

# **ENVIRONMENTAL PROTECTION AGENCY**

## **40 CFR Part 82**

**[EPA-HQ-OAR-2006-5065; FRL-8493-5]**

**RIN 2060-AO32**

### **Protection of Stratospheric Ozone: Revision of Refrigerant Recovery and Recycling Equipment Standards**

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Direct Final Rule.

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**SUMMARY:** The Environmental Protection Agency (EPA) is taking direct final action on motor vehicle refrigerant recovery and recycling equipment standards. Under Clean Air Act Section 609, motor vehicle air-conditioning (MVAC) refrigerant handling equipment must be certified by the Administrator or an independent organization approved by the Administrator and, at a minimum, must be as stringent as the standards of the Society of Automotive Engineers (SAE) that are in effect as of the date of the enactment of the Clean Air Act Amendments of 1990. In 1997, EPA promulgated regulations that required the use of SAE Standard J2210, HFC-134a Recycling Equipment for Mobile Air Conditioning Systems for certification of MVAC refrigerant handling equipment. SAE has replaced Standard J2210 with J2788, Recovery/Recycle and Recovery/Recycle/Recharging Equipment for HFC-134a Refrigerant. To avoid confusion with an outdated reference, EPA is updating its reference to the new SAE standards. This action reflects a change in industry standard practice. This action also revises the EPA addresses to send equipment certification forms.

**DATES:** This rule is effective on December 31, 2007 without further notice, unless EPA receives adverse comment or a request for public hearing by [Insert date 30 days from date of publication in the Federal Register]. If we receive adverse comment or a request for a public hearing, we will

publish a timely withdrawal in the Federal Register informing the public that some or all of the amendments in this rule will not take effect.

**ADDRESSES:** Submit your comments, identified by Docket ID No EPA-HQ-OAR-2006-5065, by one of the following methods:

- [www.regulations.gov](http://www.regulations.gov): Follow the on-line instructions for submitting comments.
- E-mail: [a-and-r-Docket@epa.gov](mailto:a-and-r-Docket@epa.gov)
- Fax: 202-566-1741
- Mail: Environmental Protection Agency, Mailcode 6102T, EPA Docket Center (EPA/DC), 1200 Pennsylvania Avenue, NW, Washington, DC 20460
- Hand Delivery: Public Reading Room, Room B102, EPA West Building, 1301 Constitution Avenue, NW, Washington, DC  
Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

*Instructions:* Direct your comments to Docket ID No. EPA-HQ-OAR-2006-5065. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at [www.regulations.gov](http://www.regulations.gov), including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through [www.regulations.gov](http://www.regulations.gov) or e-mail. The [www.regulations.gov](http://www.regulations.gov) website is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through [www.regulations.gov](http://www.regulations.gov) your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to

technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

*Docket:* All documents in the docket are listed in the [www.regulations.gov](http://www.regulations.gov) index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in [www.regulations.gov](http://www.regulations.gov) or in hard copy at the Air Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. This Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Air Docket is (202) 566-1742.

**FOR FURTHER INFORMATION CONTACT:** Karen Thundiyil, Stratospheric Protection Division, Office of Atmospheric Programs (MC 6205J), Environmental Protection Agency, 1200 Pennsylvania Ave NW, Washington, DC 20460; telephone number: (202) 343-9464; fax number (202) 343-2363; email address: [thundiyil.karen@epa.gov](mailto:thundiyil.karen@epa.gov).

**SUPPLEMENTARY INFORMATION:**

EPA is publishing this rule without a prior proposed rule because we view this as a noncontroversial action and anticipate no adverse comment because this action is primarily administrative in nature. However, in the “Proposed Rules” section of today’s Federal Register, we are publishing a separate document that will serve as the proposed rule to update EPA’s reference to an obsolete SAE standard, if adverse comments or a request for public hearing are received on this direct final rule. We will not institute a second comment period on this action.

Any parties interested in commenting must do so at this time. For further information about commenting on this rule, see the ADDRESSES section of this document.

If EPA receives adverse comment or a request for a public hearing, we will publish a timely withdrawal in the Federal Register informing the public that this direct final rule will not take effect. We would address all public comments in any subsequent final rule based on the proposed rule.

Existing regulations covering specifications for motor vehicle air conditioning (MVAC) refrigerant handling equipment reference Society of Automotive Engineers (SAE) standards that have become outdated because the SAE has issued new updated standards. This action will update existing regulations to reference newly updated SAE standards. This regulatory action is primarily administrative with no significant policy issues.

Section 609 of the Clean Air Act, requires that EPA regulations be at least as stringent as SAE J1990 standard. J1990 describes refrigerant handling equipment for CFC-12 refrigerant. Since Section 609's conception, the MVAC sector has transitioned from CFC-12, an ozone depleting substance, to HFC-134a, a non-ozone depleting substance. Now HFC-134a is the predominant refrigerant in MVACs in the United States and around the world. At the start of the transition from CFC-12 to HFC-134a, more than 13 years ago, SAE developed standard J2210 on HFC-134a refrigerant handling equipment. J2210 described standards for HFC-134a refrigerant recovery and recycling machines. At the time of transition from CFC-12 to HFC-134a, EPA adopted J2210. Now, SAE has updated the standard on HFC-134a refrigerant handling equipment from J2210 to J2788. This action updates EPA's reference to SAE's new HFC-134a refrigerant handling equipment standards (J2788 in Appendix C to Subpart B of Part 82 in the Code of Federal Regulations).

## **I. Background**

### A. Statutory Authority

Title VI of the Clean Air Act (Act) is designed to protect the stratospheric ozone layer. Section 609 of the Act requires the Administrator to promulgate regulations establishing standards and requirements regarding the servicing of MVACs. The Act requires that the Administrator establish standards for using MVAC refrigerant handling equipment that shall be at least as stringent as the applicable standards of SAE in effect as of the date of enactment (November 15, 1990).

### B. EPA Section 609 Equipment Certification Program

EPA requires that any person repairing or servicing MVACs shall certify to EPA that such person has acquired approved refrigerant handling equipment. An independent standards testing organization, approved by EPA, certifies equipment as meeting the MVAC refrigerant handling equipment standards. At this time, Intertek/ETL and Underwriters Laboratories Inc. (UL) have been approved by EPA to certify MVAC refrigerant handling equipment.

### C. SAE Industry Standards

EPA refers to the SAE J standards for technical specifications related to MVAC servicing issues. SAE's standards are developed through international participation and cooperation of MVAC experts from motor vehicle manufacturers, MVAC suppliers, chemical manufacturers, refrigerant handling equipment manufacturers and other interested industry stakeholders. SAE standards are internationally recognized, adopted and referenced by all major motor vehicle manufacturers and their suppliers. SAE periodically updates their standards to reflect changes in industry best practices and/or technology improvements.

## **II. New Industry Practice and Updated SAE Standard**

Test results from the SAE Improved Mobile Air Conditioning Cooperative Research Project, an MVAC industry sponsored research project, indicated that equipment designed to meet SAE standards J2210 did not recover refrigerant from MVAC systems as well as was previously assumed (Docket No. EPA-HQ-OAR-2006-0428-0001). As much as 30% of refrigerant remained in an MVAC system when J2210 recovery equipment indicated all refrigerant had been recovered. MVAC service technicians rely on complete refrigerant recovery to refill MVAC systems according to the motor vehicle manufacturer specification. In light of sub-standard recovery performance, SAE revised their standards to include performance standards that ensure an improved standard of refrigerant recovery and recharge. SAE replaced standard J2210 with standard J2788 in October 2006. J2788 encompasses all of J2210, adds standards on recharging of MVAC systems, and adds performance standards to improve equipment refrigerant recovery performance. Specifically, J2788 sets a recharge accuracy standard of 0.5 ounces and requires 95% recovery of refrigerant from a MVAC system.

With this action, EPA is updating its reference to the SAE standards at §82.36. SAE J2210 will no longer exist effective December 2007, and will be superseded by J2788. In Section 82.36 Approved refrigerant recycling equipment, EPA is updating the reference from J2210 to J2788, for recovery/recycling equipment and for recovery/recycling/recharging equipment. In addition, for purposes of clarity, EPA is adding a clause to Section 82.34 (Prohibitions and required practices), which specifies that equipment manufactured or imported must meet the SAE standards. By updating our reference to SAE's new standard J2788, the Agency avoids confusion on the part of the refrigerant handling equipment manufacturer, service technician or A/C service shop owner who would otherwise face a federal requirement that referenced an obsolete standard that conflicts with the new industry standard practice established with J2788.

Currently the regulations under §82.36 (Approved refrigerant recycling equipment) envisage more than just refrigerant recycling and include refrigerant recovery. Therefore, to more accurately reflect the provisions outlined in that section, EPA is revising the title of §82.36 from “Approved refrigerant recycling equipment” to “Approved refrigerant handling equipment.”

While this action updates EPA’s reference to SAE’s new J2788 standard, it does not require an immediate replacement of previously certified MVAC recovery and recovery/recycling equipment with new J2788 equipment. Rather, all new MVAC refrigerant handling equipment manufactured after December 31, 2007 must be certified to J2788. Equipment manufactured after December 31, 2007 that is certified to J2210 will not satisfy EPA requirements and cannot be manufactured or imported. See Section III below for a discussion on existing inventory of equipment certified to J2210.

A/C service shops owners or technicians may decide to accelerate plans to replace old J2210 equipment with the new J2788 equipment standard because of the expected refrigerant savings that translate into a cost savings. According to the January 2007 Mobile Air Conditioning Society Worldwide (MACS) Service Report (Docket No. EPA-HQ-OAR-2006-0428-0003), the new J2788 equipment will result in a 30 to 50% refrigerant savings because the equipment will recover more refrigerant from a MVAC system. Recovered refrigerant can be recycled for future use, rather than buying new refrigerant product.

### **III. Effective Date**

MVAC recovery/recycling equipment and MVAC recovery/recycling/recharging equipment manufactured or imported after December 31, 2007 must be certified by an EPA-approved independent standards testing organization to meet the specifications of Appendix C of 40 Code of Federal Regulations, Part 82, Subpart B. As explained above, Appendix C will

now require that such equipment be certified under SAE's updated standard J2788. EPA expects that this date provides sufficient time for production facilities and distributors to transition to the new SAE standards and sell most if not all of their inventory of J2210 equipment, since SAE released the new J2788 standard in October 2006. EPA will allow sales of J2210 equipment stock manufactured before January 1, 2008. Although certification of new equipment under SAE standard J2788 becomes effective for equipment manufactured or imported after December 31, 2007, EPA suggests that equipment manufacturers transition to the new equipment standard as soon as feasible.

#### **IV. Revision to Equipment Certification Mailing Address**

EPA Regional Offices maintain the MVAC refrigerant handling equipment certification forms sent by equipment owners, but the current regulations require equipment purchasers to mail the form to EPA Headquarters. EPA Headquarters then must fax or mail every equipment certification to the appropriate region, based on the equipment owner's place of business. To streamline this process, EPA is amending §82.42 so that equipment owners may send their certification forms directly to the appropriate EPA region.

#### **V. Statutory and Executive Order Reviews**

##### A. Executive Order 12866: Regulatory Planning and Review

This action is not a "significant regulatory action" under the terms of Executive Order (EO) 12866 (58 FR 51735, October 4, 1993) and is therefore not subject to review under the EO.

##### B. Paperwork Reduction Act

This action does not impose any new information collection burden. The recordkeeping and reporting requirements included in this action are already included in an existing information collection burden. This action does not make any changes that would affect burden. However, the

Office of Management and Budget (OMB) has previously approved the information collection requirements contained in the existing regulations, 40 CFR part 82, under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. and has assigned OMB control number 2060-0247, EPA ICR number 1617.05. A copy of the OMB approved Information Collection Request (ICR) may be obtained from Susan Auby, Collection Strategies Division; U.S. Environmental Protection Agency (2822T); 1200 Pennsylvania Ave., N.W., Washington, DC 20460 or by calling (202) 566-1672. A copy may also downloaded from <http://www.regulations.gov>.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9.

### C. Regulatory Flexibility Act

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a

significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions. For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) a small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's rule on small entities, we certify that this action will not have a significant economic impact on a substantial number of small entities. As MVAC service shop owners replace end-of-life refrigerant handling equipment, owners will purchase equipment certified to the new SAE standard.

#### D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of \$100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other

than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of \$100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Today's rule does not affect State, local, or tribal governments. The impact of this rule on the private sector will be less than \$100 million per year. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA. EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. These changes being made by this action are to update EPA's reference to the new SAE standards.

#### E. Executive Order 13132: Federalism

Executive Order 13132, entitled "Federalism" (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government

and the States, or on the distribution of power and responsibilities among the various levels of government.”

This action does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. The changes being made by this action are to update EPA’s reference to the new SAE standards. Thus, Executive Order 13132 does not apply to this rule.

F. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

Executive Order 13175, entitled “Consultation and Coordination with Indian Tribal Governments” (65 FR 67249, November 6, 2000), requires EPA to develop an accountable process to ensure “meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.” This final rule does not have tribal implications, as specified in Executive Order 13175. It does not significantly or uniquely affect the communities of Indian tribal governments, because this regulation applies directly to facilities that use these substances and not to governmental entities. Thus, Executive Order 13175 does not apply to this rule.

G. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

Executive Order 13045: “Protection of Children from Environmental health Risks and Safety Risks” (62 FR 19885, April 23, 1997) applies to any rule that: (1) is determined to be “economically significant” as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate

effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

EPA interprets Executive Order 13045 as applying only to those regulatory actions that are based on health or safety risks, such that the analysis required under section 5-501 of the Order has the potential to influence the regulation. This rule is not subject to Executive Order 13045 because it is based on technology performance and not on health or safety risks.

H. Executive Order 13211: Actions that Significantly Affect Energy Supply, Distribution, or Use

This rule is not subject to Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use” (66 FR 28355 (May 22, 2001)) because it is not a significant regulatory action under Executive Order 12866.

I. National Technology Transfer and Advancement Act

As noted in the proposed rule, Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (“NTTAA”), Public Law No. 104-113, Section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This rulemaking explicitly references technical standards; EPA uses the SAE revision versions of

J2210. These standards can be obtained from <http://www.sae.org/technical/standards/>.

#### J. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 et seq., as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the Federal Register. A Major rule cannot take effect until 60 days after it is published in the Federal Register. This action is not a “major rule” as defined by 5 U.S.C. 804(2). This rule will be effective December 31, 2007.

**List of Subjects in 40 CFR Part 82**

Environmental protection, Motor vehicle air-conditioning, Recover/recycle equipment, Recover/recycle/recharge equipment, Reporting and certification requirements, Stratospheric ozone layer.

Dated: November 2, 2007.

Stephen L. Johnson,  
Administrator.

For the reasons set out in the preamble, 40 CFR Part 82 is amended as follows:

**PART 82-PROTECTION OF STRATOSPHERIC OZONE**

1. The authority citation for Part 82 continues to read as follows:

**Authority:** 42 U.S.C. 7414, 7601, 7671–7671q.

Subpart B – Servicing of Motor Vehicle Air Conditioners

2. Section 82.34 is amended by adding a new paragraph (e) to read as follows:

§82.34 Prohibitions and required practices.

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(e) Refrigerant handling equipment manufactured or imported for use during the maintenance, service or repair of MVACs for consideration cannot be introduced into interstate commerce unless meeting the requirements of §82.36.

Subpart B – Servicing of Motor Vehicle Air Conditioners

3. Section 82.36 is amended by revising the section heading and paragraph (a)(4) to read as follows:

§82.36 Approved refrigerant handling equipment.

(a) \*\*\*

(4) Effective January 1, 2008, equipment that recovers and recycles HFC-134a refrigerant and equipment that recovers and recycles HFC-134a refrigerant and recharges systems with HFC-134a refrigerant must meet the standards set forth in Appendix C of this subpart based upon J2788 – HFC-134a (R-134a) Recovery/Recycling Equipment and Recovery/Recycling/Recharging for Mobile Air-Conditioning Systems.

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4. Section 82.42 is amended by revising paragraph (a)(1)(iii) to read as follows:

§82.42 Certification, recordkeeping and public notification requirements.

(a)\*\*\*

(1)\*\*\*

(iii)The manufacturer name and equipment model number, the date of manufacture, and the serial number of the equipment. The certification must also include a statement that the equipment will be properly used in servicing motor vehicle air conditioners, that each individual authorized by the purchaser to perform service is properly trained and certified in accordance with §82.40, and that the information given is true and correct. Owners or lessees of recycling or recovery equipment having their places of business in:

Connecticut

Maine

Massachusetts

New Hampshire

Rhode Island

Vermont

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region I; Mail Code SEA; JFK

Federal Building; One Congress Street, Suite 1100; Boston, MA 02114-

2023.

Owners or lessees of recycling or recovery equipment having their places of business in:

New York

New Jersey

Puerto Rico

Virgin Islands

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region II (2DECA-AC); 290

Broadway, 21st Floor; New York, NY 10007-1866.

Owners or lessees of recycling or recovery equipment having their places of business in:

Delaware

District of Columbia

Maryland

Pennsylvania

Virginia

West Virginia

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region III--Wheeling Operations

Office; Mail Code 3AP12; 303 Methodist Building; 11th and Chapline

Streets; Wheeling, WV 26003.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alabama

Florida

Georgia

Kentucky

Mississippi

North Carolina

South Carolina

Tennessee

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region IV(APT-AE); Atlanta  
Federal Center; 61 Forsyth Street, SW.; Atlanta, GA 30303.

Owners or lessees of recycling or recovery equipment having their places of business in:

Illinois

Indiana

Michigan

Minnesota

Ohio

Wisconsin

must send their certifications to:

CAA section 609 Enforcement Contact, EPA Region V (AE17J); 77 West  
Jackson Blvd.; Chicago, IL 60604-3507.

Owners or lessees of recycling or recovery equipment having their places of business in:

Arkansas

Louisiana

New Mexico

Oklahoma

Texas

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region VI (6EN-AA); 1445 Ross  
Avenue, Suite 1200; Dallas, Texas 75202.

Owners or lessees of recycling or recovery equipment having their places of business in:

Iowa

Kansas

Missouri

Nebraska

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region VII; Mail Code APCO/  
ARTD; 901 North 5th Street; Kansas City, KS; 66101.

Owners or lessees of recycling or recovery equipment having their places of business in:

Colorado

Montana

North Dakota

South Dakota

Utah

Wyoming

must send their certifications to:

CAA section 600 Enforcement Contact, EPA Region VIII, Mail Code 8ENF-T,  
999 18th Street, Suite 500, Denver, CO 80202-2466.

Owners or lessees of recycling or recovery equipment having their places of business in:

American Samoa

Arizona

California

Guam

Hawaii

Nevada

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region IX; Mail Code AIR-5; 75

Hawthorne Street; San Francisco, CA 94105.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alaska

Idaho

Oregon

Washington

must send their certifications to:

CAA section 609 Enforcement Contact; EPA Region X (OAQ-107); 1200 Sixth

Avenue; Seattle, WA 98101.

Subpart B – Servicing of Motor Vehicle Air Conditioners

5. Appendix C to Subpart B is revised to read as follows:

Appendix C to Subpart B of Part 82 – SAE J2788 Standard for Recovery/Recycle and  
Recovery/Recycle/Recharging Equipment for HFC-134a Refrigerant

**FOREWORD**

This Appendix establishes the specific minimum equipment requirements for the recovery/recycling of HFC-134a that has been directly removed from, and is intended for reuse in, mobile air-conditioning systems and recovery/recycling and system recharging of recycled, reclaimed or virgin HFC-134a. Establishing such specifications will ensure that system operation

with recycled HFC-134a will provide the same level of performance and durability as new refrigerant.

## 1. SCOPE

The purpose of this SAE Standard is to establish the specific minimum equipment performance requirements for recovery and recycling of HFC-134a that has been directly removed from, and is intended for reuse in, mobile air-conditioning (A/C) systems. It also is intended to establish requirements for equipment used to recharge HFC-134a to an accuracy level that meets Section 9 of this document and SAE J2099. The requirements apply to the following types of service equipment and their specific applications.

- a. Recovery/Recycling Equipment,
- b. Recovery/Recycling – Refrigerant Charging,
- c. Refrigerant Recharging Equipment Only.

1.1 Improved refrigerant recovery equipment is required to ensure adequate refrigerant recovery to reduce emissions and provide for accurate recharging of mobile air conditioning systems.

Therefore, 12 months following the publication date of this standard, requirements in this standard supplements and supersedes, SAE J2210.

## 2. REFERENCES

### 2.1 Applicable Publications

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, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

SAE J2099 Standard of Purity for Recycled HFC-134a (R-134a) for Use in Mobile Air-Conditioning Systems

SAE J2196 Service Hoses for Automotive Air-Conditioning

SAE J2197 Service Hose Fittings for Automotive Air-Conditioning

SAE J2296 Retest of Refrigerant Container

#### 2.1.2 CGA Publications

Available from CGA, 4221 Walney Road, 5th Floor, Chantilly VA 20151-2923, Tel: 703-788-2700, [www.cganet.com](http://www.cganet.com).

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

#### 2.1.3 DOT Publications

Available from the Superintendent of Documents, U. S. Government Printing Office, Mail Stop: SSOP, Washington, DC 20402-9320.

OT Standard, CFR Title 49, Section 173.304 Shippers—General Requirements for Shipments and Packagings

#### 2.1.4 UL Publications

Available from Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096, Tel: 847-272-8800, [www.ul.com](http://www.ul.com).

UL 1769 Cylinder Valves

UL 1963 Refrigerant Recovery/Recycling Equipment

### 3. SPECIFICATION AND GENERAL DESCRIPTION

3.1 The equipment must be able to remove and process HFC-134a (R-134a) from mobile A/C systems to the purity level specified in SAE J2099.

3.2 The equipment shall be suitable for use in an automotive service garage environment and be capable of continuous operation in ambients from 10 °C to 49 °C (50 °F to 120 °F). If it is designed to recharge a system, and it uses a scale for this purpose, the scale must demonstrate the ability to maintain accuracy per the test in 10.2.

3.3 The equipment must be certified that it meets this specification by an EPA listed certifying laboratory.

3.4 The equipment shall have a label, which states, "Certified by (Certifying Agent) to Meet SAE J2788 superseding SAE J2210" in bold-type letters a minimum of 3 mm (1/8 in) in height.

### 4. REFRIGERANT RECYCLING EQUIPMENT REQUIREMENTS

#### 4.1 Moisture and Acid

The equipment shall incorporate a desiccant package that must be replaced before saturation with moisture, and whose mineral acid capacity is at least 5% by weight of the dry desiccant.

4.1.1 The equipment shall be provided with a means of indicating when the filter desiccant moisture capacity has reached the allowable limit and desiccant replacement is required. This may include a reliable means of detecting moisture level or an algorithm based on the amount refrigerant recovered. The user must be clearly alerted to replace the filter prior to the full saturation. Warnings shall be displayed on screens and (printed on printouts where applicable).

The warnings must explain that the machine is approaching the end of filter life. The manufacturer must incorporate a lockout when the end of filter life is reached.

4.1.2 The manufacturer shall use an identification system to ensure that a new filter has been installed to reset the machine for operation.

#### 4.2 Filter

The equipment shall incorporate an in-line filter that will trap particulates of 15 micron spherical diameter or greater.

#### 4.3 Scale (if used)

The scale must maintain accuracy when moved, as per the test in Section 10.

#### 4.4 Purging Noncondensable Gases

4.4.1 The equipment shall automatically purge noncondensables (NCGs), which are primarily air, if the acceptable level

is exceeded. NCG removal must be part of the normal operation of the equipment and instructions must be

provided to enable the task to be accomplished within 30 min (to reach the refrigerant purity level specified in SAE J2099).

4.4.2 Refrigerant loss from noncondensable gas purging during the testing described in Section 8 shall be minimized by a method that initiates a purge when the machine has not been in use for a period long enough for air-refrigerant separation in the tank to have occurred.

#### 4.5 Recharging and Transfer of Recycled Refrigerant

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

### 5. SAFETY REQUIREMENTS

5.1 The equipment must comply with applicable federal, state, and local requirements on equipment related to handling HFC-134a material. Safety precautions or notices related to safe

operation of the equipment shall be prominently displayed on the equipment and should also state "CAUTION—SHOULD BE OPERATED BY QUALIFIED PERSONNEL."

5.2 Under NO CIRCUMSTANCES should any equipment be pressure tested or leak tested with air/HFC-134a mixtures.

Do not use compressed air (shop air) or leak detection in systems containing HFC-134a.

## 6. OPERATING INSTRUCTIONS

6.1 The equipment manufacturer shall provide a warning in the instruction manual regarding the possibility of refrigerant contamination in the mobile A/C system being serviced.

6.1.1 If recovery/recycle equipment has refrigerant identification equipment, the refrigerant identification equipment shall meet the requirements of SAE J1771.

6.1.2 Recovery/recycling equipment not having refrigerant identification capability shall have instructions in the equipment manual covering possible contamination problems to the equipment and the contamination of the existing recycled refrigerant in the container in the equipment.

6.2 The equipment manufacturer must provide operating instructions, including proper attainment of vehicle system vacuum (i.e., when to stop the extraction process), filter/desiccant replacement, and purging of noncondensable gases (air). Also to be included are any other necessary maintenance procedures, source information for replacement parts and, repair and safety precautions.

6.2.1 The manual shall identify the proper maintaining of hose and seals to prevent the addition of excess air, due to leaks, during the recovery process, which would increase the NCG level in the recovered refrigerant.

6.3 The equipment must prominently display the manufacturer's name, address, the type of refrigerant it is designed to recycle, a service telephone number, and the part number for the replacement filter/drier.

## 7. FUNCTIONAL DESCRIPTION

The ability of the equipment to meet the refrigerant recovery and recharge specifications of this section shall be determined by the test procedures of Section 10.

7.1 The equipment must be capable of continuous operation in ambient temperatures of 10 °C (50 °F) to 49 °C (120 °F). Continuous is defined as completing recovery/recycle and recharge (if applicable) operations with no more than a brief reset period between vehicles, and shall not include time delays for allowing a system to outgas (which shall be part of the recovery period provided by this standard). Continuous may include time out for an air purge if necessary, although it is understood that extended equipment-off time is preferred to allow NCG and refrigerant separation in the supply tank for optimum results.

7.1.1 The equipment shall be capable of removing a minimum of 95.0% of the refrigerant from the test system in 30 minutes or less, without external heating, or use of any device (such as shields, reflectors, special lights, etc.) which could heat components of the system. The recovery procedures shall be based on 21 to 24 °C (70 to 75 °F) ambient temperature. The test system for qualifying shall be a 1.4 kg (3.0 lbs) capacity orifice tube/accumulator system in a 2005 Chevrolet Suburban with front and rear A/C, or the test option described in 10.5, and shall be determined by accurately weighing the recovery machine with the resolution and accuracy of within 3 g (.006 lb) in the range of the machine's weight. The laboratory shall maintain records of the vehicle, including its VIN (vehicle identification number).

7.1.2 However, the preceding shall not preclude a brief period of engine operation at fast idle (up to 15 minutes, up to 2000 rpm) to circulate refrigerant and oil, and provide some engine and warm-up of A/C refrigeration components. The laboratory shall monitor coolant temperature per the vehicle engine coolant temperature sensor, and coolant temperature shall not be allowed to exceed 105 °C (221 °F). The time required shall not be included in the total time of 30 minutes set forth in 7.1.1.

7.1.3 The refrigerant that is recovered, following oil separation, shall be measured and the quantity displayed, accurate to within  $\pm 30$  g (1.0 oz). The equipment must include a provision for checking the accuracy, per the requirements of 9.1.

7.2 During recovery operation, the equipment shall provide overfill protection to assure that the liquid fill of the storage container (which may be integral or external) does not exceed 80% of the tank's rated volume at 21 °C per Department of Transportation (DOT) Standard, CFR Title 49, Section 173.304 and the American Society of Mechanical Engineers.

7.3 Portable refillable tanks or containers used in conjunction with this equipment must be labeled "HFC-134a (R-134a)," meet applicable Department of Transportation (DOT) or Underwriters Laboratories (UL) Standards, and shall incorporate fittings per SAE J2197.

7.3.1 The cylinder valve shall comply with the standard for cylinder valves, UL 1769.

7.3.2 The pressure relief device shall comply with the Pressure Relief Device Standard Part 1—Cylinders for Compressed Gases, CGA Pamphlet S-1.1.

7.3.3 The tank assembly shall be marked to indicate the first retest date, which shall be 5 years after the date of manufacture. The marking shall indicate that retest must be performed every subsequent 5 years. SAE J2296 provides an inspection procedure. The marking shall be in letters at least 6 mm (1/4 in) high.

7.3.4 ASME tanks as defined in UL-1963 may be used and are exempt from the retest requirements.

7.3.5 If the machine is designed for recharging, and the marketer permits use of a non-refillable refrigerant tank, the machine shall include a way to ensure refrigerant remaining in the tank (called the “heel”) to no more than 2% of tank rated capacity when the tank is indicated to be empty. This may be done by the machine marketer as follows:

- specify a non-venting procedure, to minimize the amount of unused refrigerant remaining in the tank. The machine shall include any devices required for the procedure, other than ordinary service shop tools and supplies, and include in the operator’s manual, any instructions.
- Provide an automatic or (with instructions in the operator’s manual) semi-automatic non-venting procedure with the machine.

The laboratory shall test for the 2% capability. For testing purposes it may use a refillable tank, minimum 15 lb capacity (6.8 kg) containing a minimum of 7.5 lbs (3.4 kg) refrigerant. The test is as follows:

- a.. Weigh the tank at the start of the test, on a scale accurate to plus/minus 3 grams, to ensure it contains sufficient refrigerant.
- b.. Operate the machine to remove refrigerant from the tank, charging into a holding container until the tank is indicated to be empty. Continue with the marketer’s recommended procedure for the 2% capability.
- c.. Weigh the tank, on a scale accurate to plus/minus 3 grams.
- d.. Using the recovery compressor and/or a vacuum pump, draw the tank into a vacuum of 9 to 10 inches Mercury (225 to 250 mm Mercury). The tank must hold that vacuum with a decay of less

than 10% in 10 minutes. If vacuum decays 10% or more, the procedure shall be repeated as necessary to ensure the tank is empty.

e.. Weigh the tank on a scale accurate to plus/minus 3 grams. The difference in weight from Steps 3 to 5 shall be within 2% of the weight of the amount of refrigerant that is the tanks rated capacity.

f.. This test may be performed at the conclusion of testing in 10.4 or 10.5. If the machine passes or has passed all other testing in this standard, the marketer may make modifications in procedure and/or machine operation and retest once at a later date, within 90 days. If the machine fails the retest, the machine must be completely retested per this standard, or may be certified per the following alternative. The marketer of the machine may specify use of a non-refillable refrigerant tank that provides for recycling and/or disposal of the residual refrigerant, in either case in a manner that does not vent. Or the marketer may exclude use of a one-way container, in the machine's operating instructions.

7.4 All flexible hoses must comply with SAE J2196.

7.5 Service hoses must have shutoff devices located at the connection point to the system being serviced. Any hoses or lines connected to refrigerant containers on or in the machine also shall have shutoff devices at the connection points, so that the containers may be changed without loss of refrigerant. A tank that is a permanent installation is exempt from this requirement.

7.6 The equipment shall separate oil from the refrigerant, measure the amount accurate to 20 ml (0.7 oz.), so the technician has an accurate basis for adding oil to the system.

7.6.1 This statement shall be predominately identified in the equipment service manual.

NOTE: Use only new lubricant to replace the amount removed during the recycling process. Used lubricant should be discarded per applicable federal, state and local requirements.

## 8. TESTING

This test procedure and its requirements are to be used to determine the ability of the recycling equipment to adequately recycle contaminated refrigerant.

8.1 The equipment shall be able to clean the contaminated refrigerant in §8.3 to the purity level defined in SAE J2099.

8.2 The equipment shall be operated in accordance with the manufacturer's operating instructions.

### 8.3 Contaminated HFC-134a (R-134a) Sample

8.3.1 The standard contaminated refrigerant shall consist of liquid HFC-134a with 1300 ppm (by weight) moisture (equivalent to saturation at 38 °C, 100 °F), 45 000 ppm (by weight) HFC-134a compatible lubricant, and 1000 ppm (by weight) of noncondensable gases (air).

8.3.1.1 The HFC-134a compatible lubricant referred to in 8.3.1, shall be polyalkylene glycol (PAG), ISO 100 such as UCLN or PAG ISO 46-55, such as Idemitsu or equivalent, which shall contain no more than 1000 ppm by weight of moisture.

8.3.1.2 Although the test lubricant is a PAG, to conform to that used in the test vehicle system, the equipment manufacturer also shall ensure that it is compatible with polyol ester lubricant, such as ND 11 as used in electrically driven compressors in some hybrid vehicles.

### 8.4 Test Cycle

8.4.1 The equipment must be preconditioned by processing 13.6 kg (30 lb) of the standard contaminated HFC-134a at an ambient of 21 to 24 °C (70 to 75 °F) before starting the test cycle.

1.13 kg (2.56 lb) samples are to be processed at 5 min intervals. The test fixture, depicted in Figure 1, shall be operated at 21 to 24 °C (70 to 75 °F).

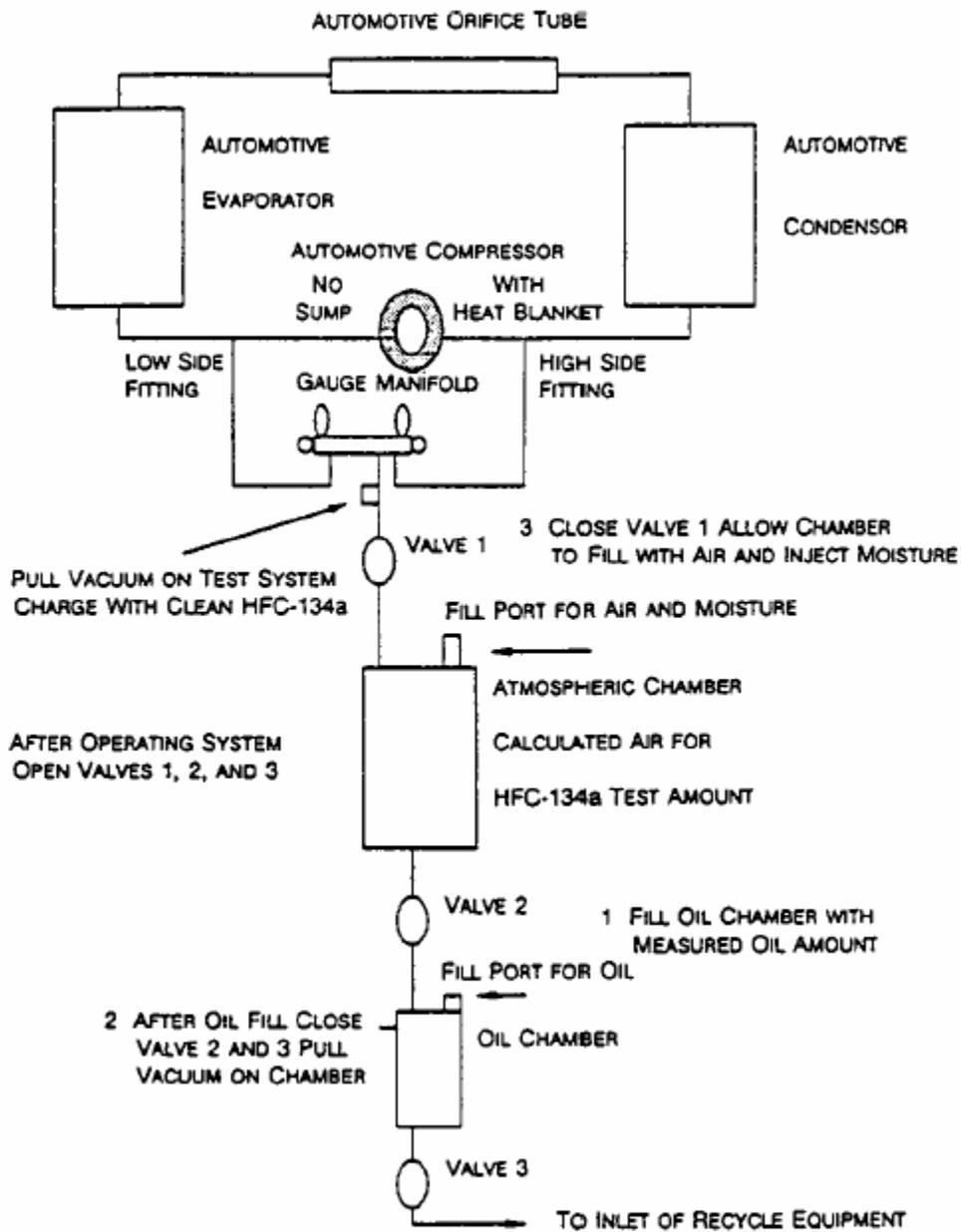


FIGURE 1 - TEST FIXTURE

8.4.2 Following the preconditioning procedure per 8.4.1, 18.2 kg (40 lb) of standard contaminated HFC-134a are to be processed by the equipment.

#### 8.5 Sample Requirements

8.5.1 Samples of the standard contaminated refrigerant from 8.3.1 shall be processed as required in 8.6 and shall be analyzed after said processing as defined in 8.7, 8.8, and 8.9. Note exception for noncondensable gas determination in 8.9.4.

#### 8.6 Equipment Operating Ambient

8.6.1 The HFC-134a is to be cleaned to the purity level, as defined in SAE J2099, with the equipment operating in a stable ambient of 10, 21, and 49 °C (50, 70 and 120 °F) while processing the samples as defined in 8.4.

#### 8.7 Quantitative Determination of Moisture

8.7.1 The recycled liquid phase sample of HFC-134a shall be analyzed for moisture content via Karl Fischer coulometric titration, or an equivalent method. The Karl Fischer apparatus is an instrument for precise determination of small amounts of water dissolved in liquid and/or gas samples.

8.7.2 In conducting this test, a weighed sample of 30 to 130 g is vaporized directly into the Karl Fischer anolyte. A coulometric titration is conducted and the results are reported as parts per million moisture (weight).

#### 8.8 Determination of Percent Lubricant

8.8.1 The amount of lubricant in the recycled HFC-134a sample shall be determined via gravimetric analysis. The methodology must account for the hygroscopicity of the lubricant.

8.8.2 Following venting of noncondensable gases in accordance with the manufacturer's operating instructions, the refrigerant container shall be shaken for 5 min prior to extracting samples for testing.

8.8.3 A weighed sample of 175 to 225 g of liquid HFC-134a is allowed to evaporate at room temperature. The percent lubricant is calculated from weights of the original sample and the residue remaining after evaporation.

#### 8.9 Noncondensable Gases—Testing for Amount

8.9.1 The amount of noncondensable gases shall be determined by gas chromatography. A sample of vaporized refrigerant liquid shall be separated and analyzed by gas chromatography. A Porapak Q column at 130 °C (266 °F) and a hot wire detector may be used for the analysis.

8.9.2 This test shall be conducted on liquid phase samples of recycled refrigerant taken from a full container as defined in 7.2 within 30 min following the proper venting of noncondensable gases.

8.9.3 The liquid phase samples in 8.9.2 shall be vaporized completely prior to gas chromatographic analysis.

8.9.4 This test shall be conducted at 10 and 49 °C (50 and 120 °F) and may be performed in conjunction with the testing defined in 8.6. The equipment shall process at least 13.6 kg (30 lb) of standard contaminated refrigerant for this test.

8.9.5 The equipment shall be capable of charging refrigerant into systems with various lubrication types and shall deliver less than 1% by weight residual oil during system charge if the machine permits oil charging with refrigerant (due to residual oil in the service hoses and recovery unit refrigerant circuit from prior recovery, diagnostics and oil injection. This shall be determined during SAE J2099 testing.)

## 9. RECHARGING THE SYSTEM

9.1 It is the responsibility of the equipment manufacturer to ensure that the vacuum removal performance leaves the system 98% free of NCGs before recharging, following recovery and recycle under the provisions of this document.

The equipment must be capable of both indicating and recharging the system to within 15 g (0.50 oz) of vehicle manufacturer's specifications. The laboratory shall test for this capability by choosing a charge amount that is within the range of the vehicle manufacturer's specifications. The equipment must indicate and charge the system with that chosen amount, within  $\pm 15$  g (0.5 oz).

Example: If 500 g is chosen, the actual and indicated charge must be 485 to 515 g, with any difference between actual and indicated charge within the laboratory scale accuracy requirements of this standard. If a scale is used in the machine, the equipment manufacturer shall provide a method or service for the technician to check scale accuracy, and include any necessary accuracy-checking device (such as a calibration weight(s)) with the machine. If a mass flow system is used for charge determination, it must maintain accuracy equal to the 15 g (0.50 oz) specification. The equipment manufacturer shall provide a method for checking accuracy and include any necessary accuracy testing device(s) with the machine. If the accuracy testing device(s) for a scale or mass flow machine includes a consumable, the manufacturer shall include a quantity of replacement or refill devices for five years of periodic testing as recommended.

9.2 If any other system is used for charge determination, such as a positive displacement pump, the equipment manufacturer shall provide a method and any needed device(s) to check accuracy that is/are appropriate for its method of operation, including any temperature-compensating trim if used.

## 10. EQUIPMENT TEST PROCEDURE BY LABORATORY FOR RECOVERY/RECYCLING AND RECOVERY/RECYCLING/RECHARGING MACHINES

10.1 Preliminary: Ambient (in shop) temperature shall be 21 to 24 °C (70 to 75 °F). Test vehicle shall be “overnight cold” (not run for at least eight hours).

10.2 The machine must have a self-contained provision for checking accuracy of the indicated amount of refrigerant recovered in liquid or vapor or mixture form(s) from a vehicle system and (if applicable) charged into a vehicle, and adjusting if necessary, to meet requirements of 9.1, 9.2.

Therefore: If the machine uses a scale for that purpose, check the accuracy of that scale and make any adjustment if necessary. If an alternative method of measuring refrigerant is used, follow the equipment manufacturer’s procedure for ensuring accuracy. Next, move the machine, such as by rolling it, along the floor, a minimum of 20 feet (6.1 meters) within 10 seconds. Follow with the test procedure in 10.3, then 10.4 or 10.5.

### 10.3 Test Procedure

If desired, this test procedure may be preceded by engine/system operation for up to 15 minutes, up to 2000 rpm.

1. You must start with an empty system, using this method: (a) operate machine to recover refrigerant, per equipment manufacturer’s instructions. (b) Deep-vacuum system to a minimum of 710 mm (28 in) of mercury. (c) Monitor vacuum for decay, checking every 20 minutes. If decay exceeds 75 mm (3 in), deep vacuum the system again. When system holds 710 mm (28 in)  $\pm$ 0/-75 mm (3 in) of mercury vacuum for three hours, it is considered empty.

2. Place machine on a platform scale with the capacity to weigh the recovery/recycle/recharge machine, and with the resolution and accuracy of within  $\pm$ 3 g (.006 lb) in the range of the machine’s weight. Weight should include the machine’s service hoses draped over the machine, and with the machine’s oil reservoir removed. If necessary to add oil to vehicle system as a result

of a system operation preparatory to the recovery process, inject the needed quantity through the service valve at this time.

3. Record weight of machine in as weight A.

4. Reconnect service hoses to the test vehicle.

5. Follow the equipment manufacturer's specified procedure for charging the vehicle manufacturer's recommended amount of refrigerant into the system. Note: if this does not apply to the machine under test, i.e. a recovery/recycling only machine, the use of charging equipment that meets this standard and the platform scale shall be used to verify the accuracy of the charge.

6. Disconnect the service hoses from the test vehicle and drape them on the machine. Check and record the weight of the machine. Record this weight as weight B. The difference between weight A and weight B should be equal to the recommended charge that was installed per the machine's display, within 15 g (0.5 oz). If the difference is greater than 15 g ( $\pm 3$  g), the machine fails the charge accuracy test, and no other tests shall be performed at that time. The manufacturer must document changes made to improve accuracy and furnish them to the laboratory prior to a new test. Exception: if the maximum deviation is no more than a total of 20 g, the calibration of the scale or other measuring system may be rechecked and readjusted once, and the entire test repeated just once.

#### 10.4 Recovery Test Using a Vehicle

1. Following a successful system charge, the system and engine shall be run for 15 minutes at 2000 rpm to circulate oil and refrigerant, following which engine and system shall rest for eight hours. Then the laboratory may begin the recovery test. If the machine manufacturer specifies, operate the engine/system for up to 15 minutes, at up to 2000 rpm, then shut off engine/system.

2. If the machine has an automatic air purge, disable it. Check the weight of the machine with the platform scale (service hoses draped over machine, oil reservoir removed). Record the number as Weight C. Reinstall oil reservoir if it had been removed in the recovery procedure.
3. Start timer. Connect service hoses to system of test vehicle and perform recovery per the equipment manufacturer's instructions. The vehicle system service valves' cores must remain in the fittings for this procedure.
4. When recovery is completed, including from service hoses if that is part of the recommended procedure, disconnect hoses and drape over machine. Stop timer. The elapsed time shall be 30.0 minutes or less. If it is in excess of this time, the machine fails the test and no retest is allowed. The manufacturer must document changes made to the machine to improve its performance before a new test is allowed, and furnish them to the laboratory.
5. If the recovery is completed in no more than the 30.0 minutes, measure the oil level in the reservoir, remove the reservoir and then determine the amount of refrigerant recovered, as detailed in Nos. 6 and 7: as measured by the machine and also by noting the weight of the platform scale, which shall be recorded as Weight D.
6. The platform scale shall indicate that a minimum of 95% of the amount charged into the system has been recovered. If the platform scale indicates a lower percentage has been recovered, the machine fails the recovery test.
7. The machine display shall indicate that a minimum of 95.0% of the amount charged into the system has been recovered, within a tolerance of  $\pm 30$  g (1 oz) when compared with the platform scale (Weight D minus Weight C). The 30 g (1 oz) tolerance may produce a machine display reading that is below the 95.0% recovery. If a greater difference between machine and platform scale occurs, the machine fails the recovery test.

### 10.5 Recovery Test Fixture Test Option

If an equipment manufacturer chooses, as an alternative to the actual vehicle, it may certify to SAE J2788 with a laboratory fixture that is composed entirely of all the original equipment parts of a single model year for the 3.0 lb capacity front/rear A/C system in the 2005-07 Chevrolet Suburban. All parts must be those OE-specified for one model year system and no parts may be eliminated or bypassed from the chosen system, or reproduced by a non-OE source. No parts may be added and/or relocated from the OE position in the 2005-07 Suburban. No parts may be modified in any way that could affect system performance for testing under this standard, except adding refrigerant line bends and/or loops to make the system more compact. Reducing the total length of the lines, however, is not permitted. The fixture system shall be powered by an electric motor, run at a speed not to exceed 2000 rpm, and for this test option, no system warm-up or equivalent procedure may be used. The certifying laboratory shall maintain records of all parts purchased, including invoices and payments. The assembly of the parts shall, as an outside-the-vehicle package, duplicate the OE system and its routing, including bends, except for permitted additions of bends and/or loops in refrigerant lines. Aside from the absence of engine operation and the limitations posed by the standard and the use of the electric motor, the test shall otherwise be the same as the test on the Suburban, including test temperature.