



SURFACE VEHICLE STANDARD

J639™

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(R) Safety and Design Standards for
Motor Vehicle Refrigerant Vapor Compression Systems

RATIONALE

This document covers refrigerant system design and safety related requirements for refrigerants used in mobile air conditioning (MAC) systems and is being updated for the addition of a secondary loop R-152a system and general improvements for example and clarity. The intent of this standard is to ensure safe MAC systems by forcing proper risk assessments and appropriate design solutions.

1. SCOPE

This SAE Standard applies to refrigerant vapor compression systems that provide cooling and/or heating for passenger cars, light trucks, and commercial vehicles (on and off road) that use automotive type mobile air conditioning (MAC) systems. Large trucks, buses, and other vehicles that do not use typical automotive A/C systems or use refrigerants not listed in this document are not covered by this standard. This standard covers vehicles with MAC systems using belt driven compressors and electric motor driven compressors.

This document provides industry-recognized standards for the design, assembly, and test of MAC systems, including necessary service equipment, and is intended to cover all phases of the lifetime of MAC systems to minimize environmental, health, and safety impacts. The standards listed in this document cover the currently accepted industry guidelines and procedures. The standards can be used as requirements for regulatory authorities to meet minimum environmental, health, and safety requirements. Also included are cautionary statements for the service industry to alert technicians to the inadvisability and possible health or safety effects associated with venting refrigerant during service. It is not intended to restrict the use, or further development of, other types of refrigerants or refrigeration systems for MAC applications. This document may be amended, or additional safety standards created, should other refrigerants or refrigeration systems become practical. This document addresses only HFC-134a (R-134a), carbon dioxide (R-744), HFO-1234yf (R-1234yf), and HFC-152a (R-152a) refrigerants. For R-152a refrigerants, this standard will only apply to secondary loop systems. To prevent system contamination, all refrigerants used in MAC vapor compression systems require unique service fittings and service equipment. The unique service fittings are intended to significantly reduce the potential for refrigerant cross-contamination during service activities.

CFC-12 (R-12) is no longer in use in new MAC systems. The service fitting description is maintained as a reference for older vehicles still in use. When retrofitting an R-12 system to use R-134a or when removing R-12 (during vehicle disposal), use service equipment designed for R-12 and certified to meet the requirements of SAE J1990 (R-12 recovery and recycle equipment).

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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 +1 724-776-4970 (outside USA), www.sae.org.

2.1.1.1 System Design Guidelines

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| SAE J2683 | Refrigerant Purity and Container Requirements for Carbon Dioxide (CO ₂ R-744) Used in Mobile Air-Conditioning Systems |
| SAE J2772 | Measurement of Passenger Compartment Refrigerant Concentrations Under System Refrigerant Leakage Conditions |
| SAE J2776 | Refrigerant Purity and Container Requirements for New HFC-134a 1,1,1,2-Tetrafluoroethane Refrigerant Used in Mobile Air-Conditioning Systems |
| SAE J2844 | R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems |
| SAE J3188* | R-152a (HFC-152a) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems |

2.1.1.2 System Components

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| SAE J2842 | R-1234yf and R-744 Design Criteria and Certification for OEM Mobile Air Conditioning Evaporator and Service Replacements |
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2.1.1.3 Service Activities

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| SAE J2197 | HFC-134a (R-134a) Service Hose Fittings for Automotive Air-Conditioning Service Equipment |
| SAE J2297* | Ultraviolet Leak Detection: Stability and Compatibility Criteria of Fluorescent Refrigerant Leak Detection Dyes for Mobile R-134a and R-1234yf (HFO-1234yf) Air-Conditioning Systems |
| SAE J2670* | Stability and Compatibility Criteria for Additives and Flushing Materials Intended for Aftermarket Use in R-134a (HFC-134a) and R-1234yf (HFO-1234yf) Vehicle Air-Conditioning Systems |
| SAE J2888 | R-1234yf Service Hose, Fittings and Couplers for Mobile Refrigerant Systems Service Equipment |
| SAE J3223* | R-152a (HFC-152a) Service Hose, Fittings and Couplers for Mobile Refrigerant Systems Service Equipment |

2.1.1.4 Technician Service Procedures

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| SAE J2845* | R-1234yf (HFO-1234yf) and R-744 Technician Training for Service and Containment of Refrigerants Used in Mobile A/C Systems |
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2.1.1.5 Service Equipment

SAE J1990	Recovery and Recycle Equipment for Mobile Automotive Air-Conditioning Systems
SAE J2099*	Standard of Purity for Recycled R-134a (HFC-134a), R-1234yf (HFO-1234yf) and R-152a (HFC-152a) for Use in Mobile Air-conditioning Systems
SAE J2209	CFC-12 (R-12) Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems
SAE J2296	Retest of Refrigerant Container
SAE J2788	HFC-134a (R-134a) Recovery/Recycle/Recharging Equipment for Mobile Air-Conditioning Systems
SAE J2791	HFC-134a Refrigerant Electronic Leak Detectors, Minimum Performance Criteria
SAE J2810	HFC-134a (R-134a) Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems
SAE J2843*	R-1234yf (HFO-1234yf) Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems
SAE J2851*	R-1234yf (HFO-1234yf) Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems
SAE J2912	Performance Requirements for R-134a and R-1234yf Refrigerant Diagnostic Identifiers for Use with Mobile Air Conditioning Systems
SAE J2913	R-1234yf (HFO-1234yf) Refrigerant Electronic Leak Detectors, Minimum Performance Criteria
SAE J2927	R-1234yf (HFO-1234yf) Refrigerant Identifier Installed In Recovery and Recycling Equipment for Use With Mobile A/C Systems
SAE J3212*	R-152a (HFC-152a) Refrigerant Identifier Installed in Recovery and Recycling Equipment for Use With Mobile A/C Systems
SAE J3221*	R-152a (HFC-152a) Refrigerant Electronic Leak Detectors, Minimum Performance Criteria
SAE J3222*	R-152a (HFC-152a) Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems

2.1.1.6 Retrofit Documents

SAE J1660	Fittings and Labels for Retrofit of CFC-12 (R-12) Mobile Air-Conditioning Systems to HFC-134a (R-134a)
SAE J1661	Procedure Retrofitting CFC-12 (R-12) Mobile Air-Conditioning Systems to HFC-134a (R-134a)

2.1.1.7 Reference Documents

SAE J51	Refrigerant 12 Automotive Air-Conditioning Hose
SAE J1627	Performance Criteria for Electronic Refrigerant Leak Detectors
SAE J1628	Technician Procedures for Refrigerant Leak Detection in Service of Mobile Air Conditioning Systems
SAE J1657	Selection Criteria for Retrofit Refrigerants to Replace CFC-12 (R-12) in Mobile Air-Conditioning Systems
SAE J1658	Alternate Refrigerant Consistency Criteria for Use in Mobile Air-Conditioning Systems