

Refrigeration Up-Date

2005 Refrigeration Up-Date

Most contractors are always on the lookout to do things more economically. Plan now to attend Refrigeration Up-Date 2005 and put you and your company in a better position to face today's challenges. The Up-Date is scheduled for Friday, April 1st at the Village Inn Golf and Conference Center in Clemmons, NC.

The 2005 Up-Date will be presenting outstanding educational and technical programs, as well as providing an excellent means of networking and solidifying strong business relationships with oth-

ers in this industry.

Thirty-six exhibitors will be on hand to demonstrate the latest in technology, products and services. (A list of exhibitors may be found on Page 6.) Up-Date seminars include speakers from the NC Department of Labor—OSHA; the US EPA, Stratospheric Protection Division; Copeland Corporation and Mueller.

Also on tap for those interested, is an optional golf tournament. Please contact the Board office for more information on the tournament.

A block of rooms has been reserved at the Village Inn at a rate of \$55, plus tax. Individuals are responsible for making their own reservations by calling the hotel direct at 336-766-9121. Reservations should be made prior to February 26th and may be guaranteed by credit card or advanced deposit. After February 26, the unused portion of the room block will be released and availability cannot be guaranteed.

Registration is free for the seminars and exhibits. A registration form may be found on page 5.

Refrigeration Leaks Are A Growing Concern

The following article was reprinted with permission, from the 1/10/2005 issue of "The News".

By John Tomczyk

One might think that with the advanced refrigeration systems of today, and with electronic leak detectors and fluorescent dyes, that finding leaks wouldn't be such a difficult problem for technicians. However, all sealed systems leak and they're not always easy to find. The leak could be 1 pound per second or as low as 1 ounce every million years.

The leak repair requirements, promulgated under Section 608 of the Clean Air Act Amend-

ments of 1990, require that an owner/operator of an appliance that normally contains a refrigerant charge of more than 50 pounds must take corrective action when a leak is discovered that exceeds the applicable trigger rate during a 12-month period. Trigger rates range from 35 percent for commercial refrigeration to 15 percent for comfort cooling appliances.

Since July 1992, it has been unlawful to knowingly vent refrigerants to the atmosphere. In keeping with the intent of the U.S. Environmental Protection Agency, it makes sense to completely understand the causes of leaks in refrigerant systems.

Every pressurized system leaks because 'flaws' exist at every joint fitting, seam, or weld. These flaws may be too small to detect with even the best of leak detection equipment. But given time, vibration, temperature, and environmental stress, these flaws become larger detectable leaks.

Thus, it is technically incorrect to say that a unit has no leaks. All equipment has leaks to some degree. A sealed system, which has operated for 20 years without ever needing a charge, is called a 'tight system.' However, the equipment still has leaks — just not enough leakage to read on a gauge or affect cooling

(Continued on page 4)

Permanently Lapsed Refrigeration Contractor Licenses

The following refrigeration contractor licenses permanently lapsed on December 31, 2004 for non-payment of licensing fees:

2092	Ajas, Andre P, Havelock, NC	3162	Mercadante, Robert N, Glen Cove, NY
2875	Allred, James K, Burlington, NC	583	Mimms, James A, Sanford, NC
1848	Badger, Craig N, Gastonia, NC	2454	Mitchell, Herman R, North Wilkesboro, NC
681	Bame, Charlie L, Greensboro, NC	1772	Moore, Samuel R, Durham, NC
3760	Bray, Matthew R, Fuquay-Varina, NC	3571	Owens, Parks L, Iron Station, NC
2025	Childers, Paulette R, Kings Mountain, NC	2778	Palus, William W, Garner, NC
2215	Dawkins, James, Hamlet, NC	3165	Paxson, Robert L, Grandy, NC
1295	Dillard, Furman L, Kannapolis, NC	3941	Pigg, Jr, S. Lee, Monroe, NC
T0046	Dilley, Howard E, Pickerington, OH	3673	Poland, Jr., Brice S, Elm City, NC
1764	Hilbourn, Joyce M, LaGrange, NC	3624	Priddy, Kent, Boone, NC
2130	Hinson, Bobby L, Edgewater, FL	2290	Redden, John M, Nebo, NC
1738	Hough, Ronnie, Monroe, NC	3921	Rojas, Carlos R, Myrtle Beach, SC
1192	Jamison, Howard G, Weaverville, NC	3744	Sheehan, William J, Swansboro, NC
1227	Jenkins, Morris G, Gastonia, NC	3137	Sisk, Jr., Robert V, Charlotte, NC
3870	Jines, Michael A, Statesville, NC	1717	Skinner III, James A, Kenly, NC
3799	Key, Jr., Melvin S, Mount Airy, NC	1235	Sloan, Jim H, Morehead City, NC
2910	Keyes, Jr., William P, Waxhaw, NC	1147	Snyder, K.W., Moyock, NC
2718	King, Sr, Chester W, Albertson, NC	2690	Turner, Sr., Wesley E, Clayton, NC
1107	Kirby, James T, Edenton, NC	759	Usher III, Armand, Clinton, NC
1284	Lewis, Joseph E, New Bern, NC	2796	Venable, Mark P, Raleigh, NC
548	Lutz, Hansel L, Terrell, NC	1320	Wells III, William W, Asheville, NC
1866	Mallard, Alva S, Franklinton, NC	3963	Wisniewski, Mark, Marietta, Ga
2914	Malphurs, Ralph V, Charlotte, NC	3026	Woods, Tim G, Charlotte, NC
3429	Martin, Stephen L, Sacramento, CA		

Disciplinary Action

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

Bobby Baker, Rolesville, NC.

Allegations of misconduct in the business of refrigeration contracting in that the licensee offered to provide refrigeration services while not properly licensed with this Board. Licensee also failed to apply for a change of trade name.

This conduct constitutes a violation of NCGS 87-61 and 21 NCAC 60 .0304 and .0312. Consent order entered by the Board of December 3, 2004 whereby respondent was reprimanded and placed on one year's probation.

Patrick Keith Leonard, dba ACE Heating & Air Conditioning, Wilmington, NC

Allegations of Refrigeration Contracting without a license. Letter of Warning signed January 10, 2005.

Mike Reeher, dba Climate Control of Charlotte, Inc., Charlotte, NC

Allegation of Refrigerating Contracting without a license. Letter of Warning signed November 330, 22004.

Thomas M. Ward, dba Tommy Ward Refrigeration Service, Caser, NC

Allegation of Refrigeration Contracting while licensee was not properly li-

censed with this Board. Letter of Warning signed November 15, 2004.

John Tombaugh, dba Heritage Food Service, Charlotte, NC

Allegations regarding lack of proper supervision of technicians performing refrigeration contracting services. Letter of Caution issued January 26, 2005.

You are reminded that only the replacement of lamps and fuses and the installation and servicing of domestic household refrigerators and freezers and domestic ice-making appliances connected by means of attachment plug-in devices are excluding from the requirements of the law governing refrigeration contracting.

Compliance Guidance

This is the final continuation of the Compliance Guidance for Industrial Process Refrigeration Leak Repair Regulations published in the last three issues of "Refrigeration Up-Date". The information was gathered from a Food Market Institute meeting in 2003.

H. SYSTEM MOTHBALLING

System mothballing, for the purposes of these amendments, is the intentional shutdown of a refrigeration system for an extended period of time, where the refrigerant has been evacuated from the system to at least atmospheric pressure.

These amendments recognize that when a refrigeration system is in a mothballed condition, refrigerant leaks that existed when the system was operating have effectively been stopped because the system has been evacuated. Therefore, the amendments **allow the time-related requirements for repairing, retrofitting, or retiring a leaking system to be temporarily suspended while the system is mothballed**. The time-related requirements resume on the day the system is brought back on line and is no longer considered mothballed. Leak repairs following mothballing on *industrial process refrigeration* systems are still subject to *initial and follow-up verification tests*.

Applicability

When a system is mothballed, the time suspensions are available **for all types of systems**, including commercial, industrial process, and any other systems containing more than 50 pounds of refrigerant. Time suspensions under *system mothballing* apply to all time-related requirements for repairing leaks or replacing, retrofitting, or retiring a system, including time extensions that may be allowed in specific circumstances for *industrial process refrigeration* systems.

Example of System Mothballing

If a comfort-cooling system with over 50 pounds of refrigerant has a leak rate of more than 15 percent per 12-month period, the leak or leaks must be repaired within 30 days of discovery or the system must be retrofitted or retired within a 12-month period. However, if after discovery of the exceedance of the leak rate, the owner of the system voluntarily mothballs the system for a period of time, the requirement to repair leaks or retrofit or retire the system is suspended for that same time period. For example, if the system operated for five days after discovery of the exceedance of the leak rate and then was shut down and mothballed for two months, when the system returned to operating, the owner would still have 25 days to either repair the leaks or develop a 12-month retrofit or retirement plan.

I. OIL CHANGES

EPA's recent refrigerant recycling amendments deal with leak repair. However, they also address procedures to minimize emissions of refrigerant during oil changes. Many companies and *technicians* have been interested in this topic, so it is discussed here.

The oil in a refrigeration system may contain large amounts of refrigerant. EPA requires a reduction in pressure prior to an oil change so that the bulk of the refrigerant is recovered. The maximum pressure allowed is 5 psig. This greatly reduces refrigerant emissions while still allowing a slight positive pressure to force the oil from the compressor.

There are two acceptable procedures to assure recovery of refrigerant:

1. Evacuate (or pressurize) the refrigeration system, or isolated portion, to a pressure no higher than 5 psig and then

remove the oil; or

2. Drain the oil into a system receiver to be evacuated (or pressurized) to a pressure no higher than 5 psig.

These procedures minimize the loss of refrigerant from: a) the oil, and b) the interior of the refrigeration system as the oil comes out. EPA allows a slight positive pressure to help expel the oil.

The entire Compliance Guidance for Industrial Process Refrigeration Leak Repairs may be found on the Board's webpage (www.refrigerationboard.org).

Here and There

Governor Mike Easley recently reappointed Stephen B. Peay to serve a full seven year term.

All 2004 refrigeration contracting licenses expired on December 31, 2004. Renewals applications received after that date are subject to a \$35.00 late reinstatement fee.

Remember if your license is not current for 2005, it is illegal for you to display your license number on any advertising, letterhead, vehicles, etc. unless such time as your license is reinstated.

Please notify the Board office as soon as possible when your change your trade name, address or telephone number. Since much of the information mailed from the Board if done so by presort standard, it is absolutely necessary that contractors keep the office advised of address changes as soon as they become effective.

Refrigeration Leaks continued from Page 1

performance. No pressurized machine is perfect.

Remember, a leak is not some arbitrary reading on a meter. Gas escapes at different times and at different rates. In fact, some leaks cannot be detected at the time of the leak test. Leaks may plug and then reopen under peculiar conditions.

A leak is a physical path or hole, usually of irregular dimensions. The leak may be a speck of dirt on a gasket or a microgroove between fittings.

Refrigerant vapor can flow under layers of paint, flux, rust, slag, and pipe insulation. Often the refrigerant gas may show up quite a long distance from the leak site. This is why it is important to clean the leak site by removing loose paint, slag, rust, or flux. Remove any pipe insulation. Oil and grease must also be removed from the site because they will contaminate the delicate detection tips of electronic detectors.

Six Classes Of Leaks

There are six classes of leaks:

1. Standing leaks — These are leaks that can be detected while the unit is at rest (off) and high and low side pressures are fully equalized. Standing leaks, fortunately, are the most common of all leaks.

2. Pressure-dependent leaks — These are leaks that can only be detected as the pressure increases. Nitrogen is usually used to pressurize a system's low side to about 150 psig and high sides to about 450 psig. However, always check the refrigeration system's design test pressures. Pressure-dependent leak tests should be performed if no leaks are discovered by the standing leak test.

3. Temperature-dependent leaks — These leaks are associated with the heat of expansion. They usually occur from high-temperature ambient air, condenser blockages, or during a system's defrost period.

4. Vibration-dependent leaks — These leaks only occur during unit operation. The mechanical strains of motion, rotation, refrigerant flow, or valve actuation are all associated with vibration-dependent leaks.

5. Combination-dependent leaks — These leaks are flows that require two or more conditions in order to include leakage. For example, temperature, vibration, and pressure cause the discharge manifold on a semi-hermetic compressor to expand and seep refrigerant gas.

6. Cumulative microleaks — These leaks are all the individual leaks that are too small to detect with standard tools. The total loss over many years of operation slightly reduces the initial gas charge. In practice, the greater the number of fittings, welds, seams, or gasket flanges in a system, the greater the amount of cumulative microleaks.

Oil Spotting

Successful leak detection is solely dependent on careful observation made by the testing technician.

All refrigeration systems internally circulate compressor oil with the refrigerant. Oil will flow off with the refrigerant gas and mark the general area of leakage with oil. Oil spots appear wet and have a fine coating of dust.

The technician must determine if the wetness is due to oil or condensate. This can be accomplished by rubbing the area with a finger and feeling for oil slickness.

Oil spotting is the technician's first quick check, but it is not always reliable for the following reasons:

- Oil is always present at the Schrader valves and access ports due to the discharging of refrigerant hoses on the manifold and gauge set. Often these parts are falsely blamed as the main point of leakage.
- Oil blotches can originate from motors, pumps, and other sources.
- Oil residue may be the result of a

previous leak.

- Oil is not always present at every leak site. It may take months, even years, of unit operation to cause enough oil blowoff to accumulate on the outer side.
- Oil may not be present with microleaks.
- Oil may not reach certain leak positions.
- Oil may not be present on new startups.

Evaporator Suction Leaks

Many leaks that go undetected are in the evaporator coil. This is because most evaporator sections are contained in cabinets, buttoned up, or framed into areas that do not allow easy access. In order to avoid time-consuming labor to strip off covers, ducting, blower cages, or the unloading of product, an easy electronic leak detecting screening method can be used.

The steps are:

1. Turn off all system power including evaporator fan motors.

2. Pressurize the system to equalization including defrosting of freezer coils.

3. Warm up and calibrate an electronic leak detector to its highest sensitivity.

4. Locate the evaporator drain outlet or downstream trap.

5. Position the detector probe at the drain opening. (Be careful that the detector probe does not come into contact with any water.)

6. Sniff a minimum of 10 minutes or until a leak is sensed. Recalibrate the device and test again. Two consecutive positive tests confirm an evaporator leak. Two consecutive negative tests rule out an evaporator section leak.

Remember, refrigerant gas is heavier than air. Gravity will cause the gas to flow to the lowest point. If the evaporator section tests positive, the technician should expose the coil and

(Continued on page 5)

Refrigeration Leaks continued from Page 4

spray coat all surfaces with a specially formulated bubble/foam promoter.

Bubble/foamer solutions have been very successful in leak detection because of their price and effectiveness. (By contrast, household detergents often contain chlorides and will pit and corrode brass and iron.) Microfoaming solutions will form fine foam or "cocoon" when in contact with a leak.

One brand consists of an exclusive composition of esoteric microfoamers coupled into a base of coagulants and wet adhesives.

All that is required is for the solution to be applied over the suspected leak area. When a leak is found, bubbles or foam will tell the technician of its location. The technician must be patient and let the bubbles stand for at least 10 to 15 minutes if small leaks are suspected.

Another advantage of bubble testing is that bubbles can be used with nitrogen or refrigerants pressurizing the system. Small but significant leaks of less than a couple ounces per year can often be found with specially formulated solutions. If the evaporator screens negative, continue on to the condensing unit test, which is described next.

Condensing Section Leaks

to conduct a condensing section leak test, do the following:

1. Calibrate an electronic leak detector to its highest sensitivity and place the probe at the base of the unit (usually under the compressor). The unit should be fully pressurized and high- and low-side pressures should be equalized.

2. Cover the condensing unit with a cloth tarp or bedsheet to serve as a barrier against any outside air movement and to trap the refrigerant gas. Do not use plastic material.

3. Monitor for leakage for 10 minutes or until a leak is sensed. Recalibrate and test again. Two consecutive positive tests confirm condensing section leakage. Two consecutive negative tests rule out a detectable leak.

4. Use the electronic leak detector to check for leaks on the bellows of the pressure controls. Remove the control box cover and place the probe within the housing. Cover the control tightly with a cloth barrier and monitor for 10 minutes, as above.

5. If the results are positive, uncover the equipment and begin spray coating with a bubble/foam promoter.

If the results are negative, continue to the suction/liquid line leak test, which follows.

Suction And Liquid Line Leaks

The longer the tubing runs between the evaporator and condensing unit, the

greater are the chance for defects. Count on all possibilities, whether they involve a typical sight glass/drier, connection leak, or a poor solder joint hidden under pipe insulation.

1. The suction line can be screened by calibrating an electronic leak detector to its highest sensitivity.

2. Tuck the probe underneath the pipe insulation. Monitor for 10-minute intervals while the system is at rest and fully pressurized to equalization. It may be necessary to insert the probe at several downstream points.

3. If a leak is sensed, strip off the insulation and apply a bubble/foam promoter to all surfaces. If no leak was positively found, test the liquid line.

Preparation of this material was made in conjunction with Refrigeration Technologies and ESCO Press.

John Tomczyk is a professor of HVACR at Ferris State University, Big Rapids, Mich., and the author of Troubleshooting and Servicing Modern Air Conditioning & Refrigeration Systems, published by ESCO Press. To order, call 800-726-9696. Tomczyk can be reached by e-mail at tomczyk@tucker-usa.com.

Your Invitation to Attend Refrigeration Up-Date 2005

Don't Miss Refrigeration Up-Date 2005
Friday, April 1, 2005
Village Inn Golf and Conference Center
Clemmons, NC
8:00 a.m.—4:00 p.m.

Advance Registration is Encouraged

Please mail this form to:

SBRE
Suite 208, 893 Highway 70 W
Garner, NC 27529

Please register me for the upcoming Up-Date (copies of this form may be made as needed):

Name _____

Company Name _____

Mailing Address _____

City, State, Zip _____

Nickname for Badge _____

STATE BOARD OF REFRIGERATION EXAMINERS

PRST STD
US POSTAGE
PAID
RALEIGH, NC
PERMIT NO. 2287

Volume XVI, No. 1

Published quarterly as a service to refrigeration contractor licensees and others in the refrigeration industry.

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

State Board of Refrigeration Examiners
Suite 208, 893 Hwy. 70 W
Garner, NC 27529
Telephone: 919-779-4711
Fax: 919-779-4733
E-Mail: sbre1@bellsouth.net
Website: www.refrigerationboard.org

BOARD MEMBERS

T. F. WELCH, Chairman
Mount Airy, NC

F.V. STAHL, Secretary
Lewisville NC

J.M. KING, Treasurer
Lumberton, NC

G.G. RAMSEY
Concord, NC

D.L. FOX
Chapel Hill, NC

D.E. KLETT
Greensboro, NC

S. B. PEAY
Raleigh, NC

B. H. HINES
Executive Director

NOEL ALLEN, Esq.
Legal Counsel

S. L. CAVINESS
Administrative Assistant

Exhibitors, 2005 Refrigeration Up-Date

The following companies have contracted to exhibit at Refrigeration Up-Date 2005. These companies make it possible for the Board to present the Up-Dates to you at no charge.

Please make your plans now to attend and explore new technologies and methods in the HVACR industry.

A-1 Compressor
ACR Supply Company
Aeroflex USA, Inc.
Baker Distributing Co., Inc.
Bitzer US, Inc.
BVA Oils
C. C. Dickson Company
Cannon Marketing, Inc.
Chadwick & Associates, Inc.
Coastal Reps LLC
ComStar International, Inc.
ESCO Institute, Ltd./HVAC Excellence
E. V. Dunbar Company
Frank Door Co.
Greer Systems LLC
Heatcraft Refrigeration Products, LLC
Hill Phoenix
ICOR International, Inc.

Inficon, Inc.
Johnstone Supply
Knaak/Weatherguard (Pro Sales Co.)
Kysor Panels Systems/Kysor//Warren
Linzmaier & Associates, Inc.
Mayberry Marketing
Mueller
Nu-Calgon Wholesaler, Inc.
Parker Hannifin Corporation
Ref Plus USA
Shook Manufacturing Products, Inc.
Spectronics Corporation
Sporlan Valve Co.
Steve Lee and Associates
Supermarket Systems, Inc.
Tuttco, Inc.
United Components
United Refrigeration