SURFACE VEHICLE STANDARD

J3030 JUL2015

Issued 2015-07

Automotive Refrigerant Recovery/Recycling/Recharging Equipment Intended for use with Both R-1234yf and R-134a

RATIONALE

The dual-refrigerant equipment (for R-1234yf and R-134a) covered by this standard will enable smoother, more economical service during the period when vehicles with R-134a are still in use and R-1234yf is being phased in to new cars.

FOREWORD

The purpose of this document is to establish specific minimum equipment requirements for automotive refrigerant recovery/recycling/recharge equipment intended for use with both R-134a and R-1234yf in a common refrigerant circuit. Establishing such specifications will assure that this equipment does not cross contaminate refrigerant above specified limits when used under normal operating conditions.

1. SCOPE

The purpose of this SAE Standard is to establish the specific minimum equipment requirements for recovery/recycling/recharge equipment intended for use with both R-1234yf and R-134a in a common refrigerant circuit that has been directly removed from, and is intended for reuse in, mobile air-conditioning (A/C) systems. This document does not apply to equipment used for R-1234yf and R-134a having a common enclosure with separate circuits for each refrigerant, although some amount of separate circuitry for each refrigerant could be used.

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.

SAE J639 Safety Standards for Motor Vehicle Refrigerant Vapor Compression Systems

SAE J2099 Standard of Purity for Recycled R-134a (HFC-134a) and R-1234yf (HFO-1234yf) for Use in Mobile Air-conditioning Systems

SAE J2196 Service Hose for Automotive Air-Conditioning

SAE J2197 Hfc-134a (R-134a) Service Hose Fittings for Automotive Air-Conditioning Service Equipment

SAE J2762 Method for Removal of Refrigerant from Mobile Air Conditioning System to Quantify Charge Amount

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE J2776 Refrigerant Purity and Container Requirements for New HFC-134a 1,1,1,2 -Tetrafluorethane Refrigerant Used in Mobile Air-Conditioning Systems

SAE J2788 HFC-134a (R-134a) Recovery/Recycle/Recharging Equipment for Mobile Air-Conditioning Systems.

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

SAE J2844 R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for use in Mobile 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 Performance Requirements for R-134a and R-1234yf Refrigerant Diagnostic Identifiers (RDI) for Use with Mobile Air Conditioning Systems

SAE J2927 R-1234yf Refrigerant Identifier Installed in Recovery and Recycling Equipment for Use with Mobile A/C Systems

SAE J2913 R-1234yf [HFO-1234yf] Refrigerant Electronic Leak Detectors, Minimum Performance Criteria

2.1.2 Compressed Gas Association (CGA) Publication

Available from CGA, 1235 Jefferson Davis Highway, Arlington, VA 22202.

CGA Pamphlet S-1.1Pressure Relief Device Standard Part 1 - Cylinders for Compressed Gases

2.1.3 DOT Publication

Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

CFR 49, Section 173.304 – Shippers - General Requirements for Shipments and Packagings

SAE J2912 Performance Requirements for R-134a and R-1234yf Refrigerant Diagnostic Identifiers for Use with Mobile Air Conditioning Systems.

2.1.4 UL PUBLICATIONS

Available from UL, 333 Pfingsten Road, Northbrook, IL 60062-2096, Tel: 847-272-8800, www.ul.com.

UL 991 Standard for Tests for Safety Related Controls in Employing Solid-State Devices

UL 1769 Cylinder Valves

UL 1963 Refrigerant Recovery/Recycling Equipment, Version 4, subject to the four exceptions of SAE J2843, 2.1.4

UL 60730 Standard for Automatic Electrical Circuits for Household and Similar Use, Part 1, General Requirements.

2.2 Other Publications

ANSI/ISA 12:12.01 Current revision. Non-incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III Divisions 1 and 2 Hazardous (Classified) Locations (these standards reference NFPA-70 NFPA-497

3. SPECIFICATION AND GENERAL DESCRIPTION

3.1 The equipment shall be suitable for use in an automotive service garage environment and be capable of continuous operation in ambient temperatures from 10 to 49 °C.

3.2 The equipment must be certified that it meets this standard by a certifying Laboratory as listed by the EPA administrator as identified under U.S. EPA 40 CFR Ch. 1 (7-01-08 edition) 82.38.

3.3 The equipment must meet all feature content and functional requirements of both SAE J2788 for R-134a and SAE J2843 for R-1234yf, and pass all test requirements of these standards. In addition, it must pass a changeover test to determine that any refrigerant cross-contamination is within the limits of this standard, as described in Section 6 of this document. A changeover mode, beginning with a clearing procedure to minimize the amount of residual refrigerant in the plumbing lines, may be specified immediately prior to the test, which is described in Sections 5, 6.

3.3.1 The laboratory may test R-134a for SAE J2788 and SAE J2843 for R-1234yf in either order. Before proceeding to the second refrigerant and following the second refrigerant but prior to the cross-contamination test, it must ensure the machine has been cleared of either choice for the first refrigerant using laboratory equipment of confirmed performance capability for the changeover mode previously described. It may not rely on the clearing procedure built into the machine by the equipment manufacturer, as this will not be validated until the entire SAE J3030 procedure has been completed.

3.4 The equipment shall have a label which states "Design Certified by (Certifying Laboratory) to meet SAE J3030 for recovering, recycling and recharging R-1234yf or R134a using common refrigerant circuits, design certified to meet SAE J2788 certified for high-voltage service, when configured for R-134a. Design certified to meet SAE J2843 when configured for R-1234yf. Label shall use bold-type letters a minimum of 3 mm in height.

4. EQUIPMENT REQUIREMENTS FOR MACHINES DESIGNED TO USE BOTH REFRIGERANTS ON AN ONGOING BASIS

4.1 General

4.1.1 The equipment shall have an electronically-controlled electro-mechanical lockout to permit the recovery, recycle, recharge sequence of either R-1234yf or R-134a, based on a sample from the vehicle system and a subsequent readout of the appropriate refrigerant from an identifier that meets SAE J2912. If it determines that the vehicle does not contain R-1234yf or R-134a in the required purity, it shall not permit refrigerant recovery.

4.1.2 The equipment shall have a pre-select feature, so the operator can pick the refrigerant system he wishes to service. As a default, the equipment shall retain in non-volatile memory the refrigerant in the last system serviced, and display it when the machine is turned on, either as an externally-obvious mechanical setup, or by electronic display if the setup is internal. If the refrigerant service setup of the machine is different from the vehicle to be serviced, the machine shall require performing of the equipment manufacturer's specified clearing procedure. If the refrigerant is the same as in the previous operation of the machine, no clearing procedure will be necessary.

4.1.3 Test

To establish basic eligibility for certification to this standard, the equipment shall be tested by the certifying laboratory to ensure it responds appropriately to the refrigerant identifier's signal using the following steps. The analyzer in this test shall be one certified to SAE J2912.

1. The machine shall be set to R-134a mode with an active SAE J2912-compliant refrigerant analyzer (also set to R-134a mode if necessary) attached internally or SAE J2912 attached externally

2. The machine or analyzer shall be connected to an R-134a source by the certifying laboratory to verify that the machine accepts the refrigerant analyzer signal and allows recovery of that refrigerant.

3. With the machine in R-134a mode, the machine and/or external analyzer shall be connected to an R-1234yf source to verify that the machine accepts the refrigerant analyzer R-12347yf signal and prevents recovery of the R-1234yf refrigerant.

4. The machine and/or analyzer if necessary shall be set to R-1234yf mode with an active internal or external refrigerant analyzer attached to an R-1234yf source, The certifying laboratory shall test to ensure the analyzer instructs the machine to enter R-1234yf mode and that the machine accepts the analyzer signal and allows recovery of that refrigerant.

5. With the machine in R-1234yf mode, the machine or analyzer shall be connected to an R-134a source to verify that the machine accepts the R-1234yf refrigerant analyzer signal and prevents recovery of the R-134a refrigerant.

4.1.3.1 A physical means shall be provided to prevent recycle or recharge into both an R1234yf and R134a mobile air conditioning system concurrently. The certifying laboratory shall inspect for its presence and ensure it operates for this purpose.

4.1.4 The machine shall not be equipped with refrigerant oil injection.

4.1.5 Transfer of Recycled Refrigerant

Recycled refrigerant for recharging and transfer shall be taken from the liquid phase only.

4.2 Seat Leakage Tests

4.2.1 Valves, including electrically operated solenoid valves, that are used to isolate R-1234yf and R-134a refrigerant circuits, shall have a seat leakage rate below 4 g/year (0.15 oz/year) before and after 100,000 cycles of operation. This endurance test shall be conducted with R-134a and R-1234yf at maximum operating pressure that would be encountered during the recycling procedures for SAE J2788 and SAE J2843. The Seat Leakage Tests shall be performed at 1.5 times this pressure at an ambient of 21-24 °C. These tests may be performed by the manufacturer/supplier of the parts and validating data supplied to the independent testing laboratory certifying the equipment to this standard.

4.3 Interlocks

4.3.1 Electrical interlock devices that are used to prevent cross contamination of refrigerant shall be operated for 100 000 cycles and there shall be no failure that would permit cross contamination of refrigerant. Solid state interlock devices shall comply with the requirements for a Class B Control Function per the Standard for Automatic Electrical Circuits for Household and Similar Use, Part 1 General Requirements UL 60730-1.

4.4 Equipment requirements for machines designed for a one-time changeover

4.4.1 Although the manufacturer may use an approach that includes mechanical or electro-mechanical switching, it also may choose to offer a conversion kit for the changeover. This kit must be designed to be tamper-resistant, in that once converted, the machine cannot be retrofitted to the first refrigerant. So that the tamper resistance should result in a machine that can only be serviced with parts for the refrigerant to which it was changed. The test laboratory certifying the equipment to this standard shall execute the changeover and evaluate it for what it can reasonably consider tamper resistance.

5. TESTING

The testing shall be separated into three modes, so that a failure in any one permits the equipment manufacturer to identify and address the applicable issue. However, the only mode for which a separate retest is permitted is the changeover. The test fixture shown as Figure 1 in SAE J2843, or a functional equivalent, should be used.

Although a clearing procedure between the tests for SAE J2788 and SAE J2843 is permitted, the laboratory shall perform testing for one of these two standards, then clear the machine per 3.3.1, as the equipment maker's clearing procedure is not validated until the final test for cross-contamination. If the machine meets the standard for one refrigerant, following its validated clearing procedure, the laboratory may proceed to perform the testing for the second standard. However, the cross-contamination test described in 6.2 must be performed last.

5.1 Equipment shall be tested in sequence as noted in SAE J2843 and SAE J2788, and only following successful completion of all testing to those standards, shall it undergo the changeover test to ensure there is no excessive cross-contamination, following the sequence in section 6

6. REFRIGERANT CROSS CONTAMINATION TEST

6.1 General

6.1.1 For test validation, the equipment is to be operated according to the manufacturer's instructions.

6.2 Test Cycle

The following method shall be used after the tests and requirements for SAE J2788 and J2843 are completed. If the machine has separate onboard tanks, one for each refrigerant, the laboratory shall ensure they are empty prior to beginning the cross-contamination testing.

Following the manufacturer's instructions, the equipment shall be cleared of R-134a, prior to beginning step a. The test fixture shown in SAE J2843, Figure 1, or a functional equivalent shall be used and the test shall be conducted at each stable ambient within the range of 10-13 ^{0}C, 21-24 ^{0}C and 48-50 ^{0}C for a machine designed to use both refrigerants on an ongoing basis. The cross-contamination samples are to be taken sequentially and as reasonably contemporaneously as possible at the three noted temperatures. The machine must pass the cross-contamination test at each of the temperatures. For a machine designed for a single, tamper-resistant (permanent) changeover, the test shall be conducted only at 21-24 ^{0}C.

a. A 1.13 kg standard sample of virgin R-1234yf shall be processed by the equipment.

b. Follow manufacturer's instructions to clear the equipment of R-1234yf before processing R134a. The refrigerant loss during processing of this sample shall be measured and shall not exceed 5% of the sample.

c. Process a 1.13 kg, standard sample of virgin R-134a through the equipment.

d. Follow manufacturer's instructions to clear the equipment of R-134a. The refrigerant loss during processing of this sample shall be measured and shall not exceed 5% of the sample.

e. The amount of cross contaminated refrigerant, as determined by gas chromatography, in samples processed during steps a and c shall not exceed 0.5% by mass, as described in 7.1.

7. REFRIGERANT CROSS CONTAMINATION

7.1 The amount of cross contamination of R-1234yf in R-134a or R-134a in R-1234yf shall not exceed 0.5% by mass as determined by gas chromatography. A sample of vaporized refrigerant liquid shall be separated and analyzed by gas chromatography. As an example, 1% SP-1000 on Carbopack B (60/80 mesh) column may be used for the analysis.

8. THE MANUFACTURER SHALL FILE TEST RESULTS FOR THIS COMPLETE STANDARD WITH SAE, TO COMPLY WITH THE REQUIREMENTS OF SAE J2911.

9. NOTES

9.1 Marginal Indicia

A change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

PREPARED BY THE SAE INTERIOR CLIMATE CONTROL STANDARDS COMMITTEE

APPENDIX A - CERTIFICATION REQUIREMENTS FOR SAE J3030, ALSO INCORPORATING REQUIREMENTS FOR SAE J2843 AND SAE J2788. ALTHOUGH IT IS COMPOSED OF THREE SECTIONS, ONE FOR EACH OF THE SAE STANDARDS, THE SECTIONS SHALL APPEAR SEQUENTIALLY FOR PURPOSES OF SAE J2911 LISTING OF PERFORMANCE DATA AND A SINGLE CERTIFICATION FOR ALL THREE STANDARDS SHALL BE PROVIDED ON THE APPLICABLE SAE WEBSITE

For Compliance this Standard shall meet, SAE J2911 Procedure for Certification that Requirements for Mobile Air Conditioning System Components, Service Equipment, and Service Technician Training Meet SAE J Standards. This Standard provides manufacturers, testing facilities and technician knowledge requirement providers with a procedure of certifying compliance with the appropriate SAE standard. Only certifying to SAE J2911 allows those verifying compliance to advertise their product as “Certified to the appropriate SAE Standard”. Industry, interested parties and Regulatory agencies will have access to the SAE International public Web Site posting of the results in the official SAE database.

APPENDIX B- TEST VERIFICATION - SAE J2843

The compliance information for this Standard SAE J2843 shall be recorded, verified in Table SAE J2843 and supplied to SAE. The responsible Committee (Interior Climate Control Standards Committee) has established the required certification information.

Requirement paragraph #	Performance Requirement	Certification Test Observed Value	Test Organization	Person verifying	Date of Test results	Comments
4.4.2.1	<=5% refrigerant loss (Pass)					
7.2	<=2% refrigerant heel (Pass)					
7.6	10 ml recovered oil accuracy (Pass)					
8.1	SAE J2099 purity requirements (Pass)					
8.9.5	<0.1% PAG carryover (Pass)					
9.2.1	±15 g charge accuracy (Pass)					
10.4 – Lines 4-6	95% Recovery Efficiency					
10.4 – Line 7	±30 g recovery accuracy (Pass)					

Manufacturer name:	
Equipment/Training program name:	
Model/ID: [If applicable]	
Serial number of part tested: [if applicable]	
Request for certification to the following SAE Standard:	
Requirements to meet ISO standard or EPA 608 or 609 or list other regulatory requirements	
Date evaluated/tested:	
Name and address of Certifying Test Facility	
Required Certificate attached, Yes… No	
Name of Manufacturers Contact	
Address:	
Phone Number:	
Email:	

The manufacturer/supplier declares that the information in this report is representative of equipment/component/publication of series production.

Name Title Date

I certify that that this claim meets all requirements of SAE J2911 **and** SAE J2843

[Printed name] [Title]

APPENDIX C - TEST VERIFICATION --SAE J2788

The compliance information for this Standard J2788 shall be recorded, verified in the following table for SAE J2788 and supplied to SAE. The responsible Committee (Interior Climate Control Standards Committee) has established the required certification information.

Requirement paragraph #	Performance Requirement	Certification Test Observed Value	Test Organization	Person verifying	Date of Test results	Comments
4.4.3	<=5% refrigerant loss (Pass)					
7.3	<=2% refrigerant heel (Pass)					
7.6	20 ml recovered oil accuracy (Pass)					
8.1	SAE J2099 purity requirements (Pass)					
8.9.5.1	<0.1% PAG carryover (Pass) (Optional for high voltage marking)					
9.1.1	±15 g charge accuracy (Pass)					
10.4 – Lines 4-6	95% Recovery Efficiency (Pass)					
10.4 – Line 7	±30 g recovery accuracy (Pass)					

Manufacturer name:	
Equipment/Training program name:	
Model/ID: [If applicable]	
Serial number of part tested: [If applicable]	
Request for certification to the following SAE Standard:	
Requirements to meet ISO standard or EPA 608 or 609 or list other regulatory requirements	
Date evaluated/tested:	
Name and address of Certifying Test Facility	
Required Certificate attached, Yes… No	
Name of Manufacturers Contact	
Address:	
Phone Number:	
Email:	