

COMPLIANCE CONNECTION

March / April 2019

Vol 3 Issue 2

A bimonthly newsletter designed to help you navigate the ins and outs of compliance and the safe practice of industrial refrigeration.

So You Want to Begin the New Year with a Visit From Our Friends at OSHA?

By Steve Harmon

If you want to begin 2019 with a friendly visit from the folks at the Occupational Safety and Health Administration (OSHA), then consider this opportunity. Get your cell phone out and have those guys on speed dial as I show you the best way to get them to your workplace.

If you put someone in the hospital, your obligation is to make the call. So landing your coworker in the hospital is, by far, your best bet!

Try something like this: Have your Hazmat team conduct one of your quarterly drills out by the machinery room door (You do conduct them quarterly right?). Have one of your Primary Responders prepare for entry into the hot zone by dressing in one of those pesky Level A suits. And just as he's been taught, have him don his SCBA. In the process, make sure he hits the poor equipment guy in the head. Don't forget to hit him hard enough that the 30 pounds coming down on the top of his head will knock him out cold. Then phone 911 and wave goodbye as the ambulance drives off to the hospital. Don't forget to make sure you hit him hard enough that he gets a concussion and has the exciting opportunity to stay overnight in the emergency room.

And most importantly, don't forget to get your phone out and make the call to OSHA; otherwise you're in violation.

Let's break down the ridiculous scenario above and find out what went wrong, so we don't actually have to begin our year with a visit from OSHA.

It seems the guys in our previous scenario had been trained by a group of retired firefighters for the last five years. There is absolutely nothing wrong with that. In fact, the stored knowledge those guys have is some of the best in the country. They know their business and have practiced best/worst case situations countless times to save our lives and your valuable property.

However, one of those old-time practices of grabbing the SCBA, throwing it over your head, adjusting the shoulder straps, doing a little jump to seat the system and buckling the waist belt is problematic. The issue occurs when throwing the 30 pound SCBA system in the air, over your head and down your back. This practice works wonderfully with firefighters who are in total control, have enough strength to maintain that control and make sure no one is standing in their path. It's okay for them to do it that way because firefighters practice every day at the fire station. But since we typically only practice once or twice a year, our skill level falls woefully short.

Hence the scenario where you have released a projectile with enough velocity to send one of your guys to the hospital for an overnight stay and a bump the size of a grape-

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Training Calendar

For more information about available training and classes, call 1-918-274-8639

MARCH 2019

KULPSVILLE, PA
March 26-28
24 Hr Emergency Responsee
March 27
8 Hr ERT Refresher
March 28
8 Hr ERT Refresher

APRIL 2019

BRIDGEVILLE, DE
Apr. 8-10
24 Hr Emergency Response
Apr. 9
8 Hr ERT Refresher
Apr. 10
8 Hr ERT Refresher
Apr. 11
8 Hr Incident Command
WARRENVILLE, IL
Apr. 23-26
32 Hr Level I
Ammonia Refrigeration
Apr. 23-25
24 Hr Emergency Response
Apr. 25
8 Hr ERT Refresher
Apr. 26
8 Hr Incident Command
Apr. 26
8 Hr ERT Refresher
HOUSTON, TX
Apr. 29-30
16 Hr CARO/CIRO
Refrigeration Review

JULY 2019

WARRENVILLE, IL
July 23-25
24 Hr Emergency Response
July 23-26
32 Hr Level I Ammonia
Refrigeration
July 25
8 Hr ERT Refresher
July 26
8 Hr Incident Command
July 26
8 Hr ERT Refresher

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Introducing SAFETY MAN ... mild mannered consultant, David Bennett, who stands for TRUTH, JUSTICE and SAFETY!

COMING SOON TO THE COMPLIANCE CONNECTION NEAREST YOU!

So You Want to Begin the New Year with a Visit From Our Friends at OSHA?

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fruit to brag about the next day. Remember, $F=MA$ (Force = Mass x Acceleration = Headache...at least that's how I remember the equation).

Therefore if you'd like to avoid starting your year hanging with the guys at OSHA, put the SCBA on like a coat with a helper holding the tank. This doesn't require a safe distance and you will not have to whip out that cell phone for a gleeful chat with your local OSHA representative.

Our jobs all involve conducting safe practices. Hazmat team responsibilities are hard enough. Don't add issues that are within your control to the list of hazards. We must all work together to minimize the risk that we can through proper training and teamwork.



Your Compliance Connection™

2019 REFRIGERATION REVIEW COURSES

**April 29-30, 2019
Houston, TX**

**August 26-27, 2019
Kissimmee, FL**

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).

Special for attendees — All review course attendees will be enrolled in the Regional Conference associated with the class for which they are enrolled.

Instructor

Chris Harmon, RAI of Industrial Consultants



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)

Registration Information

CALL 918-274-8639



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Industrial Consultants

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**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

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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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