



SURFACE VEHICLE STANDARD

SAE**J2845 JAN2013**Issued 2011-02
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Superseding J2845 OCT2011

R-1234yf [HFO-1234yf] and R-744 Technician Training for Service and Containment of Refrigerants Used in Mobile A/C Systems

RATIONALE

This SAE Standard is revised such that the pressurized leak check is conducted with the HVAC blower on "Low" and the SAE J2913 compliant leak detector set to high sensitivity (4 grams per year leak rate).

1. SCOPE

Technician training is required to ensure that recommended procedures are used for service and repair of Mobile Air Conditioning (MAC) systems using R-744 and/or R-1234yf. Unique requirements for each refrigerant are detailed within this standard. Technicians may be trained in either or both refrigerants. The technician shall be trained to recognize which refrigerant is being handled, how to handle it safely and be equipped with the essential information, proper equipment and tools, which are unique to these refrigerants. This standard outlines minimum content requirements for such training programs. Training programs designed in accordance with this standard are not intended to ensure or assess the technical skills of technicians regarding the diagnosis and repair of motor vehicle air conditioners. Rather, the goal of such programs is to provide information to technicians about safely handling refrigerants.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J639	Safety Standards for Motor Vehicle Refrigerant Vapor Compression Systems
SAE J1628	Technician Procedures for Refrigerant Leak Detection in Service of Mobile Air Conditioning Systems
SAE J2064	R-134a and R-1234yf Refrigerant Automotive Air-Conditioning Hose and Assemblies
SAE J2099	Standard of Purity for Recycled HFC-134a (R-134a) and HFO-1234yf (R-1234yf) for Use in Mobile Air-conditioning Systems
SAE J2211	Recommended Service Procedure for the Containment of R-134a

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SAE WEB ADDRESS:

SAE J2842	R-1234yf and R744 Design Criteria and Certification for OEM Mobile Air Conditioning Evaporator and Service Replacements
SAE J2843	R-1234yf Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems
SAE J2844	R-1234yf New Refrigerant Purity and Container Requirements Used in Mobile Air-Conditioning Systems
SAE J2851	R-1234yf Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems
SAE J2888	R-1234yf Service Hose, Fittings and Couplers for Mobile Refrigerant Systems Service Equipment
SAE J2911	Procedure for Certification that Requirements for Mobile Air Conditioning System Components, Service Equipment, and Service Technician Training Meet SAE J Standards
SAE J2912	R-1234yf Refrigerant Identification Equipment for Use with Mobile Air Conditioning Systems
SAE J2913	R-1234yf Refrigerant Electronic Leak Detectors, Minimum Performance Criteria
SAE J2927	R-1234yf Refrigerant Identifier Installed in Recovery and Recycling Equipment for Use With Mobile A/C Systems

2.1.2 Other Publications

ASHRAE 34 Designations and Safety Classification of Refrigerants

Certification Training Manual Including Refrigerant Recycling and Service Procedures for Mobile Air Conditioning Technicians and Best Service Practices, Mobile Air Conditioning Society, Lansdale, PA.

R-744 MSDS (available from chemical suppliers)

R-1234yf MSDS (available from chemical suppliers)

3. TECHNICAL REQUIREMENTS

- 3.1 Some of the practices, techniques and procedures, as well as the information, tools and equipment which have been commonly used in mobile air conditioning system diagnosis and service of R-12 and R-134a will be different for MAC systems using R-744 and/or R-1234yf. Modifications and adjustments will have to be made based on the individual characteristics of each refrigerant. No technician may perform service or repair on a mobile air conditioning system using R-744 and/or R-1234yf without being trained for the refrigerant being handled.
- 3.2 Service technicians shall be trained to always wear proper personal protective equipment while handling/servicing systems that contain any refrigerant.

- 3.3 Service technicians shall read and follow the appropriate material safety data sheets, which provide information on safety and the proper personal protective equipment to use. These include but may not be limited to the following items:
- All contact with liquid or gaseous refrigerant shall be avoided.
 - Goggles with side protection and gloves (insulated against heat loss and impermeable to refrigerant) shall be worn while working with the refrigerant circuit.
 - Exposure of the skin to refrigerant may result in frostbite, in which case rub affected area with lukewarm water. A physician shall be consulted immediately regarding the affected skin areas.
 - A physician shall be consulted immediately in the event of complaints following exposure to high refrigerant concentrations. Complaint symptoms may include: increased breathing rate, breathlessness, headache, accelerated pulse, dizziness.
 - Avoid breathing A/C refrigerant and lubricant vapor or mist. To remove refrigerant from the A/C system, use service equipment designed for recovery of that refrigerant which is certified to meet the requirements of the appropriate SAE Standards.
- 3.4 Training shall discuss key differences between equipment and tools designed for each refrigerant and stress the use of proper equipment with designated refrigerant.
- 3.5 Training shall discuss standard, hybrid and other commercialized alternative propulsion vehicles in the context of safety and performance of mobile A/C related issues (i.e., proper operation of the mobile air conditioning and cooling systems in a hybrid vehicle is important not only for passenger comfort, but for the optimal operation of on-board computers and battery packs).
- 3.6 Technician training shall include:
1. Differences between R-744 as compared to R-134a and/or R-1234yf as compared to R-134a (see Appendix A).
 2. Identification of unique fittings and labels for each refrigerant along with tank identification.
 3. Instructions on how to use refrigerant identification equipment.
 4. Instructions on how to use leak detection equipment and/or fluorescent dyes to identify leaks with each refrigerant.
 5. Instructions on how to contain and limit use of each refrigerant based on vehicle specifications, to promote technician safety and minimize the environmental impact of mobile air conditioning by using the appropriate SAE certified recovery, recycling and charging equipment.
 6. System servicing procedures as detailed in this standard.
 7. General safety best practices and specific safety best practices for each refrigerant. Technicians shall also have a good understanding of the safety requirements as defined in SAE J639.

4. UNIQUE FITTINGS AND LABELS

Technicians shall be informed that industry standards and government regulations require the use of unique service fittings and labels for each refrigerant, and be able to identify those fittings and labels.

- R-134a tank is light blue (PMS Color 2975).
- R-1234yf tank is white with red band to denote flammability.
- R-744 tank is gray (PMS Color 352).

Fitting information for each refrigerant is available in SAE Standard J639.

The U.S. EPA's Significant New Alternatives Policy (SNAP) requires that each refrigerant shall be used with a unique set of fittings to prevent the accidental mixing of refrigerants. These fittings are attachment points on the MAC system itself, on all recovery and recycling equipment, on can taps and other charging equipment, and on all refrigerant containers. Unique fittings help protect consumers and technicians by ensuring that only one type of refrigerant is used in each MAC system. They also help protect purity of the recycled supply of refrigerant. More information regarding EPA SNAP may be found at <http://www.epa.gov/ozone/snap/refrigerants/fittlist.htm>.

5. REFRIGERANT IDENTIFICATION AND POTENTIAL CONTAMINATION

Prior to servicing a MAC system, technicians shall be required to verify what refrigerant is in the system. This shall include checking the SAE J639 system label to get information about the type and quantity of refrigerant that should be in the A/C system and potential issues arising from accidental or intentional mixing of refrigerants.

Technicians shall also be warned that fittings can be defeated with adapters, labels might never be installed, and even properly affixed labels can fall off or become illegible, and for these reasons the use of an SAE certified refrigerant identification device is required to prevent the spread of contaminated refrigerant to other vehicles and the refrigerant supply.

Even though the label may be adhered correctly this does not necessarily ensure that the proper refrigerant is contained within the A/C system. MAC systems might contain R-12, R-134a, R-1234yf, R-744 and any of a number of hydrochlorofluorocarbons (HCFCs) and/or R-containing blends, HCs, or a mixture of any of the above.

Mixtures of refrigerants shall be recognized so technicians can protect themselves from hazard and to protect the shop refrigerant supply, shop equipment and MAC systems of customer vehicles from contamination.

Mixtures of refrigerants shall be identified to prevent improper recovery and the resulting further spread of the contaminated refrigerant, which could potentially damage other MAC systems and service equipment. Refrigerant recovery and recycling equipment is designed to process only one refrigerant for reuse. Recycling equipment will not segregate mixtures of refrigerants. Contaminated refrigerant (blend of more than one refrigerant or non-system refrigerant) in recovery/recycling equipment could lead to the potential contamination of more refrigerant. Technicians shall understand how to safely recover contaminated refrigerant and where to find approved reclamation/destruction facilities for contaminated refrigerant along with applicable regulations that cover this situation. For more information see <http://www.epa.gov/ozone/title6/608/reclamation/reclist.html>.

The technician shall understand that the use of a refrigerant identifier can provide an important safety warning that a hydrocarbon or other improper refrigerant has been charged into the system. Certain types of electronic leak detection devices (heated diode or corona discharge) as well as motors, switches, and controls on recovery and recycling machines, could generate sparks that could serve as ignition sources in the presence of refrigerants classified as flammable (A2, A2L or A3) by ASHRAE standard 34 2010.

Training programs shall address the possibility that the mixing of refrigerants in a MAC system can result in higher-than-expected system pressures, system and component damage, diagnostic errors and/or other potential hazards to people and environment.