



# R290 Service Process

## Quick Reference Card



### Overview

#### What is R290?

- Common name for high purity propane (C3H8) suitable for use in the refrigeration and air conditioning industry
- Hydrocarbon (HC) refrigerant
- Proven safe, not an environmental threat – has been used in international markets for 10+ years
- Used in Coca-Cola coolers, display cases, and chill cabinets.

#### Why not R134A?

- EPA plans ban on R134A, effective in 2019
- Most beverage cooler manufacturers moving to R290 as the alternative to R134A refrigerant.

### Servicing R290 Equipment

#### R290 Service Overview

- It is propane, so it is flammable. You **MUST** observe caution and proper safety practices when servicing R290 refrigeration systems
- Servicing refers to making repairs to the hermetically sealed system and any part of the electrical system. The EPA set a limit, 150 grams/ 5.29 ounces, on the amount of R290 charge for commercial applications
- Repair on R290 systems must always be done in a well ventilated area
- Because R290 is highly flammable, a combustible gas leak detector is required when servicing R290 systems.



#### Servicing R290 vs. R134A

- Operationally very similar systems:
  - Operating pressure of R290 system slightly higher than an equivalent R134A system. Example:
    - At 100F, evaporating pressure in an R290 system is approx. 46 psig
    - At 100F, evaporating pressure in an R134A system is 26.6 psig
 (See pressure chart in upper right column.)
- EPA has exempted R290 from Section 608, Venting Prohibition; however, due to safety concerns, it is recommended that R290 be recovered with a R290 recovery unit.
- EPA certification is **not** required for handling R290
- Specialized training is not mandated but is recommended (online training available)
- Refrigerant charge in an R290 system is 40 – 60% less than an equivalent R134A system
  - GDM10 requires 1.9 ounces of R290 vs 8.3 of R134A

### Parts and Tools

#### R290 Parts and Requirements

- Servicing Spark resistant/sealed electrical components are required
  - To avoid using unapproved parts, only OEM replacements parts are to be used on R290 systems
- Wire nuts, crimp connectors, and spade connectors are not approved for R290
- Push and lock connectors, with sufficient strength to hold the conductor, must be used to connect wires



#### Tools to Use on R290

- Same basic refrigeration tools as R134A EPA **AND**
  - Combustible gas leak detector
  - Propane warning placard
  - Tap valve for Propane tank
  - Fire extinguisher

**Note:** See Page 4 for parts and tools numbers.

#### R290 Recovery Cylinder and Filter By True Manufacturing

- Recovery system for R290 is basically a filter and housing similar to a water filter
- The cylinder head has a needle valve on one side (inlet) and the outlet side is plugged
- When R290 is recovered, the gas is absorbed into the filter inside the housing.
- The filter will accommodate 5.3 ounces of R290



### Parts and Tools Numbers

CCP Part #s	Equip Mfg. Part #s	Description	Price	Stock Type
144920	992987	Kit, R290, refrigeration repair*	\$400.90	Drop Ship
145251	969292	Refrigerant, R290, 10 ounces	\$6.58	Drop Ship
145427	773-164	Connector, electrical, 4 wire	\$0.15	Stock
145428	222-412	Connector, electrical, 2 wire	\$0.35	Stock
145429	222-413	Connector, electrical, 3 wire	\$0.35	Stock
145455	976480	Recovery system, refrigerant, R290	\$272.92	Drop Ship
145454	976474	Filter, recovery system, R290	\$60.49	Drop Ship

Part # 144920, Kit, R290, Refrigeration, Repair, includes:

- Combustible gas leak detector
- Danger propane placard
- R290 Tank access/tap valve.



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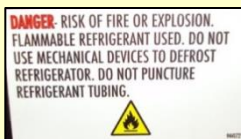
### Labels

#### What is R290?

- All coolers containing R290 are clearly labelled



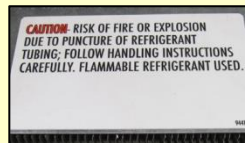
### Additional Warning Labels



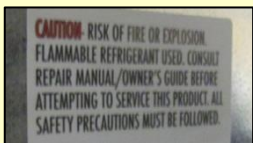
Exterior back left



Exterior back right



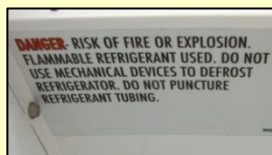
Condenser coil shroud



Condensing unit area sidewall



Interior serial tag



Interior evaporator top/cover

### Standard Features

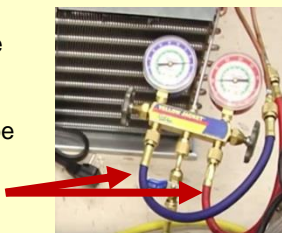
#### Red Sleeves

- Red sleeves are installed on the process tubes on R290 systems. These sleeves are not to be permanently removed



#### Red and Blue Hoses

- Standard refrigeration gauge manifold hoses are used on R290 system. However, the Red and Blue hoses are to be as short as reasonably possible – 12-inch lengths are recommended.



### Servicing Overview

You will follow the steps below each time you service an R290 system:

1. Open System
2. Release a Charge
3. Solder
4. Pressure Test
5. Vacuum
6. Charge the System
7. Confirm the Charge.



### Open System

#### Before Starting . . .

- Before starting the repair, post the Danger Propane placard on the front of the cooler
- Solder joints must not be heated (touched with a flame) to remove a component such as a compressor or filter dryer from an R290 system
- You must use a tubing cutter to cut the connections to remove a compressor or other component in an R290 system
- R290 must be purged from the system via the R290 recovery process before cutting into the system with a tubing cutting. Use caution as there may be residual R290 still in the system.



### Release(Recover) the R290 Charge

- Even though R290 can be vented to the environment, extreme caution must be observed when purging R290 from the system.
- Since the least little spark can ignite R290, it is recommended that R290 be recovered
- Access (piercing) valves are installed to recover the R290 charge
- It is required to install piecing valves on both the high-side and low-side process tubes to reclaim the R290
- Install the saddle valves as close to the pinch off area as reasonable. Alternate type of tool for releasing refrigerant is acceptable.





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### Recovering R290

**A standard reclamation system cannot be used to recover R290**

- The recovery process utilizes:

- A standard vacuum pump
- Standard gauge manifold
- Nitrogen

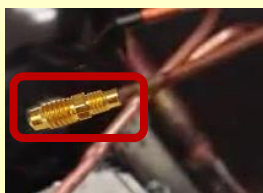
Follow the steps below:



1. Using standard vacuum pump and gauge manifold, connect the yellow hose to the vacuum pump and blue hose to the recovery cylinder.
2. Open needle valve on recovery cylinder, open valve for Blue hose on manifold, turn on vacuum pump and vacuum the recovery cylinder until a minimum of 25 hg is achieved
3. Remove the yellow hose from the vacuum pump and connect to the nitrogen tank
4. Break the vacuum, in the recovery cylinder, with 13 psig of nitrogen
5. Remove the blue hose from the recovery cylinder and open the needle valve to vent the nitrogen from the recovery tank
6. Reconnect blue hose back to the recovery cylinder
7. Move yellow hose from nitrogen tank back to vacuum pump and vacuum recovery tank again until 25 hg is achieved. Close recovery tank needle valve
8. Connect red hose to high side of refrigeration unit, blue hose to low side and yellow hose to recovery cylinder.
9. Open all valves and allow refrigerant from cooler to be absorbed into filter

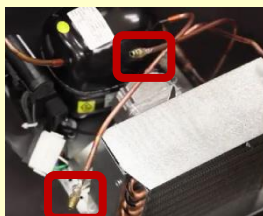
### Preparing System for Soldering and Charging

- Solder Schrader valves onto the process tubes when you install a new compressor. *Saddle/piercing valves and Schrader valves must be removed and the process tube sealed after charge is verified*
- When soldering, allow dry nitrogen to flow through the system:
  - a. Set the regulator on the nitrogen tank to 3 to 4 psig.
  - b. Install a process tube on both the high and low sides of the system to allow for the nitrogen flush and for nitrogen to flow during soldering.



### Soldering

- Assemble the copper lines and fittings



### Soldering (continued)

#### Before Soldering:

- Connect Dry Nitrogen, with regulator set at 3-4 psig, to either the high or low process tube and flush through the system for 2 minutes before soldering



#### After Soldering:

- Allow Dry Nitrogen to flow through the system at 3-4 psig during soldering. →



### Pressure Testing and Vacuuming

- After soldering, you must pressure test with Dry Nitrogen at a pressure of 175 psig  
**Note:** Maximum pressure for pressure testing is 200 psig
- Release the Dry Nitrogen pressure down to 1 – 2 psig before starting the vacuuming process
- Vacuum the system to 500 microns (this is standard protocol)
- The photo illustrates a nitrogen tank and standard gauge manifold.



### Charging the System

#### Before Charging

- You must be using Refrigeration grade Propane (R290)  
**Note:** R290 does not have the odor normally associated with natural gas and propane tanks
- When servicing an R290 system, always turn on the combustible gas leak detector and place it in the immediate work area
- Work must be performed in a well-ventilated area
- System can be charged with gas or liquid.



#### To Start Charging

1. Determine charge from cooler data plate
2. Install access valve onto R290 tank
3. Insert R290 tank into shipping box
4. Connect yellow hose to R290 tank
5. Open tank access valve
6. Open valve on yellow hose at manifold, (if manifold has a shut-off on yellow hose)
7. Place R290 on scale
8. Calibrate scale
9. Purge air from hoses
10. Open high-side valve slowly, watching scale closely, and charge system.







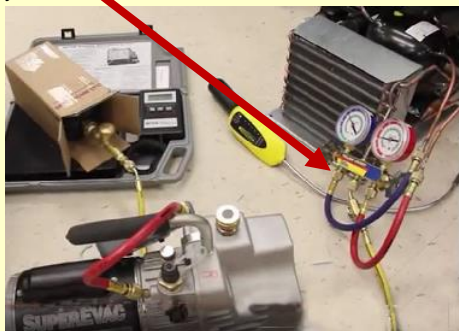
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### Charging the System (continued)

#### If charge is not achieved:

1. Start refrigeration compressor
2. Allow to run for a minimum of 1 minute
3. Complete the charging via the low/suction side of the system.



### Confirm Refrigerant Charge

#### Follow common practices for confirming refrigerant charge via system operating pressures and amperage draw:

- High and low pressure should be per a pressure temperature chart for R290
- Amperage draw should be within .5 amps of cooler's data plate:
  - Excessive low amps or pressure could indicate a low charge
  - Excessive high amps or high pressure could indicate an over charge.



### Delete Access Valves

#### Follow normal practices when you remove access valves on R290 systems:

- One pinch with the pinch-off tool will suffice in an R290 system

**Important Tip:** Always remember, the system is charged with flammable gas. Make sure the end of the copper tube is not leaking R290 before touching with flame to seal the end of the tube with solder.



### Additional Resources

#### Training

- Refrigeration Service Engineering Society (RSES) offers an online course for R290 refrigeration.



There is a charge for this course:

[www.rses.org](http://www.rses.org)

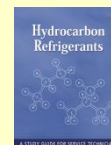
#### Videos:

True Manufacturing has posted the following videos on youtube.com:

- R290 Repair Training:  
<https://www.youtube.com/watch?v=CUmskCjhX3Q>
- True's R-290 Refrigerant Recovery System:  
<https://www.youtube.com/watch?v=4KGGCrEy9Lw>

#### Publications

- *Hydrocarbon Refrigerants: A Study Guide for Service Technicians*, published 2012 by RSES.  
ISBN-13: 978-1-61607-180-6



- *R290 Service Manual*, available from True Manufacturing.



### Notes