METROPOLITAN NY CHAPTER
Refrigeration Service Engineers Society

Continued Education for the HVAC/R Industry

"Better Service Through Knowledge"

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January 2013

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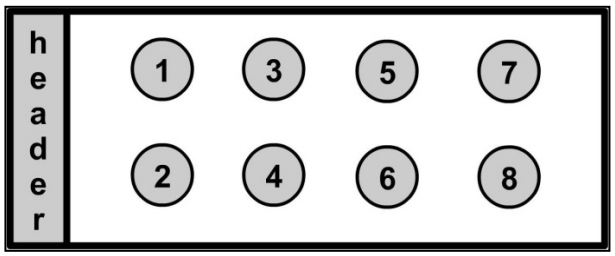
RSES® The HVACR Training Authority Metropolitan New York Chapter

Empire Keystone Association — Better Service Through Knowledge

Fan Cycling Controls

Many refrigeration systems are installed using an outdoor air-cooled condenser. When these systems are installed in a climate where the outdoor temperature drops below 60˚F, some means of preventing the condensing pressure from dropping too low must be incorporated into its design. Too low of a condensing pressure results in too low of a pressure drop across the system's TXV, leading to a reduction of refrigerant flow through the TXV and a starved evaporator. This is not good for the overall operation of the system.

Today there are several methods used to prevent a system's condensing pressure from falling too low. On systems with multiple condenser fans, one popular method is to cycle the condenser fans on and off as needed. This method should not be used on single condenser fan applications. It leads to rapid cycling of the fan motor, wide fluctuations in condensing pressures, and an unstable operation. The fans are typically cycled on and off using a "close on rise" pressure control. As the condensing pressure falls fans are cycled "off". As the condensing pressure increases fans are cycled back "on". The operation of the fans needs to be staged so that not all of the fans are cycled off or back on at the same time. Fans should be cycled individually; however if the condenser has two rows of fans each pair of fans can be cycled together. Also the fan (s) closest to header of the condenser should not be cycled off while the compressor is running. This will prevent wide condenser temperature fluctuations causing excessive expansion and contraction and metal fatigue. For example, in the picture below fans 1 & 2 are not cycled and 3 & 4, 5 & 6, 7 & 8 can be cycled together or individually.



Instead of using a pressure switch to cycle the fans, some systems may use a temperature switch. As the outdoor ambient temperature drops, the fans are cycled off. As the outdoor ambient temperature increases, the fans are cycled back on. However, using a pressure switch is more appropriate where the load on the condenser will vary due to multiple compressor operation, stages of unloading, or systems incorporating heat reclaim or hot gas defrost systems.

Proper adjustment of the pressure or temperature controls is important to the overall operation of the system. The controls should be adjusted so that the condensing pressure does not fall too low or rise too high and ideally there should not be wide fluctuations in the system's condensing pressure as the fans are cycled on and off. It is best to follow the manufacturer's recommended control settings. As a rule of thumb fans can be cycled off as the condensing temperature drops below 90˚F and cycled back on as the condensing temperature rises to 110˚F. The control's differential setting needs to be wide enough to prevent rapid cycling of the fans – which will lead to its premature failure. Fan cycling in excess of three minutes is considered excessive. For pressure controls it is not recommended to set the differential less than 35 psig and for temperature controls not less than 5˚F.

Let's look at a refrigeration system designed with an outdoor air-cooled condenser that has eight fans (2 rows of 4), a 20˚F TD, and is using R-134a as its refrigerant. In this example we will use 3 pressure switches to cycle the fans—one switch for each pair of fans. Using the picture above 1 & 2 fans are not cycled off; fans 3 & 4 will have a cut-in pressure of 147 psig, fans 5 & 6 a cut-in pressure of 155 psig, and fans 7 & 8 a cut-in pressure of 160 psig. Each of these controls will have a differential setting not less than 35 psig and may need to be increased to prevent rapid cycling as long as it does not cause the condensing pressure to drop too low.

This method of head pressure control works well in mild climates but in colder climates it may not be adequate to maintain the system's condensing pressure. In the case this method can be used in conjunction with the flooded condensing to prevent the system's condensing pressure from falling too low.

COMING EVENTS

The Future of R-22

Tankless Instantaneous Water Heaters

Temperature Sensing Technology
for A/C Applications

Copeland Discus Digital Technology

Variable Flow Control
in Ductless Split Systems

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

Metro NY Chapter RSES HVAC Training Courses

The Metropolitan New York Chapter RSES will offer the RSES Technical Institute Courses – 1, 2 & 3 on Tuesday & Thursday evenings, starting January 17th, 2013 in Long Island City, New York

Dates*: For 11 weeks on Tuesdays & Thursdays

1/15 & 1/17	1/22 & 1/24	1/29 & 1/31
2/5 & 2/7	2/12 & 2/14	2/19 & 2/21
2/26 & 2/28	3/5 & 3/7	3/12 & 3/14
3/19 & 3/21	3/26 & 3/28	

Dates Tentative – Subject to Change

Time: 6:00 PM – 10:00 PM

Location: Long Island City High School
14-30 Broadway
Long Island City, NY 11106

Cost for Course *1, 2* or *3*:
$849.00 for RSES members
$949.00 non-RSES members (also includes 1 year membership in RSES)

Includes: Technical Institute course manual, course tuition, Certificate of Completion after passing final exam, 72 hours toward NATE Recertification, for those eligible.

Register by January 10th by calling, mailing or Emailing the form below

FOR ADDITIONAL INFORMATION VISIT:
http://www.metronyrses.org
or Email: school@metronyrses.org
or Phone Stan Hollander: 718 232-6679
by Mail: Metro NY Chapter RSES
Attn: Stan Hollander, 1837 61st Street, Brooklyn, NY 11204
–Checks and Charges Welcome –
Please make checks payable to "Metro NY RSES"

TRAINING COURSE OVERVIEWS

TECHNICAL INSTITUTE COURSE *1*

This course begins with a comprehensive introduction to refrigeration and air conditioning. Topics covered include: basic physics, major system components including hermetic, semi-hermetic and open compressors, condensers, evaporators and refrigerant metering devices. It also covers the fundamental concepts of electricity and magnetism as they pertain to resistors, resistance, conductors, power supplies, circuit protection devices and transformers. Detailed information on lessons and content for Course 1 can be found at:
http://metronyrses.org/ti1.html

TECHNICAL INSTITUTE COURSE *2*

Beginning with tools-of-the-trade this course covers refrigeration system accessories, desiccants and driers, defrosting methods, refrigeration system controls and piping. It also includes instruction on compressor replacement and system evacuation, electric motors in refrigeration systems, motor capacitors and protectors, thermostats, relays, contactors and starters, test equipment and troubleshooting, pressure and enthalpy diagrams, psychrometrics, heat transfer and estimating heat loads, residential air conditioning, humidification and a review of safety codes. Detailed information on lessons and content for Course 2 can be found at:
http://metronyrses.org/ti2.html

TECHNICAL INSTITUTE COURSE *3*

Begins with comprehensive introduction to heat pump theory, including watersource heat pumps. Topics covered include computer-room environmental control, economizers, fans and blowers, air filtration and distribution evaporative condensers and cooling towers, water treatment, multiple-rack systems, hydronics, troubleshooting, controls and controls components, pneumatic relays, typical control applications, and control maintenance. Detailed information on lessons and content for Course 3 can be found at:
http://metronyrses.org/ti3.pdf

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REGISTRATION FORM

Name:_____ Company:_____
Address:_____ City: _____ State:____ Zip:_____
Email: _____ Phone: _____
Check / Credit Card Number: _____ Exp:_____
Name on Credit Card: _____
Which course are you registering for? Technical Institute Course *1, 2* or *3* Choose ONLY ONE ____
Are you a *current* RSES Member: If Yes, RSES Membership Number: _____

Please register by January 10th - space is limited.
Check or Credit Card Accepted for Payment
Make check to "Metro NY RSES" and mail w/ registration to: Metro NY RSES, Attn: Stan Hollander, 1837 61st Street, Brooklyn, NY 11204
To register by Email submit this form with Credit Card information to school@metronyrses.org

METROPOLITAN NEW YORK CHAPTER, RSES

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

In the unlikely event of meeting cancellations, announcement will be posted on our web site

Electrical Safety

When replacing or repairing any electrical components, always verify that the voltage source is truly disconnected from the circuit. Test the circuit for the presence of voltage with some type of voltmeter or voltage indicator. Do ***NOT*** solely rely on the electrical disconnect to ensure the voltage is disengaged. ***Always verify this yourself***.

Wednesday January 9th, 2013 at 7:30pm

at

RICCARDO'S

21-01 24th Avenue, Astoria NY 11102

The Future of R-22 System Service: R-422B & R-422C

by

David Trone—Icor International

PLACE LABEL HERE

EDUCATIONAL PROGRAM
Wednesday January 9th, 2013
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