



**SAE 2010
Alternate Refrigerant & System Efficiency Symposium
July 2010, Scottsdale Arizona.**

**Dr Liz Dixon
Shrieve Chemical Products**

**Results of Shrieve Evaluations of 1234yf Refrigerant on
Mobile A/C Lubricant Performance and System Chemistry**

Sae 2010 Automotive Refrigerant And System Efficiency Hfc152a

**Intergovernmental Panel on Climate
Change. Working Group III.**



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Federal Register ,2012-10 *Climate Change 2001: Mitigation* Intergovernmental Panel on Climate Change. Working Group III.,2001-07-12 IPCC assessment of the scientific technical environmental economic and social aspects of the mitigation of climate change **Automotive Engineering International** ,2003 **Fiscal Year 2001 Climate Change Budget Authorization Request** United States. Congress. House. Committee on Science. Subcommittee on Energy and Environment,2001 **Life Cycle Analysis Framework; A Comparison of HFC-134a, HFC-134a Enhanced, HFC-152a, R744, R744 Enhanced, and R290 Automotive Refrigerant Systems** William Hill,Stella Papasavva,2005 **Safety Standards for Motor Vehicle Refrigerant Vapor Compression Systems** Interior Climate Control Vehicle OEM Committee,2011 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 any vehicle with a MAC system using a belt or electric motor driven compressor This document provides standards for design assembly test and service of MAC systems to minimize environmental health and safety impacts 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 refrigeration systems for mobile air conditioning applications This document may be amended or additional safety standards created should other systems become practical This document addresses only HFC 134a R 134a carbon dioxide R 744 and HFO 1234yf R 1234yf refrigerants To prevent system contamination all refrigerants used in mobile air conditioning vapor compression systems require unique service fittings and service equipment The unique service fittings are intended to eliminate the potential for system refrigerant cross contamination during service activity 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 vehicle disposal use service equipment designed for R 12 and certified to meet the requirements of SAE J1990 R 12 recovery and recycle equipment HFC 152a is an A2 flammable refrigerant as classified by ASHRAE 34 and should be used only with a secondary loop application However until MAC systems are developed to use R 152a HFC 152a no SAE Standards for system design service equipment or service procedures have been established The R 152a service fittings described within this Standard were established as part of the industries evaluation of replacement refrigerants and are maintained for future design guidance and to prevent potential refrigerant cross contamination This document covers refrigerant system design and safety related requirements for refrigerants used in mobile air conditioning MAC systems and is being revised to comprehend R 1234yf The current wording of 4 1 1 prohibits refrigerants that are rated less than A2L which would exclude R

152a Later in the document J639 defines the fittings for R 152a The intent of this revision is to insure safe mobile air conditioning systems by forcing proper risk assessments and appropriate design solutions while correcting this conflict with regards to R152a *Safety Standards for Motor Vehicle Refrigerant Vapor Compressions Systems* Interior Climate Control Steering Committee, 2011 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 any vehicle with a MAC system using a belt or electric motor driven compressor This document provides standards for design assembly test and service of MAC systems to minimize environmental health and safety impacts 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 refrigeration systems for mobile air conditioning applications This document may be amended or additional safety standards created should other systems become practical This document addresses only HFC 134a R 134a carbon dioxide R 744 and HFO 1234yf R 1234yf refrigerants To prevent system contamination all refrigerants used in mobile air conditioning vapor compression systems require unique service fittings and service equipment The unique service fittings are intended to eliminate the potential for system refrigerant cross contamination during service activity 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 vehicle disposal use service equipment designed for R 12 and certified to meet the requirements of SAE J1990 R 12 recovery and recycle equipment HFC 152a is an A2 flammable refrigerant as classified by ASHRAE 34 and should be used only with a secondary loop application However until MAC systems are developed to use R 152a HFC 152a no SAE Standards for system design service equipment or service procedures have been established The R 152a service fittings described within this Standard were established as part of the industries evaluation of replacement refrigerants and are maintained for future design guidance and to prevent potential refrigerant cross contamination The SAE Interior Climate Control Standards Committee has been involved with the mobile air conditioning industry in developing alternate low GWP replacement refrigerants The revisions in this document cover engineering guidelines and establishing specifications for mobile air conditioning systems using current and alternate replacement refrigerants R 1234yf is added here for the first time Automotive Air-Conditioning Refrigerant Service Guide Philip G Gott, 1996-07-01 Packed with information on the servicing and retrofitting of air conditioning refrigerant systems so that shops and technicians can meet federal regulations satisfy customers and prevent damage to the environment The second edition of the Automotive Air Conditioning Refrigerant Service Guide was written to provide the latest information to automotive air conditioning service

professionals in order to help them comply with federal certification requirements and prevent damage to the environment With an emphasis on proper recovery and recycling techniques for both R 12 and R 134a as well as the proper retrofitting of R 12 systems to R 134a the book will serve as a valuable instructional tool and resource for technicians Chapters cover General Safety and Service Precautions Refrigerant and System Properties Equipment for the Extraction only of Refrigerant and Equipment for the Recycling of Refrigerant Service Procedure for the Containment of Automotive Air Conditioning Refrigerants Retrofitting CFC 12 R 12 Mobile Air Conditioning Systems to HFC 134a R 134a *Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems* Interior Climate Control Vehicle OEM Committee, 2020 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 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 Standard for Refrigerant Risk Analysis for Mobile Air Conditioning

Systems Interior Climate Control Vehicle OEM Committee,2020 This SAE Standard describes methods to understand the risks associated with vehicle mobile air conditioning MAC systems in all aspects of a vehicle s lifecycle including design production assembly operation and end of life Information for input to the risk assessment is provided in the appendices of this document This information should not be considered to be complete but only a reference of some of the data needed for a complete analysis of the risk associated with the use of refrigerants in MAC systems This standard is being updated to include provisions for R 152a HFC 152a R-12 (CFC-12), R-134a (HFC-134a), R-1234yf (HFO-1234yf), R-744, and R-152a (HFC-152a) Technician Training for Service and Containment of Refrigerants Used in Mobile A/C Systems Interior Climate Control Service Committee,2021 Mobile air conditioning MAC systems used in passenger cars and light duty trucks are covered by these SAE Standards when servicing the refrigerant system Technician training is required to ensure that recommended procedures are used for service and repair of MAC systems using R 12 R 134a R 1234yf R 744 and R 152a refrigerants Unique requirements for each refrigerant are detailed within this standard Technicians may be trained in any or all refrigerants The technician shall be trained to recognize which refrigerant is being handled and 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 and control of emissions during service This SAE Standard is intended to identify the requirements for service technicians to be professionally trained when required to service MAC systems that use refrigerant Updates are being made to add R 152a and revise some requirements for other refrigerants Energy Efficient Automotive Air Conditioning System W. O. Forrest,2002 Hfc-134a (R-134a) Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems Interior Climate Control Steering Committee,1998 The purpose of this SAE Standard is to provide equipment specifications for the recovery of HFC 134a R 134a refrigerant to be returned to a refrigerant reclamation facility that will process it to the appropriate ARI 700 Standard or allow for recycling of the recovered refrigerant to SAE J2210 specifications by using Design Certified equipment of the same ownership It is not acceptable that the refrigerant removed from a mobile air conditioning A C system with this equipment be directly returned to a mobile A C system This information applies to equipment used to service automobiles light trucks and other vehicles with similar HFC 134a R 134a A C systems

Automotive Air-conditioning Refrigerant Service Guide Philip G. Gott,1992-01-01 Compatibility of Retrofit Refrigerants with Air Conditioning System Matrials Society of Automotive Engineers,American National Standards Institute,1993 **CFC-12 (R-12) Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems** Interior Climate Control Steering Committee,1999 The purpose of this SAE Standard is to provide equipment specifications

for CFC 12 R 12 recovery for return to a refrigerant reclamation facility that will process it to the appropriate ARI Standard Air Conditioning and Refrigerant Institute or allow for recycling of the recovered refrigerant in equipment that is certified to meet the requirements of SAE J1991 Under the existing rule the U S EPA requires refrigerant removed from a mobile air conditioning A C system using recovery equipment certified to meet SAE J2209 can only be recycled using equipment meeting SAE J1991 that is owned by the same company or individual It is not acceptable that the refrigerant removed from a mobile A C system with this equipment be directly returned to a mobile A C system This information applies to equipment used to service automobiles light trucks and other vehicles with similar CFC 12 R 12 systems

Automotive Heating and Air Conditioning James D. Halderman,2023 As a result of requests from automotive instructors and reviewers the new ninth edition has been totally updated including new chapter organization and expanded coverage Updated throughout to match the latest ASE tasks two new additional chapters have been added to the new ninth edition including Service Information Work Orders and Vehicle Identification EPA Section 609 Certification Includes sample 609 test with answers Over 50 new full color line drawings and photos make the subject come alive Case studies added to selected chapters that include the three Cs Complaint Cause and Correction Expanded and updated content on refrigerants and refrigerant oil including R 1234yf Chapter 5 Updated chapter on EV and HEV HVAC Systems Chapter 13 now includes heat pump systems used in many electric vehicles Expanded and updated chapter on Air Conditioning System Performance Testing Chapter 14 Updated chapter on A C System Diagnosis and Repair Chapter 16 All terms used adhere to the SAE J1930 standard

Non-Metallic, Non-Reinforced Automotive Air-Conditioning Refrigerant Line Assembly Requirements Interior Climate Control MAC Supplier Committee,2019 The scope of SAE J3143 will cover non metallic line assemblies intended for containing and circulating lubricant PAG POE compressor oils liquid and gaseous R 134a R 152a or R 1234yf refrigerant in automotive air conditioning systems SAE J3143 will also provide the necessary hose permeation values used in SAE J2727 mobile air conditioning system refrigerant emission charts The assembly shall be designed to minimize permeation of the refrigerant contamination of the system and to be functional over a temperature range of 30 to 125 C Specific construction details are to be agreed upon between user and supplier Figure 1 shows a typical A C system with TXV SAE J3143 has been issued to establish performance requirements for non metallic and non reinforced automotive air conditioning refrigerant line assemblies

Selection Criteria for Retrofit Refrigerants to Replace R-12 in Mobile Air Conditioning Systems Society of Automotive Engineers,American National Standards Institute,1993

SAE Interior Climate Control Standards Manual ,1994

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