

Natural Refrigerant Training Summit

Building a Sustainable Workforce

R-290 Service Training

Mark Kehrer

True Manufacturing Co.



NORTH AMERICAN
Sustainable
Refrigeration
Council



NORTH AMERICAN
Sustainable
Refrigeration
Council

Natural Refrigerant Training Summit

Thank you to our sponsors!

Premium Sponsors



Basic Sponsors



North American Sustainable Refrigeration Council (NASRC)

Mission Create sustainable future for supermarket refrigeration by removing barriers to natural refrigerant adoption

➤ **501c3**
Non-Profit Organization

➤ **150+**
Members

➤ **51,000+**
Food Retail Locations

Goals

- **Build sustainable workforce**
- Increase funding options
- Increase education & awareness

Natural Refrigerants

Carbon Dioxide
R744

Propane
R290

Ammonia
R717



Need help? Look for NASRC staff!



Danielle Wright
Executive Director



Morgan Smith
Program & Communications Director



Jeanne Ackerman
Membership & Communications
Coordinator



YOUR ENERGY EDUCATION STARTS HERE

Our Energy Education Centers in Irwindale and Tulare offer online and in-person classes to help you advance your career in clean energy, and make better energy decisions for your home or business.

Sign up for a free class or join our email list.

Visit us at sce.com/classes or scan the QR code.



Before we get started...

- Please make sure you sign in by the door
- To receive an electronic certificate for this training:
 - Complete the survey at the end of the session
 - Share your name and email at the end of the survey



EQUIPMENT

HC Overview

Natural Refrigerant



TRUE[®]

TRUE[®]
REFRIGERATION



TRUE[®]
REFRIGERATION





EQUIPMENT HC Overview

- **2012 EPA APPROVES USE OF HYDROCARBON (HC) REFRIGERANTS**
 - *R290 propane for commercial (max 5.3 oz.).*
 - *R600 isobutene for residential (max 2.01 oz.).*
- **JUNE 2014 – EPA APPROVES VENTING OF HYDROCARBON REFRIGERANTS.**
 - *Allows for effective field service & repair.*





EQUIPMENT HC Overview

Global-warming potential (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.

Low GWP Refrigerant Alternatives

- **R290 PROPANE**
- **R600A ISOBUTANE***
- **R744 CO2**

REFRIGERANT	GWP	ODP
R404A	3922	0
R134a	1340	0
R290 PROPANE	3	0
R600A* ISOBUTANE	3	0
R744 CO2	1	0



NORTH AMERICAN
**Sustainable
Refrigeration
Council**

R290 CANISTERS

NATURAL REFRIGERANT ADVANTAGE



R-29

TRUE REQUIRES UL CERTIFIED R290 REFRIGERANT FOR WARRANTY WORK

- True is now requiring the use of **UL** approved refrigerant only for any warranty refrigeration repairs on True equipment.
- True strongly recommends the use of **UL** approved refrigerant only for any non-warranty refrigeration repair on True equipment.

WHY IS THE USE OF UL APPROVED REFRIGERANT SO IMPORTANT?

- Using a **UL** certified refrigerant means that the supplier of the refrigerant undergoes regular testing to confirm the purity level of the refrigerant is a minimum of 99.5% pure.
- Using **UL** approved refrigerant assures the highest purity of refrigerant is being used. This will reduce the likelihood of premature refrigeration component failures and allow the refrigeration system to function at its highest capacity, which is important for operation and energy-efficiency.

HOW COULD USING A NON-UL APPROVED R290 REFRIGERANT AFFECT MY CERTIFICATION?

- The use of any non-**UL** approved refrigerant could lead to the equipment being worked on having the **UL** Certification voided.

FOR USE IN ALL R290 SYSTEMS



100559-227

14.1
OUNCES
400
GRAMS

2001 East Terra Lane, O'Fallon, MO 63366-4434 p: 636.240.2400 f: 636.272.2408 toll free: 800.325.6152 parts toll free: 800.424.8783

truemfg.com |

194908 1M 51 8.22





EQUIPMENT HC Overview

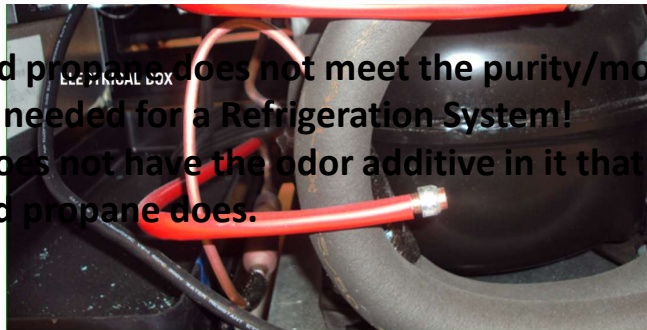
R-290 FRE

- ▶ Is there a
- ▶ Are there
- ▶ Where can
- ▶ How will I
- ▶ Differences
 - The uni



ore?

- Standard propane does not meet the purity/moisture content needed for a Refrigeration System!
- R-290 does not have the odor additive in it that standard propane does.





EQUIPMENT HC Overview

R-290 FREQUENTLY ASKED QUESTIONS

- ▶ Is there a maximum charge amount for commercial applications?
- ▶ Are there special markings on the cabinet?
- ▶ Where can I get R-290 refrigerant?
- ▶ How will I be able to tell if the system I'm working on is built with R-290?
- ▶ Differences between R-290 and standard propane from a hardware store?
- ▶ Can I retrofit older cabinet to R-290?
- ▶ Can the same parts be used to service HFC and HC units?

**No. Retrofitting any existing equipment is prohibited.
Parts on HC units must meet specific UL certifications
for non-sparking components**

TRUE®

Sealed system





R-513A (XP-10) SERVICE PROCEDURES

- Because TRUE can no longer ship any equipment with HFC refrigerants into some states we built some models with R-513A
- R-134A can be used as a direct drop-in replacement of R-513A for refrigeration repairs. Always check your state's regulations.
- The same refrigeration tools and charging equipment are used when servicing for HFC refrigerants and R-513A.



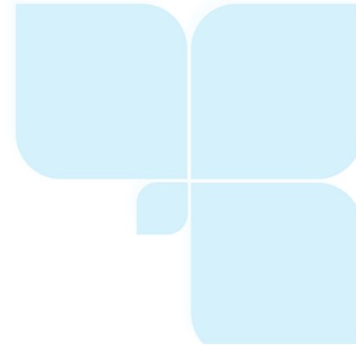


EQUIPMENT HC Components Controls





EQUIPMENT
HC Components
Electrical Connector



Wire Nut



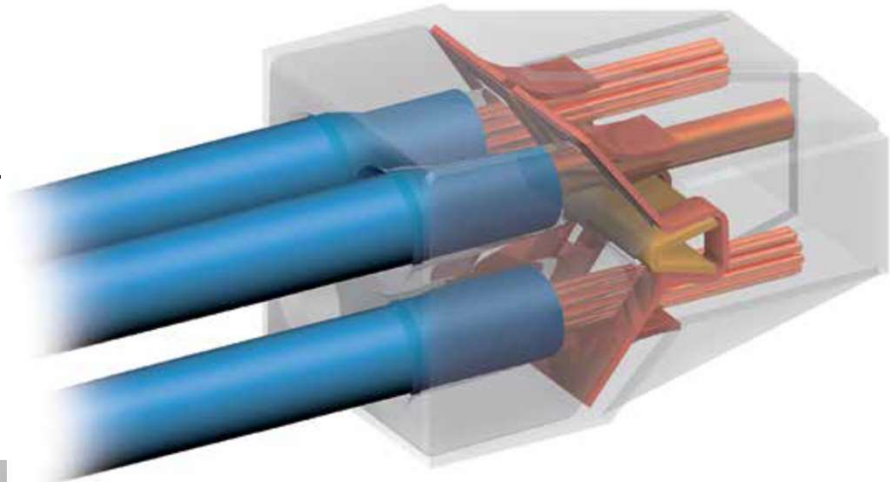
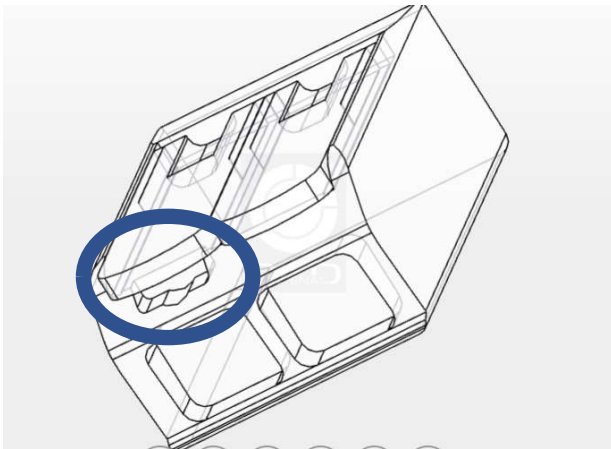
Crimp Connector





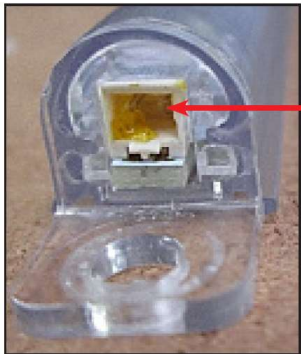
EQUIPMENT

HC Components
Electrical Connector

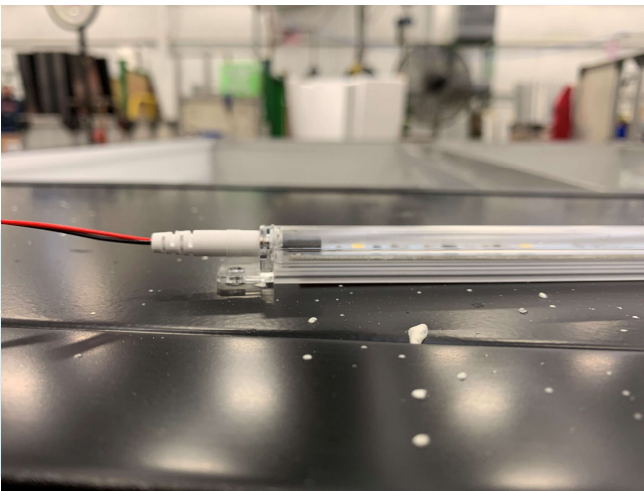
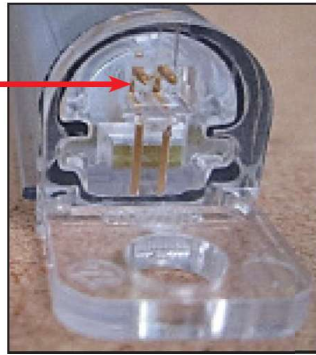


TRUE[®]

LED LIGHTING



Input Wire Connections





LED LIGHTING DRIVERS



- Input Voltage 100 - 240V (Black & White Wires)
- Output Voltage (Red & Blue Wires) **24 volts DC**



Light strip and driver are NOT interchangeable



- Input Voltage 100 - 240V (Black & White Wires)
- Output Voltage (Red & Blue Wires) **9 volts DC**



TRUE®

EQUIPMENT
HC Components
OEM Only





EQUIPMENT
HC Components
Tool Kit



P#819576
Charging Valve



EQUIPMENT
HC Components
Tool Kit



P#969422
Charging Valve



Replacement Style R-290 Cylinder &
P#819576 Charging Valve



P#819576
Charging Valve



UTULU®

EQUIPMENT

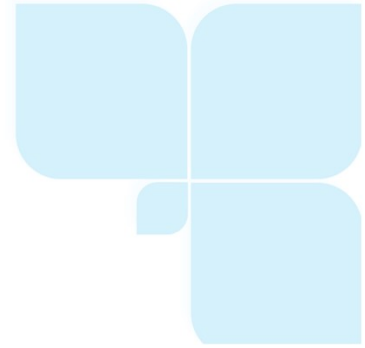
DIFFERENCE IN SERVICING HC EQUIPMENT

Tools used specifically for HC/R systems





EQUIPMENT
DIFFERENCE IN SERVICING HC EQUIPMENT
Opening refrigeration system



TRUE®

HC Components
Tools – Gauges





DIFFERENCE IN SERVICING HC EQUIPMENT *Tools*



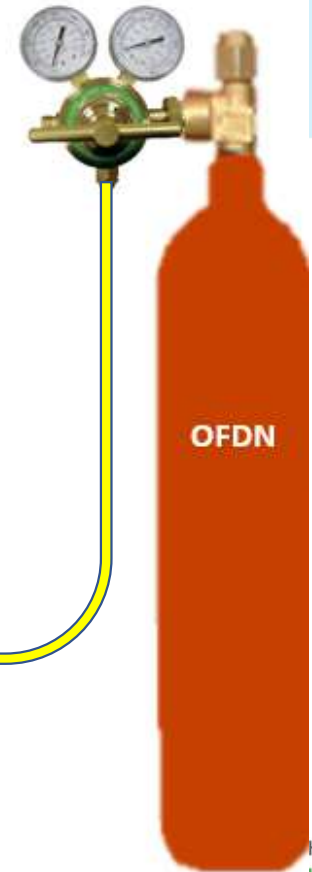
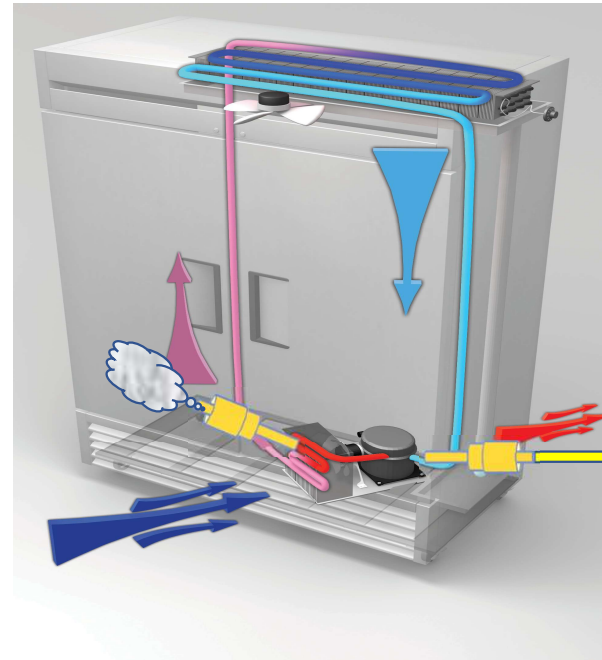


DIFFERENCE IN SERVICING HC EQUIPMENT

Nitrogen Purge

Using Dry Nitrogen set pressure to 3-5 PSI & purge for 2 minutes prior to brazing.

Continue purging nitrogen through system until all brazing is complete.





GOOD REFRIGERATION PRACTICES



500 Microns Minimum



Using a micron gauge, pull the system down to hold a minimum of 500 microns (0.5 Torr).

See if the system will hold this micron with the gauges closed and the pump switched off to test for leaks or moisture.





GOOD REFRIGERATION PRACTICES



Compound Gauge

Reading in. Hg	Microns
Vacuum	
25.849	103,430
29.107	20,686
29.717	5,171

**500 Microns
Minimum**



ATMOSPHERIC PRESSURES, ABSOLUTE VALUES				COMPOUND GAGE READING	SATURATION POINTS OF H ₂ O
psia	in. Hg	mm Hg	microns	in. Hg VACUUM	(BOILING-CONDENSING) °F
14.696	29.921	759.999	759,999	00.000	212.00
14.000	28.504	724.007	724,007	1.418	209.56
13.000	26.468	672.292	672,292	3.454	205.88
12.000	24.432	620.577	620,577	5.490	201.96
11.000	22.396	568.862	568,862	7.526	197.75
10.000	20.360	517.147	517,147	9.617	193.21
9.000	18.324	465.432	465,432	11.598	188.28
8.000	16.288	413.718	413,718	13.634	182.86
7.000	14.252	362.003	362,003	15.670	176.85
6.000	12.216	310.289	310,289	17.706	170.06
5.000	10.180	258.573	258,573	19.742	162.24
4.000	8.144	206.859	206,859	21.778	152.97
3.000	6.108	155.144	155,144	23.813	141.48
2.000	4.072	103.430	103,430	25.849	126.08
1.000	2.036	51.715	51,715	27.885	101.74
0.900	1.832	46.543	46,543	28.089	98.24
0.800	1.629	41.371	41,371	28.292	94.38
0.700	1.425	36.200	36,200	28.496	90.08
0.600	1.222	31.029	31,029	28.699	85.21
0.500	1.180	25.857	25,857	28.903	79.58
0.400	0.814	20.686	20,686	29.107	72.86
0.300	0.611	15.514	15,514	29.310	64.47
0.200	0.407	10.343	10,343	29.514	53.14
0.100	0.204	5.171	5,171	29.717	35.00

NOTE: psia X 2.035 966 = in. Hg psia X 51.715 = mm Hg psia X 51,715 = microns

Source: Refrigeration And Air Conditioning Technology - 4th Edition





GOOD REFRIGERATION PRACTICES
IMPORTANCE OF PULLING A MINIMUM
500 MICRON VACUUM





GOOD REFRIGERATION PRACTICES

CHARGING A SYSTEM

Weigh in the listed refrigerant charge located on the serial tag inside the cabinet.

R-290 can be added as a liquid or vapor. Refrigerant

134a/404A charge as a liquid only. Refrigerant should be charged through the high side.



TRUW®

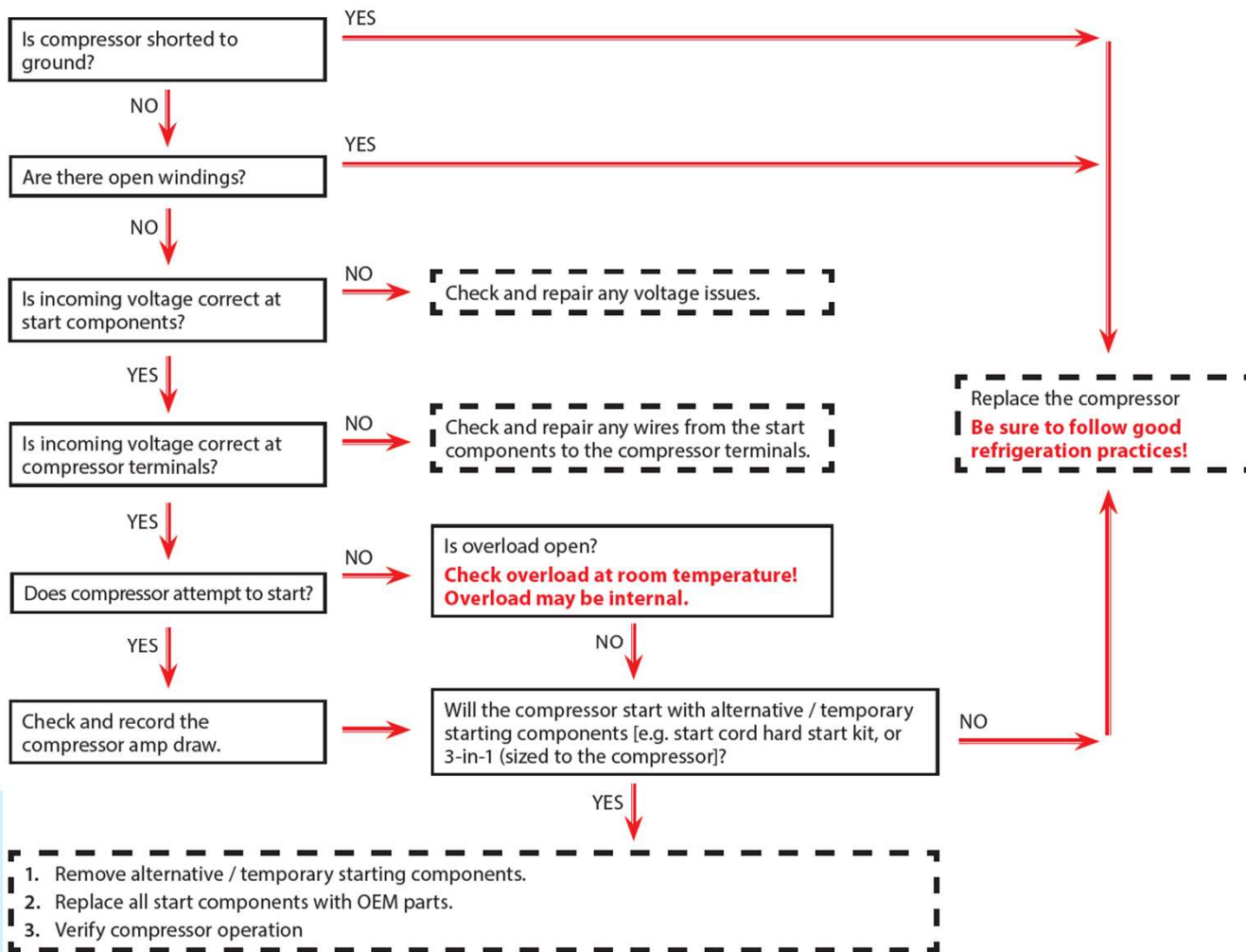
Are you using a pinch off tool?



TUWE®

LEAK CHECKING





TRUVE®

LEAK CHECKING

Place a nitrogen charge in the system to check for any leaks. Use maximum 200 PSI (13.8 Bar).



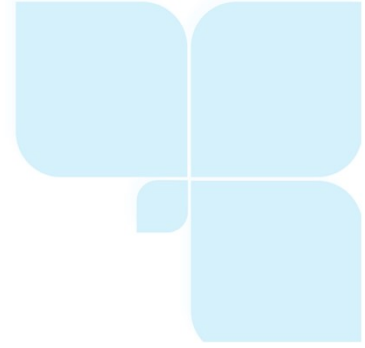
TRUE®

LEAK CHECKING

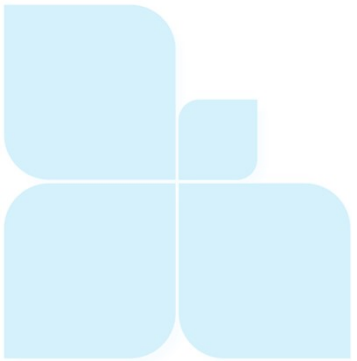
IF LEAK CANNOT BE
FOUND WE MUST
ISOLATE THE SYSTEM.



TUWE®



REVIEW





TECHNICAL SUPPORT HOURS

Monday – Friday 7:00 a.m. - 6:00 p.m. Central Time

Saturday 8:00 a.m. - 12:00 p.m. Central Time

True Main # 800-325-6152

True Service # 855-372-1368

service@truemfg.com



Share Your Feedback!



To receive an electronic training certificate:

1. Scan or visit nasrc.org/session-surveys
2. Provide your name and email at the end of the survey

Please Note: You will not receive a certificate unless you share your name on the survey form.

Presentation Title

Mark Kehrer

True Manufacturing Co.