

**TECHNICIAN TRAINING**  
BY DORMAN PRODUCTS

**DORMAN®**

**Training Center  
Presents:**

*"How To Work With R1234yf  
Air Conditioning Systems"*

1

**DORMAN®** **Aftermarket Innovators**

2



## *Your Instructor For This Webinar*

**"G" Jerry Truglia**

[gtruglia@dormantraining.com](mailto:gtruglia@dormantraining.com)

- National Trainer, ASE World Class, Master Auto, Truck, School Bus, L1, L3, CNG and...
- **ATTP Master Instructor, New York State, CT and New Jersey**
- STS (Service Technician Society) 2003 President
- **TST (Technicians Service Training) Founder and President**
- Author / Co Author/ Technical adviser on 25 plus books including OBD II and Mode 6, and Understanding and Diagnosing Hybrid Vehicles
- **Published articles for multiple newsletters, and magazines**
- Picked as one of the Top Instructors in the country by EPA & SAE
- **Numerous Radio, TV, Internet, and SAE Video appearances**
- PTEN, MotorAge and TST Webcast Instructor
- **Motor Magazine Top 20 award winner**
- Provider of OBD II Training for 14 states, Ontario Canada and the US EPA
- **Guest speaker at SAE Congress, IM Solutions and Clean Air Conference**

3



## *Your Instructor For This Webinar*

**Joshua Weaver**

[jweaver2@dormantraining.com](mailto:jweaver2@dormantraining.com)

- Associate Degree in Applied Science for Automotive Technology
- **Collage was affiliated with General Motors and Chrysler, and I interned for Ford allowing me to learn all 3 domestic Brands**
- Worked for A Kia Dealer ship for 10 years and achieved Kia Master Tech Status
- **Lead tech at dealership allowing me to see the most difficult customer concerns**
- Pennsylvania State inspection Emissions tech with waiver license
- **Holds A.S.E. L1 Advance Engine Performance**
- Holds A.S.E. L3 Light Duty Hybrid Specialist
- **E.P.A. 609**
- Manager of A 6 bay repair shop which also had a 6 bay body shop, allowing me to see a wide variety of electrical, drivability issue and module programing

4

## The In's And Out's Of R1234yf Air Conditioning Systems

This webinar will cover all the components of the R1234yf air conditioning system along with step by step instructions of how to:

- Test
- Recover
- Evacuate
- Recharge
- Add oil/dye to the system.

At over \$50.00 a pound you don't want to guess but rather test and get the job don't right the first time.

5

## Let's Connect To The Vehicle & Go Through The Proper Procedure

Steps after a visual and physical checks:

1. Sealant Test Check A/C system high-side flow should be at least 1.5 compare the high reading to the lowest after 3-minutes
2. Connect Identifier / A/C Machine
3. Follow all AC machine instructions
4. Check AC Pressure Gauges - system off for at least 30\*minutes Ambient Temperature =
5. Recovery refrigerant - Note the amount recovered & amount of oil in the drain bottle
6. Follow Machine instructions - Check to see how much was recovered and compare \*Leak
7. Refill - The R1234yf maximum charge during LEAK CHECK is 15% of the total charge
8. Use the J2913 Leak detector - highest sensitivity with the air flow out of the floor on low
9. If no leak was found Recovery - Evacuate 30 + followed by refilling the system - oil ?
10. Perform AC system test and see if it passes

6

## A/C Facts

- **Over 80% of new vehicles have R1234yf installed.**
- Mercedes Benz and Mazda are still holding out.
- **R1234yf goes for \$50.00 to \$60.00 per pound or \$500.00 to \$600.00 per 10 pound bottle.**
- Started on January 1, 2018 you were required to present a copy of your 609 AC Certification card to you auto parts store. This is mandatory if you purchase more than 2 pounds. **Why is that?**

7

## A/C Facts

- **R1234yf / SAE J2842 design criteria and certification for OEM Mobile Air Conditioning Evaporator and Service Replacements.**
- ND 11 Hybrid/Electric A/C POE Oil is anywhere \$172.00 an ounce for GM - Ford vehicles and \$160.00 for Chrysler only sold as a 3 - ounce minimum.
- **Only use an oil installer that has NEVER had a PAG oil in it.**
- **Make sure only to install the special Hybrid / Electric A/C oil.**



8

## Real World Helpers

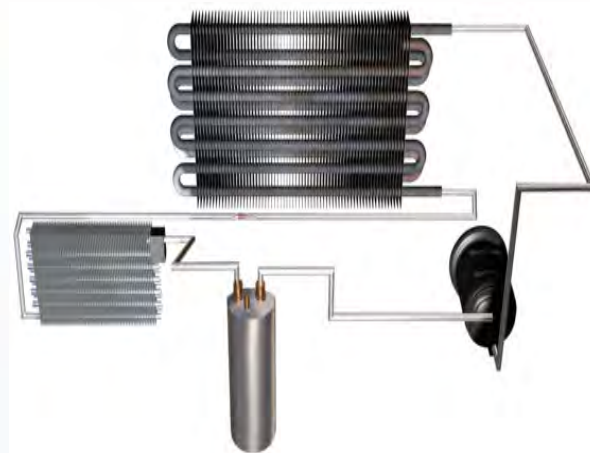
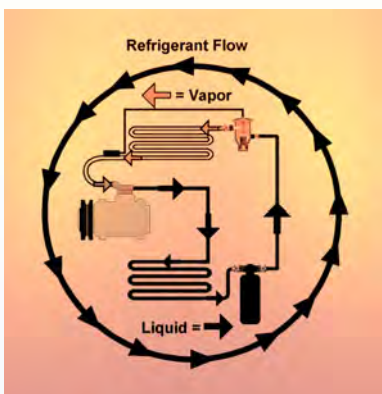
- **Can you use nitrogen to check for leaks with no refrigerant in system or use soapy water?**

**Yes, but what are you going to use to detect the nitrogen?** Better alternatives are; using an approved A/C J 2791/ J2913 Electronic Refrigerant Leak Detector with the refrigerant still in the system, A/C dye, ultrasound and **the best for small leaks, CO2 leak detection with BullsEye after all refrigerant has been recovered.** Soapy water is not really that helpful when it comes to finding small leaks.

- **J2913 sensitive to R1234yf and other refrigerants detects leaks down to 0.1 oz./year (3 g/year).**
- **1 psi of A/C pressure roughly equals 1 degree**
- **With the A/C system at rest the Low and High Side pressures should be equal if there are no blockages in the system.**

9

## Quick Review How The A/C Systems Work

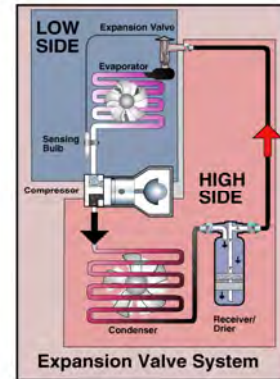


**A/C Systems Are A Closed Loop**

10

## Expansion Valve System

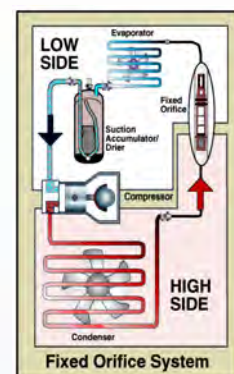
- The expansion valve sprays refrigerant into a low pressure liquid spray at the evaporator inlet. The amount of refrigerant entering the evaporator is determined by the temperature of the sensing bulb at the evaporator outlet tube.
- What should my gauges read? The typical gauge readings for this type of system would be as follows:
- Low Side = 35 - 45 PSI
- High Side = 150 - 270 PSI



11

## Orifice Tube Systems

- How do I test this system? Test this system with your manifold gauges / A/C machine with the compressor engaged.
- The normal readings will be as follows:
- R1234yf - Low Side = 35 - 45 PSI
- R12314yf - High Side = 150 - 270
- Remember these readings will also vary with outside temperature.



12



## Orifice Tube

- Are all these tubes the same?
- Which way is the correct way to install this device?



**Fixed and Adjustable Orifice Tubes**

13

## Expansion Valve System

- R134a
- Low Side = 35 - 45 PSI
- High Side = 150 - 270 PSI
- R1234yf reading are similar

R-134a TEMPERATURE PRESSURE CHART (Tabla de Temperaturas y Lecturas)		
Ambient Temperature °F/°C (Temperatura Ambiental)	Low-Pressure Gauge (Puerto de Servicio del Lado de Baja Presión)	High-Pressure Gauge (Puerto de Servicio del Lado de Alta Presión)
65°F (18°C)	25-35 psi / 172-241 kPa	135-155 psi / 931-1069 kPa
70°F (21°C)	35-40 psi / 241-276 kPa	145-160 psi / 1000-1103 kPa
75°F (24°C)	35-45 psi / 241-310 kPa	150-170 psi / 1034-1172 kPa
80°F (27°C)	40-50 psi / 276-345 kPa	175-210 psi / 1207-1448 kPa
85°F (29°C)	45-55 psi / 310-379 kPa	225-250 psi / 1551-1724 kPa
90°F (32°C)	45-55 psi / 310-379 kPa	250-270 psi / 1724-1862 kPa
95°F (35°C)	50-55 psi / 345-379 kPa	275-300 psi / 1896-2068 kPa
100°F (38°C)	50-55 psi / 345-379 kPa	315-325 psi / 2172-2241 kPa
105°F (41°C)	50-55 psi / 345-379 kPa	330-335 psi / 2275-2310 kPa
110°F (43°C)	50-55 psi / 345-379 kPa	340-345 psi / 2344-2379 kPa

Ambient temp is the outside atmospheric temperature.

14

## Evaporator Is DOT Certified / Drip Tube



**Make sure the drain tube is clear. Don't forget the Cabin Air Filter - Dirty or an incorrect filter can cause low air flow.**

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15

15

## Check Duct Air Flow With An Anemometer

**The blower motor airspeed at its highest setting should measure about 13 - 16 mph (1000 - 1450 CFM).**

Anything less than 10 mph (approx. 900 CFM) airspeed should be considered severely restricted.



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16

16



## IHX = Internal Heat Exchanger

**IHX (Internal Heat Exchanger) has been utilized in stationary air conditioning systems for many years. It was also used in a R134a system in a Toyota Sienna, and now used in R1234yf AC systems.**



Courtesy of ContiTech

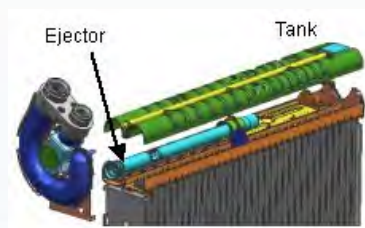
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17

17

## Ejector System

**Conventional air conditioning systems use an expansion valve to reduce the pressure of the refrigerant. DENSO's uses an ejector instead of an expansion valve. The ejector recovers expansion energy, which was previously lost in the expansion valve, and converts it into pressure energy. This, reduces the compressor's workload and helps reduce the air conditioner's overall power consumption. This is used on START / STOP vehicles.**



Courtesy of Denso

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18

18

## A/C Machine R1234yf



19

## Check Your Machine



**33 Pennies = 3 ounces.** Place the pennies on your refrigerant bottle and check the scale reading. **If the scale is adjusted properly the reading on the machine should read 3 oz more.** If it does not read the correct amount **+ or - 1 ounce** adjust the scale.

20

## Before You Connect To The System - Sealant Test & Identification Procedure

- **Step 1. SAFETY is everything! ALWAYS use goggles (clear or yellow) to protect your eyes. Use the yellow goggles to view dye.**



- **Step 2. Make sure to check for A/C Sealant in EVERY SYSTEM.**



- **Step 3. Is to check Refrigerant purity.**

## Protect Your Equipment & Hybrid EV Systems

**AirSept**  
Dual Automatic  
Recycle Guard  
Sealant Remover



**AirSept**  
**AC Charge Guard**  
Keeps PAG Oil Out  
Of Hybrid / Electric  
Compressors

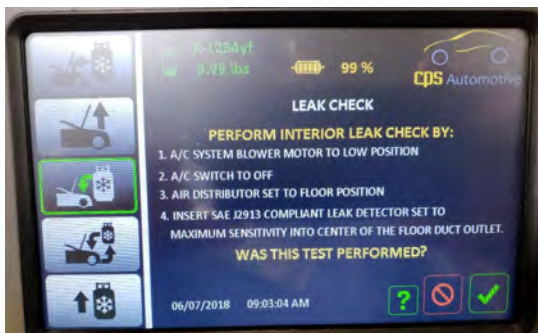
## Evacuate



**30 to 45 Minutes Evacuation Time R-1234yf**

23

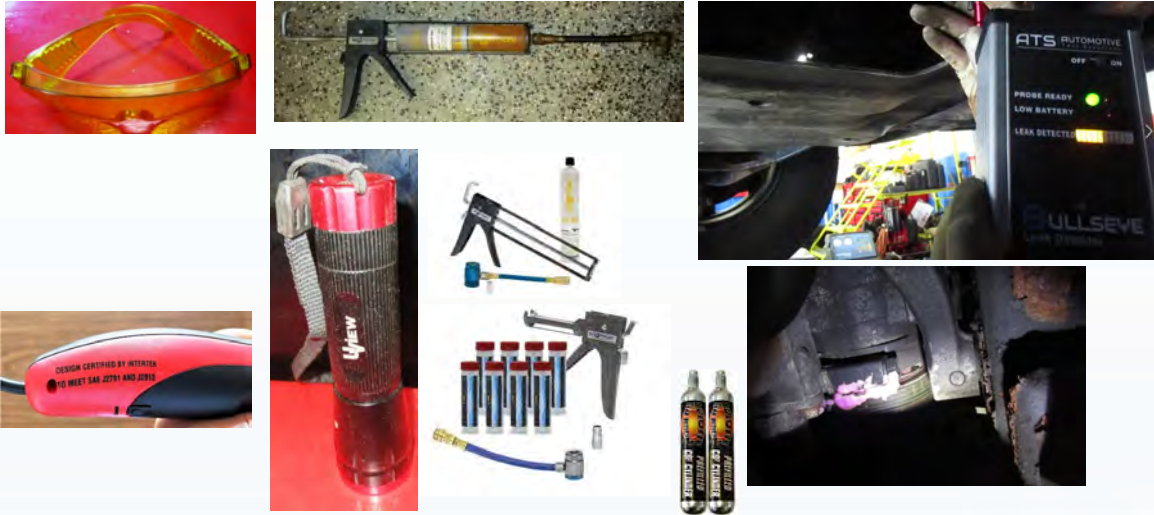
## R1234yf Leak Detector



**R1234yf Leak Detector J2913 directions on a CPS A/C machine. Perform this test for at least 5 minutes. This is a very important step since there is a safety and legal issue associated with this leak inspection. Remember that R1234yf is FLAMMABLE !**

24

## Leak Checking Equipment



25

## A/C Facts

- **All R1234yf machine's perform leak checks. 1. Vacuum leak check 2. Pressure leak check.**
- **This procedure is mandatory since it checks for flammable refrigerant being released into the vehicle's interior.**
- **R1234yf maximum charge during LEAK CHECK is 15% of the total charge. This charge is to check for a leak at the Evaporator, after the panel duct is selected to the floor panels with the fan on low speed. Using a J2913 leak detector selected on the highest sensitive position.**
- **Chrysler R1234yf machine requires the VIN number to be read by the OBD II port.**

26



## Expansion Valve System Pressure Diagnostics

Low-Pressure Gauge	High-Pressure Gauge	Action Required
IN RANGE	IN RANGE	NONE - A/C is working properly
LOW	LOW	Add Refrigerant
LOW	HIGH	Possible blockage of the expansion valve or orifice tube
HIGH	LOW	Possibly faulty compressor
HIGH	HIGH	System is overcharged - Recover refrigerant

27



## TST Big Event Sat April 6<sup>th</sup> 2024

### Instructors:

- "Understanding Internal Combustion"
- Bernie Thompson
  
- "Is the Transmission to Blame? "
- Wayne Colonna
  
- "Cracking The Case"
- Sherwood Cooke

Keynote Speaker: Mark Warren

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

28



## *Hands-On Engine & Emission Class*

3 Day / 24 Hours Time: 8:00am to 4:30pm

Dates: *Friday April 19<sup>th</sup> - Saturday April 20<sup>th</sup> & Sunday April 21<sup>st</sup>*

Cost:  
\$1200.00

Includes: Book, Lunch, Snacks & all day Beverages

Computer Diagnostic Class Hands On Class

May 17<sup>th</sup> Friday to 19<sup>th</sup> Sunday

Cost:  
\$1200.00

*Location: 10 Lupi Plaza, Mahopac, NY 10541*

*#845 628-1062*

*[drestucci@dormantraining.com](mailto:drestucci@dormantraining.com) or [gtruglia@dormantraining.com](mailto:gtruglia@dormantraining.com)*



29

29



**Webinar Tonight Thursday April 4, 2024 7:00 pm EST**

***"Working On Today's Air Conditioning Systems"***

***Instructor Ken Zanders***



30

30



31

We offer greater freedom to fix cars and trucks  
by engineering exclusive, labor-saving  
and cost-effective repair solutions.



*Thank You !*

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32

32