

Issued 1995-10
Cancelled 2010-11

Superseding J1770 OCT95

AUTOMOTIVE REFRIGERANT RECOVERY/RECYCLING EQUIPMENT INTENDED FOR USE WITH BOTH R12 AND R134A

Foreword—The purpose of this document is to establish specific minimum equipment requirements for automotive refrigerant recovery/recycling equipment intended for use with both R12 and R134a 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 equipment intended for use with both R12 and R134a 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 R12 and R134a having a common enclosure with separate circuits for each refrigerant.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1991—Standard of Purity for Use in Mobile Air-Conditioning Systems

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

SAE J2196—Service Hoses for Automotive Air-Conditioning

SAE J2197—HFC-134a Service Hose Fittings for Automotive Air-Conditioning

2.1.2 COMPRESSED GAS ASSOCIATION (CGA) PUBLICATION—Available from CGA, 1235 Jefferson Davis Highway, Arlington, VA 22202.

CGA Pamphlet S-1.1—Pressure 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

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- 2.1.4 UL PUBLICATIONS—Available from Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062-2096.

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

UL 1769—Cylinder Valves

UL 1963—Refrigerant Recovery/Recycling Equipment

- 2.2 Related Publications**—The following publications are provided for information purposes only and are not a required part of this document.

- 2.2.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1990—Extraction and Recycling Equipment for Mobile A/C Systems

SAE J2210—HFC-134a (R134a) Recycling Equipment for Mobile A/C Systems

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 ambients from 10 to 49 °C.
- 3.2** The equipment must be certified that it meets this specification by Underwriters Laboratories Inc. (UL), or by an equivalent certifying Laboratory.
- 3.3** The equipment shall have a label which states "Design Certified by (Certifying Laboratory) to meet SAE J1770 for recycling R12 and R134a using common refrigerant circuits," in bold-type letters a minimum of 3 mm in height.

4. Equipment Requirements

4.1 General

- 4.1.1 The equipment shall have a lockout to prevent cross contamination to the level required by 9.2.1g to assure the clearing process has been completed before an operation involving recovery of a different refrigerant can begin. Following initiation of the clearing process no further technician action shall be required. The equipment shall prevent initiation of the recovery operation if hoses, storage tanks, internal refrigerant circuits, etc., are not connected properly.
- 4.1.2 If an operator action is required to clear the unit prior to reconnecting for a different refrigerant, the equipment shall be provided with a means which indicates which refrigerant was last processed.
- 4.1.3 Means shall be provided to prevent recovery from both an R12 and R134a mobile air conditioning system concurrently.
- 4.1.4 TRANSFER OF RECYCLED REFRIGERANT—Recycled refrigerant for recharging and transfer shall be taken from the liquid phase only.

4.2 Seat Leakage Test

- 4.2.1 Valves, including electrically operated solenoid valves, that are used to isolate R12 and R134a refrigerant circuits, shall have a seat leakage rate not exceeding 15 g/year (1/2 oz/year) before and after 100 000 cycles of operation. This Endurance Test shall be conducted with R134a at maximum operating pressure as determined by 8.1 and 8.2. The Seat Leakage Test shall be performed at 1.5 times this pressure at an ambient of 24 °C.

4.3 Interlocks

- 4.3.1 Electrical interlock devices 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 Transient Overvoltage Test and the Fast Transient (Electric Noise) Test contained in the Standard for Tests for Safety Related Controls Employing Solid-State Devices, UL 991.

4.4 Noncondensable Gases

- 4.4.1 The equipment shall either automatically purge noncondensables (NCGs) if the acceptable level is exceeded or incorporate a device that indicates to the operator the NCG level has been exceeded. A pressure gauge used to indicate an NCG level shall be readable in 1 psig increments. 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.
- 4.4.2 Refrigerant loss from noncondensable gas purging, oil removal, and refrigerant clearing shall not exceed more than 5% by weight of the total amount of refrigerant through the equipment as detailed in 8.1, 8.2, and 9.2.

4.5 Filter

- 4.5.1 A 15 μm filter, or other equivalent means, to remove particulates of 15 μm spherical diameter or greater shall be located before any manual or electrically operated valves that may cause cross contamination.

4.6 Moisture and Acid

- 4.6.1 The equipment shall incorporate a desiccant package that must be replaced before saturated with moisture and whole acid capacity is at least 5% by weight of total system dry desiccant.
- 4.6.2 The equipment shall be provided with a moisture detection means that will reliably indicate when moisture level exceeds 15 ppm in R12 or 50 ppm in R134a and requires the filter/dryer replacement.

5. Operating Instructions

- 5.1 The equipment manufacturer must provide operating instructions, including proper attainment of vehicle system vacuum (i.e., when to stop the extraction process and also to stop the extraction process if it is noticed that the A/C system being serviced has a leak), filter/desiccant replacement, and purging of noncondensable gases (air). The instructions shall indicate that the correct sequence of operation be followed so that the equipment can properly remove contaminants to the acceptable level. Also to be included are any other necessary maintenance procedures, source information for replacement parts and repair, and safety precautions.
- 5.2 The equipment must prominently display the manufacturer's name, address, the type of refrigerant—R12 and R134a, a service telephone number, and the part number for the replacement filter/drier. Operation manuals must cover information for complete maintenance of the equipment to assure proper operation.

6. Safety Requirements

- 6.1 The equipment must comply with applicable federal, state and local requirements on equipment related to the handling of R12 and R134a material. Safety precautions or notices related to the safe operation of the equipment shall be prominently displayed on the equipment and should also state "Caution—Should Be Operated By Qualified Personnel."