

# R-410A Safety Training Program

## R-410A Purpose of Training

The HVACR industry has been using HCFC's since the 1940's. Due to environmental and competitive pressure, HCFCs including R-22 are being phased-out. In response, many of the manufacturers began selling equipment that uses HFC-410A. R-410A presently marketed under the brand names Honeywell AZ-20, Carrier Puron, or DuPont Suva.

Air conditioning equipment manufactured for R-410A will require contractors and technicians to shift to different tools, equipment and SAFETY STANDARDS when installing or changing out older split A/C systems and repairing systems in the field.

R-410 has a much higher vapor pressure than R-22. The discharge pressure of R-410A is approximately 50% to 70% higher than R-22. These higher pressures create some safety concerns.

To address the issues of safe handling, training and certification with the use of R-410A the industry worked together to unify behind a Universal R-410A Safety Training & Certification program. The AC&R Safety Coalition members include RSES, ESCO Institute, Ferris State University, Indoor Air Quality Association, Industrial Technology Excellence, Green Mechanical Council, HVAC Excellence, COSA & the United Association. Together working with numerous manufacturers, wholesalers & industry associations they have developed a Universal R-410A curriculum.

## Course Content

### **R-410A and the R-22 Phase-out**

- § HCFC Phase out Schedule
- § Regulation and Change
- § The Future
- § Safety and R-410A

### **Refrigeration & Air Conditioning Systems Fundamentals**

- § Vapor Compression System
- § Condensing Pressure
- § Evaporating Pressure
- § Refrigerant States & Conditions
- § Saturation
- § Vapor Pressure
- § Superheat

§ Subcooling

### **R-410A Considerations**

§ Compressor

§ Compression Ratios

§ Condenser

§ Receiver

§ Filter/Driers

§ Liquid Line

§ Metering Device

§ Evaporator

§ Suction Line

### **Refrigerant Chemistry & Applications**

§ Chlorofluorocarbons (CFC's)

§ Hydrochlorofluorocarbons (HCFC's)

§ Hydrofluorocarbons (HFC's)

§ Blends

§ Blend Fractionation

§ Blend Temperature Glide

§ Superheat & Subcooling

§ Calculation for Near-Azeotropic Blends

§ Subcooling & Superheat with

§ Temperature Glide

§ Evaporator Superheat Calculation

§ Condenser Subcooling Calculations

§ Blend Lubricants

### **HCFC-22 Replacement Candidates**

§ R-410A

§ Typical Operating Pressures

§ Temperature Glide & Fractionation

§ Pressure / Temperature Chart

§ R-407C

§ Temperature Glide & Fractionation

### **Basic Service Tools**

§ Gauge Manifold

§ R-410A Considerations

§ Micron Gauge

- § Vacuum Pumps
- § R-410A Considerations

### **Basic Service Tools ( Continued )**

- § Leak Detectors
- § R-410A Considerations

### **Refrigerant Recovery Systems**

- § Passive Recovery (System Dependant)
- § Active Recovery (Self Contained)
- § R-410A Considerations

### **Refrigerant Charging**

- § Undercharge
- § Overcharge

### **R-410A System Charging**

- § Charging for Proper Subcooling
- § Charging for Proper Superheat
- § Precautions

### **R-407C System Charging**

### **R-407C Refrigerant Leaks & Leak detectors**

### **Refrigeration Oils & Applications**

- § Oil Groups
- § Synthetic Oils
- § Alkybenzene
- § Glycols
- § Esters
- § Waste Oils
- § Lubricants, R-410A, R-407C & R-134A
- § Advantages of POE vs. Mineral oils
- § Concerns with POE Lubricants

### **Safety**

- § Personal Safety Protection
- § Electrical Safety
- § Safe Refrigerant Handling
- § Storage Cylinders
- § Shipping
- § ASHRAE Standard 34
- § Equipment Room / Job Site Safety
- § Monitors / Alarms

## Ventilation

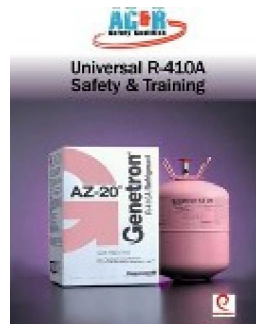
- § Purge Venting
- § Breathing Apparatus

## Safety Overview

- § R-410A Considerations
- § Material Safety Data Sheet
- § Toxicity
- § Flammability
- § Combustibility
- § Ingestion
- § Skin / Eye Contact
- § Inhalation
- § Refrigerant Decomposition

## Environmental Considerations

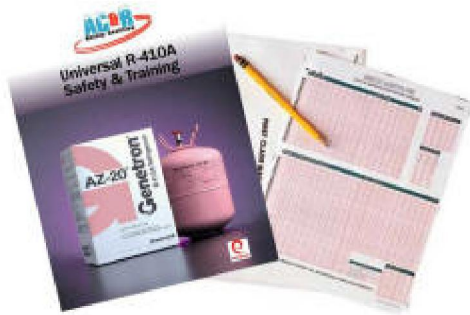
## Training Manual



This book will provide field service personnel with the necessary training and practical knowledge to safely perform service on systems containing R-410A as well as R-407C and other near azeotropic blends. This manual also includes information on: the R-22 phaseout, appropriate refrigerant and oil applications, service techniques, as well as safe handling of R-410A.

## Interactive CD-ROM

## Certification



An end of course assessment - certification is available to validate if attendees comprehend the course materials..

### **Additional Information**

[http://www.youtube.com/watch?feature=player\\_detailpage&v=nA-XbfxqgRo](http://www.youtube.com/watch?feature=player_detailpage&v=nA-XbfxqgRo)

