METROPOLITAN NY CHAPTER
Refrigeration Service Engineers Society

Continued Education for the HVAC/R Industry

"Better Service Through Knowledge"

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Inspecting Refrigeration Compressors

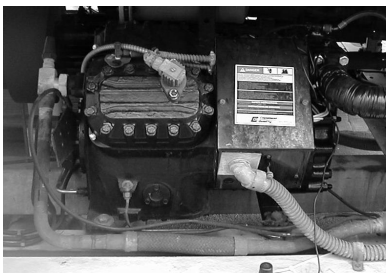
Refrigeration system maintenance can be broken down into two distinctive tasks. First, the system's current operating conditions need to be inspected and observed to ensure that the system is operating at or close to its design parameters. Second, the system needs to be inspected to help prevent or predict any future system issues.

Preventing or predicting system problems can be a major benefit to both a service contractor and the customer. This is especially true when dealing with the system's compressor. Preventing a compressor failure is a major benefit. A good maintenance program will include a thorough inspection of the compressor. One inspection task that is sometimes overlooked is an examination of the compressor's motor winding insulation. The integrity of the compressor's motor winding insulation can be obtained by measuring its resistance value. This is done by measuring the resistance between the compressor's motor winding and its body. This resistance value is normally quite high (in the millions ohm range) so a megohmmeter must be used in place of a standard ohmmeter. Measuring a low resistance value would be an indication of a problem within the compressor.

A low resistance reading can be the result of several problems within a compressor. One possible cause is a breakdown in the motor's winding insulation. This condition will normally result in a failed compressor at some time in the future. How long until the failure depends on the extent of the damage to the insulation. One benefit to discovering this condition early is that the customer can plan for or budget the replacement cost of the compressor.

A low resistance, however, does not always mean the motor's winding insulation is damaged. There are other problems that can also result in a low resistance reading. Contaminated refrigerant, oil level, refrigerant in the oil, and current leakage through electrical fusites or terminal plates can also cause a low resistance reading. These other possibilities should be investigated first before condemning the motor's winding insulation.

When using a resistance test to determine a problem within a compressor, a single reading gives little insight into the condition of a motor's winding insulation or another problem. The readings should be trended over a period of time and should be part of the regular maintenance program. If a trend of lower resistance readings is observed over a period of time then corrective action should be taken.



When taking these resistance readings always follow the instructions provided by the megohmmeter manufacturer. Any external electrical components connected to the compressor terminals must be removed as they will affect the resistance reading. The reading should be taken the same way each time – with the same instrument and using the same method. The resistance reading will also vary with temperature, so it should be taken when the compressor temperature is the same.

Always check with the compressor manufacturer to determine when a resistance reading is too low. Copeland Corporation recommends the following limits on their installed and running compressors: A 20 to 50 megohm reading indicates the compressor is okay. When a 0.5 to 20 megohm reading is observed they recommend cleaning up the system (replacing the system's filter/driers and changing the compressor's oil). A reading of less than 0.5 megohm indicates a defective compressor.

Although the procedure for measuring and trending the resistance value of the compressor's motor winding insulation is time consuming, the benefits of preventing or predicting a compressor failure makes it time well spent.

Compressor Inspection Worksheet

Semi-Hermetic Refrigerant Cooled Compressors

Date: _____

Time: _____

Customer: _____

_____

_____

Telephone: _____

Make: _____

Model: _____

Serial Number: _____

Outdoor Air Temp. _____

Refrigerant Type _____

Cylinder Head Temp. _____

Discharge Line Temp. _____

Discharge Pressure _____

Suction Line Temp. _____

Suction Pressure _____

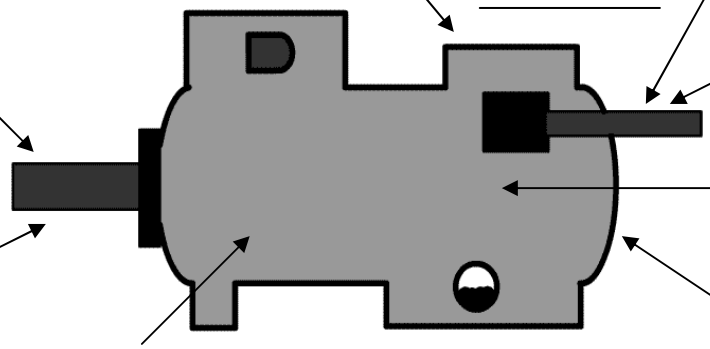
Crankcase Temp. _____

Outlet Oil Pressure

Outlet: _____

Crankcase: _____

Net Oil Pressure: _____



Motor Barrel Temp. _____

Oil Level _____

Electrical Information

Three Phase Compressors	Single Phase Compressors
T1 to T2 Voltage: _____	Applied Voltage: _____
T2 to T3 Voltage: _____	Amperage Draw: _____
T1 to T3 Voltage: _____	Potential Relay Coil
% Voltage	Resistance: _____
Imbalance: _____	Potential Relay Contact
T1 Amps: _____	Resistance: _____
T2 Amps: _____	Start Cap. MFD: _____
T3 Amps: _____	Start Cap Volt: _____
% Current	Run Cap. MFD: _____
Imbalance: _____	Run Cap Volt: _____
T1 to T2 Resistance: _____	C to R Resistance: _____
T2 to T3 Resistance: _____	C to S Resistance: _____
T1 to T3 Resistance: _____	R to S Resistance: _____
Unloaders	C to Ground Res.: _____
Number of unloaders: _____	C to Ground Res: _____
Coil Voltage: _____	R to Ground Res: _____

Oil Analysis	Crankcase Heater
Clean _____	Type: _____
Contaminated: _____	Wattage: _____
	Applied Voltage: _____

Compressor Contactor

Voltage Drop L1 to T1: _____ Coil Voltage: _____

Voltage Drop L2 to T2: _____ Coil Resistance: _____

Voltage Drop L3 to T3: _____

Technician's Comments:

COMING EVENTS

October - Refrigeration Piping: Problems & Troubleshooting

Over the summer we will be busy putting together another great series of educational programs, including more all day seminars.

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

IMPORTANT

You will be receiving a ballot for Regional Director of Region 2 (our region). Please take a few moments to vote for and reelect our current Regional Director, Joe Marchese, CMS. If not enough votes are received from the regional chapters, RSES International will either appoint one, or—even worse— eliminate this position. We need your vote to maintain our strong and influential voice in this great organization of ours.

METROPOLITAN NEW YORK CHAPTER, RSES
For Information Call: Stan Hollander, CMS (718) 232-6679

The Chapter Officers and Board members wish you all a successful and safe summer season.
We look forward to seeing you in September
SAFE & HEALTHY
for another informative series of Educational Programs.

Wednesday May 12th, 2010 at 7:30pm

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

Transitioning from R-22 : Alternatives and Proper Retrofit Procedures

By

Stephen Spletzer — Arkema, Inc.

PLACE LABEL HERE

EDUCATIONAL PROGRAM
Wednesday May 12th, 2010
at 7:30pm
SEE DETAILS — THIS PAGE

RSES
The HVACR Training Authority
Metropolitan New York Chapter
Refrigeration Service Engineers Society
241 Halsey Street
Brooklyn, NY 11216