



Hydrocarbon Refrigerant Training

Refrigeration Service Engineers Society

- **Established in 1933**
- **World's leading education, training and certification association**
- **Developed a Hydrocarbon Training Program in 2012.**
- **Updated it to reflect the recent EPA SNAP approved refrigerants for New Equipment.**

Hydrocarbon Training Program

Includes:

- **HC Manual**
- **50 Question Test, passing score of 88%**
- **Online Training Video Series available**
- **Face-to-Face Seminars available**

Training Content

Hydrocarbons as Refrigerants

- **Brief History**
- **Purpose of Training**
- **Why use Flammable Refrigerants?**
- **Worldwide Applications**

Training Content

HC Regulations and Standards

- **EPA Approved Flammable Refrigerants**
- **Approved Flammable Applications and Limits**
- **EPA Approval of HFC R-32**
- **HFC Approved Applications**
- ***May be adapted to CSA B52 Standard for Canada***

Training Content

Refrigerant Properties and Safety

- **MSDS Sheets**
- **Flash Point**
- **Auto-ignition Temperature**
- **Lower Explosive Limits**
- **Upper Explosive Limits**
- **ASHRAE Refrigerant Ratings**

Training Focus

Best safe working practices with flammable refrigerants for manufacturers, service technicians, installers such as:

R-290 - Propane

R-600a - Isobutane

R-441A - Flammable Blend (HRC188C)

Others: R-170, R-152a, R-32

HFO's (HFO-1234yf, HFO-1234ze....)

EPA - Applications and Limits

NEW - Household Refrigerators, Freezers and Combination Refrigerator/Freezers	Specific Refrigerants & Charge Amounts	UL250
<u>NEW</u> - Retail Food Refrigerators and Freezers: (stand-alone retail food refrigeration equipment only)	Specific Refrigerants & Charge Amounts	UL471
<u>NEW</u> - Vending Machines	Specific Refrigerants & Charge Amounts	UL541
<u>NEW</u> - Very Low Temperature Refrigeration Equipment Temperatures of - 170°F (- 112°C) or lower - Non-mechanical heat transfer & Thermo-syphon Systems	Specific Refrigerants & Charge Amounts	UL471
<u>NEW</u> - Residential and light commercial equipment for self contained room air conditioners: PTACs, PTHPs, window units, portable units	Specific Refrigerants Charge Based on Unit Capacity	UL484

Training Content

Refrigerant Properties and Safety

- **Flammability and Ignition**
- **Ignition Sources**
- **Electrical Connections**
- **Work Space Guidelines**
- **Safety Checks**

Training Content

System Component Compatibility

- **Compressors**
- **Refrigerant Control Devices**
- **Driers**
- **Evaporators and Condensers**
- **Lubricants**

Training Content

Servicing Procedures

- **What you do BEFORE servicing.**
- **Unauthorized Refrigerants**
- **Ventilating the Work Area**
- **PPE and Tools**
- **Leak Detection**

Training Content

Servicing Procedures

- **Removal**
- **Vent or Not Vent**
- **Recovery**
- **Evacuation**
- **Charging**
- **Start-up**

Training Content

The Refrigeration Cycle

- **Superheat**
- **Subcool**
- **Applications**

Training Content

Cylinder Storage and Transport

- **Storage Methods: how and where**
- **Classification of Cylinders**
- **Flammable Refrigerant Signage**
- **Non-Flammable Refrigerant Signage**

Number Trained to Date

Approximately 1,500 as of June 1st, 2015

**We do not currently collect any data on
the proportion of trained HVAC&R
contractor/engineers in the U.S.**

What changes has RSES seen in the demand for HC training?

Inquiries have almost **TRIPLED** resulting from the latest EPA SNAP policy release.

What changes has RSES seen in the level of awareness of natural refrigerants?

Due to the number of inquiries, awareness is obviously growing, but we still have a long way to go.

What has been your experience in providing HC training?

- 1. Very receptive, both online and on-site.**
- 2. Concern about flammability issues.**

What has been your experience in providing HC training?

- 3. After training, they are more comfortable with safety and procedures.**
- 4. They understand that some of their old established work techniques must improve.**

Does RSES work with end users, and if yes, which ones?

Development and BETA testing procedures, we worked with:

- 1. True Mfg.**
- 2. Hussman**
- 3. Accurate Ref.**
- 4. Red Bull North America**
- 5. Leif Sundgaard**
- 6. Ben & Jerry's/Unilever**

Does RSES work with end users, and if yes, which ones?

**To date, the following manufacturers have
directed their technicians towards the RSES
training materials:**

- 1. True Mfg.**
- 2. Beverage Air**
- 3. Minus Forty Technologies**

Does RSES plan to extend/revise its HC training in the future?

RSES is constantly in the loop with regulations and technology changes. The HC training is presently on its 2nd edition.

Can you comment on the market potential of HCs in the U.S.?

**‘EXPLOSIVE’
and then add HFC R-32**

Conclusion

RSES is currently the only independent organization that has an HC Training Program.

RSES has several manufacturers who use the Training as their approved manufacturer training.

RSES is interested in partnering with additional manufacturers, so we welcome your inquiry.

**Thank
You**

www.rses.org