



The Service Sector Prepares for HFO-1234yf

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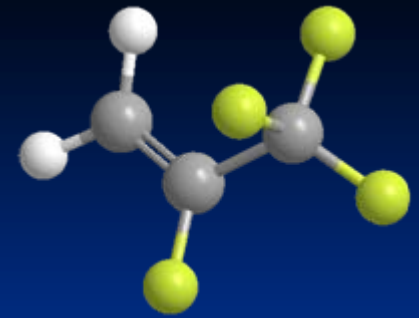
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Agenda

- **HFO-1234yf Review**
- **Service Differences**
- **Technician Training**
- **Recovery/Recycle/Recharge Equipment**
- **Storage and Handling**

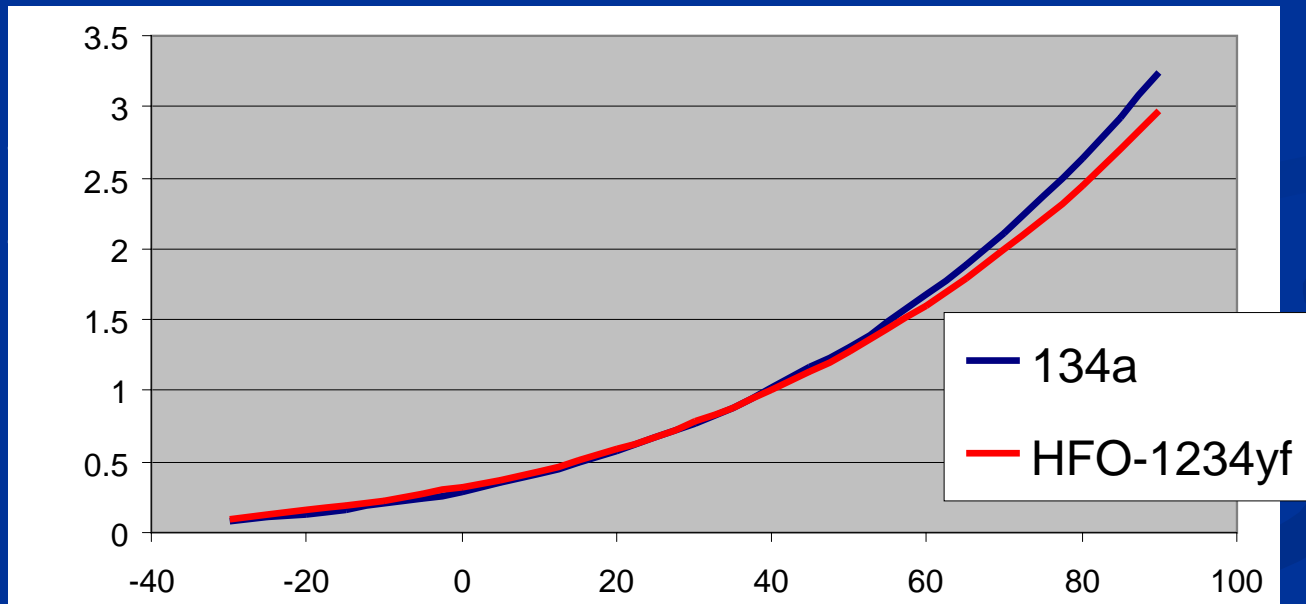


HFO-1234yf Properties



Properties	<u>1234yf</u>	<u>134a</u>
P_{vap} , MPa (25°C)	0.677	0.665
P_{vap} , MPa (80°C)	2.44	2.63
GWP (100 ITH)	4	1410
Toxicity	A-Low	A-Low
Flammability	Mild	None

Vapor Pressure



HFO-1234yf has vapor pressure, toxicity class A, similar to R-134a, but has mild flammability

Servicing Differences



Some potential service differences for HFO-1234yf are:

- Service shops and technicians may need to purchase/use new equipment (flammability/product differences)
 - Recovery/recycle/recharge equipment
 - Refrigerant identifiers
 - Leak detection equipment
- HFO-1234yf refrigerant system components should not be replaced with ones removed from a system that uses another type of refrigerant, or from a salvaged vehicle
 - Replacement evaporators should meet SAE J2842
- HFO-1234yf is mildly flammable
 - Precautions used with other flammables (gasoline, oil) are applicable to HFO-1234yf

Servicing Differences




Some potential service differences for HFO-1234yf are:

- Lubricants used with HFO-1234yf systems may be different than those currently used
 - Hybrid compressors, driven by high-voltage electric motors, or equipped with hermetic mobile A/C systems, use different oils
 - Necessary to check oil requirements

- Do-it-yourselfers may charge non-approved refrigerants into HFO-1234yf systems
 - Result – refrigerant cross contamination
 - Could cause system failure and/or system misdiagnoses

Servicing Differences

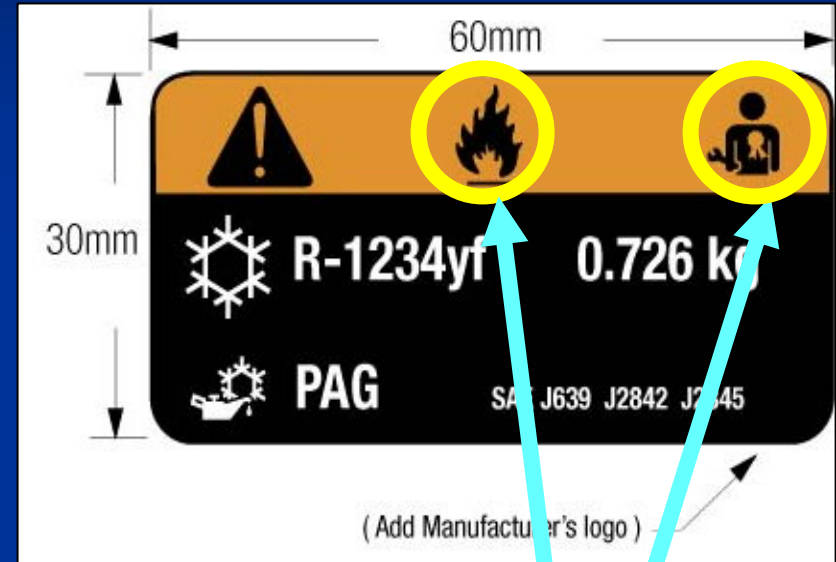
Typical OEM R-134a Label



A rectangular label with a yellow header containing a black triangle with an exclamation point and the word "CAUTION" in bold black letters. Below the header, the text reads: "THIS AIR CONDITIONING SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL. REFRIGERANT UNDER HIGH PRESSURE. IMPROPER SERVICE METHODS MAY CAUSE PERSONAL INJURY. SEE SERVICE MANUAL FOR DETAILS. SYSTEM COMPLIES WITH SAE J-639." At the bottom, there is a table with three columns: TYPE(PART NO), AMOUNT, and a blank column for identification.

	TYPE(PART NO)	AMOUNT	
REFRIGERANT	R-134a	475-525g 1.05-1.16lbs	
COMPRESSOR LUBRICANT	PAG(FD46XG)	140-160cc	

Proposed OEM HFO-1234yf Label



A rectangular label with a black background and a white border. The top section is orange and contains a white exclamation point in a triangle, a white flame symbol, and a white silhouette of a person. The middle section is black and contains a white snowflake symbol, the text "R-1234yf", and "0.726 kg". The bottom section is black and contains a white snowflake symbol, the text "PAG", and "SAE J639 J2842 J2845". Dimensions are indicated: 60mm width and 30mm height. Two yellow circles highlight the flame and person symbols, with blue arrows pointing to the "Additional Information" box. A note at the bottom right says "(Add Manufacturer's logo)".

Additional Information:

Refrigerant flammability symbol

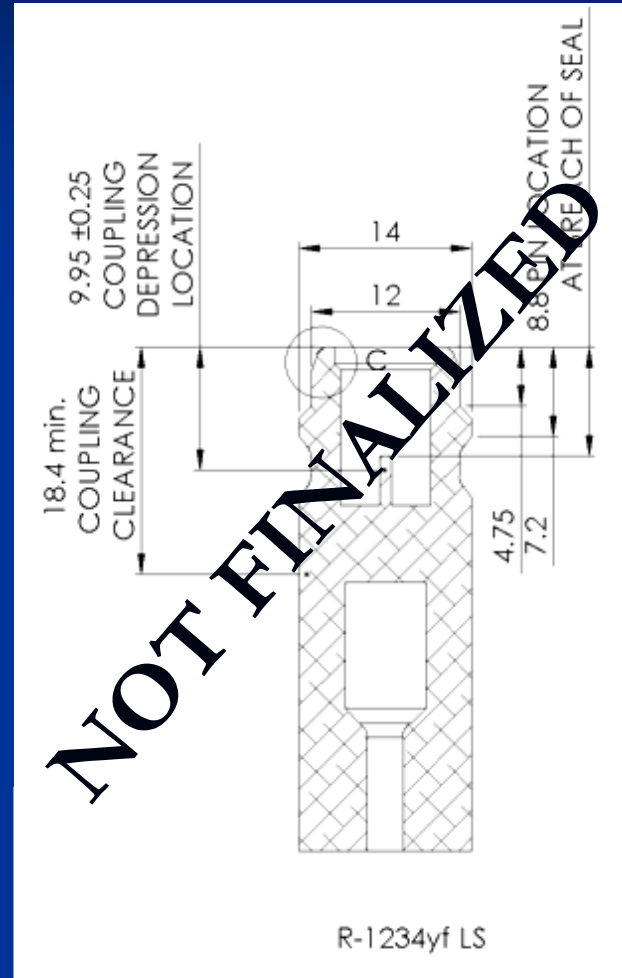
J2845 Technician Training for Safe Service and Containment of Refrigerants

Servicing Differences



R-134a Valve

Prop HFO-1234yf Valve



SAE J639 AC System Low
Side Quick Connect

Servicing Best Practices

- In general, low lying areas, (such as workshop pits, shafts or cellar exits), may cause released refrigerant to pool as it is heavier than air
 - Current regulations require work areas to be adequately ventilated and extraction units switched on if available.
 - Refer to local, state and federal rules and regulations regarding ventilation.
- Care should be taken to avoid over-charging of the refrigerant system.
- Service technicians should not smoke or have any open flame present while working on refrigerant containing systems

Technician Training per SAE J2845



Service Related

- (1) Understand unique differences between R-1234yf and HFC-134a;
- (2) Identification of unique fittings/labels for each refrigerant along with tank identification;
- (3) How to use refrigerant identification equipment;
- (4) How to use leak detection equipment and/or fluorescent dyes to identify leaks with each refrigerant;
- (5) System servicing practices (incl. proper recovery/recycling/recharge)

Safety and Environmental Related

- (6) Follow vehicle manufacturer recommendations, to promote technician safety and minimize environmental impact using appropriate recovery, recycling and charging equipment;
- (7) Technicians must have a good understanding of the safety requirements defined in SAE J639.

OEM's have requested this standard to provide similar basis for technician refrigerant training

Technician Training per SAE J2845

- Intent of J2845 is to provide sufficient technician training, and to highlight refrigerant handling differences

Flammability	HFC-134a	HFO-1234yf
	No	Yes
Lower Flammability Level	N/A	6.2%
Upper Flammability Level	N/A	12.3%
AC System		
AC Type	Vapor Compression	Vapor Compression
AC Components	Can use either R-134a evaporator or HFO-1234yf evaporator	Use only evaporators which meet J2842
Storage, Handling		
Container Type	Light Blue Container, PMS Color 2975	White Container with Red Band
Product Storage	Do not expose to open flames, red hot surfaces, or temps in excess of 52C	Do not expose to open flames, red hot surfaces, or temps in excess of 52C
Personal Protective Equipment	gloves, goggles	gloves, goggles
Equipment		
Recovery/Recycling Equipment	Only use equipment that meets J2210, superseded by J2788 and is for use with R-134a	Only use equipment that meets J2843 and is for use with HFO-1234yf
Recovery Only	Only use equipment that meets J1732, superseded by J2810 and is for use with R-134a	Only use equipment that meets J2851 and is for use with HFO-1234yf
Leak Detectors	Only use equipment that meets J1627 or J2791 and is for use with R-134a	Only use equipment that meets J2913 and is for use with HFO-1234yf

R/R/R Equipment-J2843

J2843 HFO-1234yf Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems

Highlights

- Machines' internal components reduce/minimize arcing/sparking
- Machines will have additional cabinet ventilation
- New hose connections will be required with HFO-1234yf (J639)
- HFO-1234yf refrigerant cylinder color white with red band per J639
- New equipment will prevent re-charge if system has a leak.
- Machine has 2-step process
 1. Vacuum Check
 - Pull vacuum, check for decays
 - If system decays, will stop machine
 2. Pressure Check
 - If vacuum does not decay, will add 10% charge
 - Monitor pressure, check for pressure decay
 - If the pressure decays, remaining 90% of the refrigerant will not be administered.

Recovery Equipment-J2851

J2851 HFO-1234yf Recovery Only Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems

Highlights:

- **Machines' internal components reduce/minimize arcing/sparking**
- **Machines will have additional cabinet ventilation**
- **New hose connections will be required with HFO-1234yf (J639)**
- **HFO-1234yf Refrigerant cylinder color- white with red band per J639**
- **New equipment will prevent re-charge if system has a leak.**
- **Machine will RECOVER, even if there is a system leak**



Storage and Handling Information

- HFO-1234yf package options exist for both disposable and returnable containers
 - **Disposable packages limited to about 2 lb size**
 - **Current DOT regulations prohibit packaging flammable gases in DOT 39 disposable containers beyond 0.75 in³ interior volume.**
 - **Returnable packages available in 2, 5, 10, 20 and 30 lb size**
- Currently working with DOT to understand additional HFO-1234yf disposable packaging options.
- Check with your local, state or federal agencies, as storage of multiple containers of refrigerant may be subject to regulation.
- Refrigerant should always be stored in a cool, dry location, out of direct sunlight



Storage and Handling Information

R-134a



- 30 lb disposable containers
- Light blue package color

HFO-1234yf



- 30 lb returnable containers
- White with red band package color

Packages have about the same footprint, ie. They take about the same floor space.

Summary

- To prepare for HFO-1234yf service technicians will need.....
 - New recovery/recycle/recharge or recovery-only equipment
 - New refrigerant identifier
 - New leak detection equipment
 - Assure adequate ventilation and follow flammable storage practices per local, state and federal regulations
 - Appropriate technician training



Thank You!

Please contact us at....

- www.MACSW.org
- www.refrigerants.dupont.com
- www.SmartAutoAC.com