Industrial Consultants

Your Compliance Connection™

2019 REFRIGERATION REVIEW COURSES

April 29-30, 2019 Houston, TX

August 26-27, 2019 Kissimmee, FL

Instructor
Chris Harmon, RAI
Industrial Consultants

This special two-day course is held in conjunction with RETA Chapter Hosted Regional Conferences:

April 29-30
DFW Ammonia Refrigeration Regional Conference
Houston Marriott Westchase
2900 Briarpark Dr. • Houston, TX
Room Reservations at the Marriott:
$119/night *(plus applicable tax)*
Click here to be connected to the on-line reservation desk and take advantage of the negotiated group rate.

August 26-27
Central FL Ammonia Refrigeration Regional Conference
Embassy Suites Lake Buena Vista South
4955 Kyngs Heath Rd. • Kissimmee, FL
Room Reservations:
$122/night *(plus applicable tax)*
Click here to be connected to the on-line reservation desk and take advantage of the negotiated group rate.

This course is designed as a review course addressing materials that may be included in the RETA certification exam(s). This course is ***not*** intended to walk the attendee through the exam(s).

See Next Page For Full Course Outline

Who Should Attend
Industrial refrigeration operators • technicians • consultants
end-users • plant managers • plant or process engineers

Registration Investment $395
Successful completion of the class provides attendees with 16 professional development hours (PDH)

Investment includes lecture materials (review textbook) and daily lunch. It is recommended for students to have reviewed and bring the following textbooks: *RETA Industrial Refrigeration One and Two (IR1 and IR2)* and *Basic Electricity 2 (BE2) - available at* ***http://www.reta.com***.

Special for attendees — All review course attendees will be enrolled in the Regional Conference associated with the class for which they are enrolled. Regional Conference enrollment provides for (but may not be limited to) receipt of Regional Conference attendees materials as well as participation in Exhibit Hall hours.

Enrollment is limited to 30 students.

Houston, TX April 29-30 Click Here

REGISTER ONLINE TODAY!

Kissimmee, FL August 26-27 Click Here

Contact Information
For questions regarding the Refrigeration Review Course, please contact:

Industrial Consultants
PO Box 833 • Owasso OK 74055
www.ammonia.com
Tel: 918-274-8639 • FAX 918-274-8816
Email: info@ammonia.com

RETA CIRO or CARO Certification Exam
Course attendees may elect to sit for a RETA certification exam (CIRO or CARO) following the course. **Test candidates must preregister** *(submitting all paperwork and payment)* for the certification exam at least 2 weeks in advance of testing date. ***For details on how to register and arrange for your RETA certification exam, go to the RETA website at http://www.reta.com.*** If you have questions regarding the Certification Exam, please contact Dan Reisinger at RETA HQ (email dan@reta.com) or 541-497-2955.

Refrigeration Review Course Outline

Refrigeration Fundamentals Review

Basic Refrigeration Terms and Principles
- Units of measurement: area, volume, specific volume, rate (CFM, GPM), temperature, pressure (psia, psig) pressure/temperature chart
- Heat: conduction, convection, radiation, BTU, sensible heat, latent heat, specific heat, latent heat of vaporization/conduction, specific heat, subcooling, superheating, saturation, water heat curve
- Ton of refrigeration, heat calculations

Heat Flow in Refrigeration Systems
- Factors that affect conduction of heat: area, temperature difference, thermal conductivity, distance the heat passes through
- Conditions which increase/decrease effect of evaporator performance
- Pressure-enthalpy or Mollier Diagram

The Basic Refrigeration Cycle – Heat Flow
- The flow of heat through the four main components
- Basic P&ID for a system
- Heat of compression, compression ratio, pressure drop, noncondensable gases

Properties of Refrigerants
- Refrigerant selection factors
- Refrigerant operating characteristics: evaporator pressure, condensing pressure, theoretical discharge temperature, refrigerating effect (BTU/lb), Mass flow (lb/min/ton)
- Advantages/disadvantages of refrigerants
- Saturated refrigerant table: explanation of each column

Compressors
- Types of compressors:
  - Positive displacement, dynamic displacement
  - Open drive, hermetic
  - Reciprocating, rotary
- Reciprocating compressor: horizontal, VSA, V-W
- Rotary vane compressor
- Rotary screw compressor: compression cycle, oil
- Loading of a compressor
- Two stage compression and booster compressors
- Operation and maintenance: oil, oil heaters, slugging, log sheets

Lubrication
- Function in a refrigeration system, quality
- Types: splash, force-feed
- Oil and an ammonia system: draining oil and its dangers
- Oil pots, oil stills, oil scrubber
- Oil cooling

Evaporators/Cooling Units
- Function
- Fluid cooling, air cooling, forced convection, blast freezing, plate freezing
- Secondary coolant

Condensers
- Function and general types
- Shell and tube condenser
  - Causes of elevated head pressure
  - Cleaning, leaking, re-tubing
- Evaporative condenser
  - Basic design components and flow of refrigerant
  - Effect of humidity
  - Scale, corrosion
  - Head pressure control, fans, motors, dampers

Receivers
- Function
- Typical receiver connections and their functions
- King valve
- Overpressure protection

Purging
- Function
- Sources of noncondensables
- Types: manual, on-line, automatic
- Hansen purger

Refrigeration System Operations

Low Side Feed Valves and Controls (Evaporator Feed)
- Hand expansion valve (HEV)
- Thermostatic valve (TXV):
  - forces that drive the valve
  - nine basic points of operation
  - equalization
- Solenoid valve
- Float switch/level sensor
- Float valve

Direct Expansion System (DX)
- Basic design
- Slop-over/slugs
- Top feed/bottom feed
- Suction line accumulator

Flooded Systems
- Basic design
- Oil accumulation
- Resistance to heat transfer: product side/refrigerant side
- Causes of over-fill
- Consequences of slop-over (slugs)

Pumped Liquid Recirculation Systems (Liquid Overfeed)
- Basic design and recirculation ratio
- Pumps: mechanical and gas operated
- Basic rules for operation of centrifugal pumps
- Gas pumper systems: single, double, constant pressure
- Pump sizing, line sizing
- Refrigerant charge
- Start-up and basic operation, oil removal
- Advantages/disadvantages

Secondary Coolant Circulation System
- Direct vs. indirect
- Common secondary coolants
- 2 pipe/3 pipe system
- Defrost of secondary coils
- Pump types for secondary refrigerant
- Heat exchangers:
  - Open tank
  - Shell and tube
  - Plate and frame and its advantages

Two Stage System
- Basic design of operation
- Horsepower savings
- Compression cycle: booster compressor/high stage compressor
- Intercooler function: shell & coil, flash type
- Noncondensables
- Cascade System

Coil Defrost
- Moisture content, pump down, fan delay, pressure equalization
- Air defrost
- Electric defrost
- Water defrost
- Continuous defrost
- Hot gas defrost operation and guidelines
- Causes for excess of ice buildup

Measuring System Performance
- Measurements: horsepower, BTU, HP/ton, Kilowatt, Kw/ton, Kw demand
- Calculation: compression ratio, cost and efficiency

Electricity
- Fundamentals: Ladder Diagram
  - Rungs of the ladder
  - Symbols
  - Switches
  - Circuits

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