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STATE BOARD OF REFRIGERATION EXAMINERS

Refrigeration Up-Date

Removing Oil From A Semi-Hermetic Compressor

By Joe Marchese

Occasionally a technician may need to temporarily add oil to a semi-hermetic reciprocating compressor to maintain an adequate oil level, if the oil has been trapped out in the evaporator or suction line. This additional oil should not be left in the system.

The cause of the oil trapping should be identified and repaired in a timely fashion. If the additional oil returns to the compressor, it could cause damage as a result of oil slugging or excessive oil pumping.

OIL DRAIN PLUG OPTION

There are several methods for removing oil from a semi-hermetic reciprocating compressor. The easiest is through an oil drain plug. If the compressor is equipped with an oil drain plug, all a technician must do is reduce the pressure in the crankcase by running the compressor and front seating its suction service valve.

1. Pump the system down to 1 to 2 psig.

2. Shut down the compressor.

3. Once the compressor is off, front seat its discharge service valve, which will completely isolate the compressor from the system.

4. Carefully loosen the oil drain plug and allow the oil to seep out of the compressor around the thread of the plug until enough oil has been removed. *Note:* Do not totally remove the plug from the compressor. Only allow the oil to seep around its threads.

WITHOUT AN OIL DRAIN PLUG

If the compressor is not equipped with an oil drain plug, or if it is not convenient to use, oil can be removed from its oil fill plug.

Use the following procedure:

1. Attach a gauge manifold to the access ports of the suction and discharge service valves.

2. Front seat the suction service valve and run the compressor.

3. Continue running the compressor until the crankcase pressure has reached 0 psig.

4. Shut down the compressor.

5. Front seat its discharge service valve.

6. Remove the oil fill plug from the compressor.

7. Insert a 1/4-inch O.D. copper tube with a shutoff valve into the oil fill plug opening. Position the 1/4-inch copper tube so that one end is near the bottom of the crankcase and the other end, which is external to the compressor, is positioned below the oil level of the compressor and into an approved container.

8. Place a rag around the 1/4-inch O.D. copper tube where it exits the compressor.

9. Using dry nitrogen, pressurize the compressor crankcase through the suction service valve's access port to about 5 psig.

10. The oil should drain from the compressor. If necessary, repressurize the crankcase with dry nitrogen.

11. Once a sufficient amount of oil has been removed, remove the 1/4-inch O.D. copper tube.

12. Reinstall the fill plug.

13. Evacuate the system to 500 microns.

14. Backseat both the suction and discharge service valves.

15. Restore power to the compressor and place it back in operation.

This method is more time consuming, but it will allow oil to be removed from a compressor. Before using this procedure, make sure the compressor does not have an oil drain plug. Removing oil from a compressor using its oil drain plug is normally a much easier process.

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Suggestions for articles of interest for publication in this newsletter are welcome.

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THOUGHTS FROM THE CHAIRMAN

As we embark on the second half of 2006, one of the focuses of the Board continues to be the investigation of unlicensed work being performed across the State. Our procedures call for a written report containing as many facts as possible about the unlicensed work. While Board staff attempts to follow-up on "anonymous" complaints, they are often hindered by the lack of specific information, i.e. locations, addresses, dates and their inability to contact the complaint for additional information. I would encourage each of you to file a complaint form when you are aware of work being done by unlicensed persons.

Another area for concern is supervision. 21 NCAC 60.0311(c) states, "A licensee shall obtain permits and allow his number to appear on permits only for work over which he will provide general supervision until the completion of the work, for which he holds the contract and for which he receives all contractual payments.

(1) General supervision is that degree of supervision which is necessary and sufficient to ensure that the work is performed in a competent manner and with the requisite skill and that the work is done timely, safely and in accordance with applicable codes and rules. General supervision requires that the review of the work be performed in person by the licensee while the work is in progress.

(2) Each business office for which a licensee is responsible shall be actively and locally supervised by that licensee who shall have primary responsibility and a corresponding amount of time personally involved in the work contracted for or performed by that office."

Please insure that your office is following this rule and you are able to provide the Board with factual evidence that supervision is being properly handled.

Last, you are reminded that permits are required for installation and that the permit should be obtained from the local Building Code enforcement staff prior to any work being started. You should also be sure that a request for final inspection is made within ten (10) days of completion of the work.

Keep in mind that a licensee should obtain permits and allow his number to appear on permits only for work over which he will provide general supervision until the completion of the work, for which he holds the contract and for which he receives all contractual payments.

PLAN AHEAD
MAKE YOUR CALENDAR NOW
REFRIGERATION UP-DATE 2007
APRIL 4, 2007

2006 Scholarships Awarded

The scholarships funded by the State Board of Refrigeration Examiners were recently awarded to Otto Afanador and William C. James. Both Mr. Afanador an Mr. James are enrolled at Alamance Community College in Burlington, NC and are in the HVAC/R technology curriculum.

Scholarships are available to persons enrolled in or interested in enrolling in an Associate in Applied Science Degree Program of study in HVAC/R technology as well as those persons interested in enrolling in or enrolled in an Associate in Applied Degree Program of study in Commercial Refrigeration.

Applicants must meet the following criteria to qualify for a N.C. State Board of Refrigeration Scholarship.

1. Be a resident of N.C.;

2. Be enrolled (or must intend to enroll) in an Associate in Applied Science Degree of study in Commercial Refrigeration or HVAC/R Technology.

3. Maintain a grade point average at or above the level required for graduation; and

4. Continue for the duration of the scholarship at the college where he or she was enrolled at the time of the scholarship award.

Two or more scholarships are awarded annually depending on available funds.

The amount of the scholarship(s) will be determined by the interest accrued on the endowed principle fund. The annual award will not be greater than the total of the student's tuition, books and supplies for two semesters of the academic year. Scholarship checks will be made payable jointly to the individual recipients and to their community colleges. Recipients will be selected by a committee composed of members of the N.C. State Board of Refrigeration Examiners and N.C. Community College Staff.

Please contact the Board office (893 Hwy. 70 W., Garner, NC 27529, 919-779-4711 or sbre1@bellsouth.net) for a scholarship application. Deadline for receipt of the applications to the Financial Aid Office at the Community College is no later than January 1 annually

Disciplinary Action

Blanchard, Robert B., Gaston Heating & Air Conditioning, Columbus, NC.

Allegations of refrigeration contracting without a license. Letter of warning signed May 28, 2006.

Penalties for violation of the licensing law and Board rules vary depending on the facts and circumstances of each case.

Lucado, Philip R., American Industrial Contractors, Greensboro, NC.

Allegations of refrigeration contracting without a license. Letter of warning signed April 24, 2006.

Mechanical Code Up-Dated

The N.C. Building Code Council has adopted the 2006 N.C. Building Code with a July 1, 2006 effective date. The 2006 N.C. version of the Building Code is based on the 2003 International Code Council publications. You should be aware that changes were made to the Mechanical Code, Chapter 11, Refrigeration.

The 2002 Building Code will remain effective until December 31, 2006 for optional use. The 2006 N.C. Building Codes are published by the International Code Council and may be purchased at:

www.iccsafe.org/e/promo.html?promoid=NCDOI.

The effective 2006 NC Building Codes include:

1. Building
2. Energy Conservation
3. Fire
4. Fuel Gas
5. Mechanical
6. Plumbing

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Ammonia In Place of R-22 Means Options

(*Editor's note: The following is an excerpt from the most recent Bitzer "Refrigerant Report" (13th edition). The company is taking a look at using ammonia in some applications where R-22 had been the preferred refrigerant.)*

Refrigerant NH3 (ammonia) has been used for more than a century in industrial and larger refrigeration plants. It has no ozone depletion potential and no direct global warming potential. The efficiency is at least as good as R-22. In some areas, the efficiency is even more favorable. Its contribution to indirect global warming is therefore small.

There are some negative aspects that restrict the wider use in commercial areas or require costly and sometimes new technical developments. NH3 has a high isentropic exponent (NH3 = 1.31, while R-22 = 1.18) which results in a discharge temperature that is higher than that of R-22. Single-stage compression is therefore already subject to certain restrictions below an evaporating temperature of around -10 degrees C (16 degrees F).

Efforts are being made worldwide to develop simpler NH3 systems that can also be used in commercial applications.

There is also a question of suitable lubricants. The oils used previously were not soluble with complicated technology and seriously limit the use of direct expansion evaporators due to the deterioration in heat transfer. Special demands are made on the thermal stability of the lubricants due to the high discharge gas temperatures. This is especially valid when automatic operation is considered, where the oil should remain for years in the circuit without losing any of its stability.

NH3 has a high enthalpy difference and, as a result, a relatively small circulating mass flow (approximately 13 percent to 15 percent compared to R-22). This feature is favorable for large plants but makes regulation of the refrigerant injection more difficult with small capacities.

A further criterion that must be considered is the corrosive action on copper-containing materials. Pipelines must be made of steel.

Additional characteristics include toxicity and flammability, which require special safety measures in the construction and operation of such plants.

DESIGN CRITERIA

Based on the present state of technology, industrial NH3 systems need totally different plant technology compared to usual commercial systems.

Due to its insolubility with the lubricating oil and specific characteristics of the refrigerant, high-efficiency oil separators and flooded evaporators with gravity or pump circulation are usually employed. Because of the toxicity-flammability issue, the evaporator often cannot be installed directly at the cold space. The heat transport must then take place with a secondary refrigerant circuit.

Two-stage compressors, or screw compressors with generously sized oil coolers, must be used at medium-pressure ratios. The compressor is usually of an open design, with the drive motor a separate component.

Refrigerant lines, heat exchangers, and fittings must be made of steel. Be aware that such pipelines are subject to examination by certified inspectors.

Corresponding safety measures and special machining rooms are required depending on the size of the plant and the refrigerant charge.

SOME SOLUTIONS

Efforts are being made worldwide to develop simpler NH3 systems that can also be used in commercial applications.

One aspect of the research program is dealing with part-soluble lubricants, with the aim of improved oil circulation in the system. Simplified methods for automatic return of nonsoluble oils are also being examined as an alternative.

Also, various equipment manufacturers have developed special evaporators, in which the refrigerant charge can be significantly reduced. In addition, there are also solutions for the sealing of the NH3 plants. This deals with compact liquid chillers (charged below 50 kg), installed in a closed container and partly with an integrated water reservoir to absorb NH3 in case of a leak. This type of compact unit can be installed in areas that were previously reserved for plants with halogen refrigerants.

It is still too early to give a final judgment concerning the extended use of compact NH3 systems in place of plants with HFC refrigerants and conventional technologies. From a purely technical viewpoint and presupposing an acceptable price, it is anticipated that a wider range will be available soon.