problem. More than likely the oil pressure will trip again, shutting down the compressor and system again. The cause of the oil pressure failure is not always apparent. At times a technician must monitor the system over a period of time to determine the true cause of the system problem. <<

Measuring the Pressure Drop Across an Evaporator

One of the methods which can be used to measure the airflow across an air conditioning evaporator is by measuring the static pressure drop across the coil. This may require the drilling of access holes into the casing of the system. When drilling care must be taken not to puncture any of the refrigerant lines or cause damage to any other system components. This is especially the case with residential split system air conditioners connected to a forced-air furnace. In order to read the static pressure at the inlet of the coil, probe must be placed between outlet side of the indoor blower and the inlet of the coil. <<

YOU MAKE THE CALL…
Answer:

Based on the information given, the most likely cause is a break in the low voltage wiring leading to the outdoor condensing unit. On a call for cooling you should measure 24 volts across the "Y" and the common terminal at the indoor unit and at the coil of the compressor contactor.

COMING EVENTS

Heat Recovery Venting

Business & Pricing Guidelines

Scroll Compressors

Back to the Basics

Defrost Controls

If you have any suggestions or requests for future programs, please let us know!

METROPOLITAN NEW YORK CHAPTER, RSES

For Information Call: Stan Hollander, CMS (718) 232-6679

Compressor Rated Load Amperage (RLA)

- The RLA as stated on a refrigeration compressor represents the "rated load amperage" and not the "running load amperage" of the compressor, as we were led to believe.
- The actual running load amperage of a compressor has nothing to do with RLA. RLA is a mathematical calculation to meet UL standards.
- Compressor manufacturers must run a series of tests to determine the Maximum Continuous Amps before the overload trips.
- Once that has been determined, UL says "divide the MCA by 1.56 to determine the RLA".
- Copeland and Carlyle use a different factor. They divide the MCA by 1.44.
- Tecumseh uses the 1.56 factor.
- If the RLA has any value, it is to determine at what amperage draw the compressor overload will trip and to determine the fuse/circuit breaker size and the wire size. Trying to determine if a compressor is good or bad using RLA is a mistake, it has nothing to do with the actual running load amperage of a compressor.

Wednesday April 8th, 2009 at 7:30pm

at

RICCARDO'S
21-01 24th Avenue, Astoria NY 11102

UV Air Purification,
Makeup Air Systems & IAQ

By

John Cotton, Field Controls

PLACE LABEL HERE

MEETING
Wednesday April 8th, 2009
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The HVACR Training Authority
Metropolitan New York Chapter
Refrigeration Service Engineers Society
241 Halsey Street
Brooklyn, NY 11216