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400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J1771

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CRITERIA FOR REFRIGERANT IDENTIFICATION EQUIPMENT FOR USE WITH MOBILE AIR-CONDITIONING SYSTEMS

Foreword—The purpose of this SAE Standard is to establish criteria for refrigerant identification equipment intended for use with or without recycling equipment when removing refrigerant from Mobile Air-Conditioning Systems or from refrigerant containers prior to charging a mobile air-conditioning system.

Establishing such specifications will provide a means to identify relatively pure refrigerant R12 or R134a from mixtures of refrigerants (HFC, HCFC, CFC, hydrocarbons, etc.), in a mobile system prior to recovering/recycling the refrigerant or prior to charging an A/C system from a refrigerant container.

1. **Scope**—This SAE Standard applies to refrigerant identification equipment to be used for identifying refrigerant when servicing a mobile air-conditioning system or for identifying refrigerant in a container to be used to charge a mobile air-conditioning system.
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 PUBLICATION**—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J639—Safety Practices for Mechanical Vapor Compression Refrigeration Equipment or Systems Used to Cool Passenger Compartments of Motor Vehicles
 - 2.1.2 **UL PUBLICATION**—Available from Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096. (1-800-704-4050)

UL 1604—Electrical Equipment for Use in Class I and II, Division 2 and Class III Hazardous (Classified) Locations
 3. Equipment evaluated under this document shall have the following 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.

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- 3.1.1 Equipment may be design certified as a Refrigerant Diagnostic Tool or as a Refrigerant Identifier when tested per 5.8.
- 3.1.2 REFRIGERANT DIAGNOSTIC TOOL—Equipment that will identify the refrigerant to 98, 96, 94, 92, or 90% purity and will also identify 5, 10, 15, or 20% of air in the refrigerant.
- 3.1.3 REFRIGERANT IDENTIFIER—Equipment that will identify the refrigerant to 98, 96, 94, 92, or 90% purity.
- 3.2 Equipment may be certified to identify as many refrigerants or substances in accordance with the manufacturer's design.
- 3.3 The equipment shall be certified that it meets this specification by Underwriters Laboratories, Inc. (UL) or by an equivalent independent nationally recognized testing laboratory. The laboratory shall maintain documentation of testing to this specification for each model certified, including all calibration data and equipment calibration dates for a period of 5 years.
- 3.4 The equipment shall be marked as indicated in 3.4.1 or 3.4.2. The marking shall be in bold-type letters, a minimum of 3 mm in height, where "X" is replaced by the designation of the refrigerant for which the equipment was certified to identify, "Y" is replaced by the percent value (of refrigerants) in 2% increments (per 5.8), and "Z" (where applicable) is replaced by the percent value (of air) in 5% increments.
- 3.4.1 A refrigerant diagnostic tool shall have a label which states "Refrigerant Diagnostic Tool Design Certified by (Certifying Agent) to meet SAE J1771 to identify 'X' to 'Y' percent purity. Also this equipment will detect 'Z' percent or greater of air in 'X'."
- As an example, for a diagnostic tool that meets this specification to identify R12 and R134a by ABC Company, to 98% purity and to detect 5% air, the label would read--"Refrigerant diagnostic tool Design Certified by ABC Company to Meet SAE J1771 to identify R12 or R134a to 98% purity. Also, this equipment will detect 5% or greater of air in R12 or 134a."
- 3.4.2 A refrigerant identifier shall have a label which states "Refrigerant Identifier Design Certified by (Certifying Agent) to Meet SAE J1771 to identify 'X' to 'Y' purity."
- As an example, for an identifier that meets this specification to identify R12 and R134a by ABC Company, to 94% purity, the label would read--"Refrigerant Identifier Design Certified by ABC Company to Meet SAE J1771 to identify R12 or R134a to 94% purity."
- 4. Operating Instructions**
- 4.1 The equipment manufacturer shall provide operating instructions, including warm-up time (if needed), calibration, parts replacement list, and use instructions. The instructions shall include any other necessary maintenance procedures, source information for replacement parts and repair, and safety precautions.
- 4.2 For equipment certified as a refrigerant identifier, the operating instruction manual shall clearly indicate that the percent of refrigerant purity that is indicated includes the percent amount of air that may be in refrigerant being tested but does not identify the air as a containment. The following statement, or equivalent, shall be provided in the manual.

NOTE— The percent refrigerant purity indicated by this equipment includes the amount of air that may be in the refrigerant being tested. However, the percent amount of air is not identified. For example, the identifier may indicate 98% refrigerant purity, but the refrigerant may contain 10% air.

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- 4.3** For equipment certified as a diagnostic tool the operating instruction manual shall clearly indicate the meaning of the percentage of refrigerant purity and percentage amounts of air that the tool displays. The following statement or equivalent shall be provided in the manual:

NOTE—This diagnostic tool will display the percent of refrigerant purity and the percent of air in the refrigerant being tested. Since the percent of air is included as part of the percent refrigerant purity, the total of the two percentages displays may exceed 100%. For example, the tool may display: 98% refrigerant purity and 10% air. This means there is 10% air in the refrigerant being tested.

- 4.4** If the equipment requires special calibration gases, source information and test facilities, this information must be included with the operating instructions. Instructions must clearly indicate calibration frequency intervals to ensure the analyzer maintains its accuracy and sensitivity.
- 4.5** The instructions shall indicate if the equipment is for use with vapor only or for vapor and liquid. Tests per 5.8 shall be conducted using the correct refrigerant phase as declared by the manufacturer.

5. Equipment Requirements

- 5.1** The equipment shall be capable of identifying the specified refrigerants, R12 and/or R134a, to the specified purity level when evaluated to the test criteria in 5.8 and 5.9. The indication may be a visual display or other accurate display means.
- 5.2** The equipment shall not use more than 14 g (0.50 oz) per test cycle of the material being identified to perform its functions.
- 5.3** Equipment that is intended to be connected to automotive refrigerant recycling machines may have means to prevent flow of refrigerant to the recycling machine, as soon as refrigerant which does not meet the purity specification (as marked per 3.4) is detected.
- 5.4** Equipment shall meet a gas ignition test as follows. The identifier is to be installed in a test chamber at a 49 °C ambient. The identifier is to be operated in the normal standby condition and the most easily ignitable mixture of propane and air is to be introduced into the identifier. The identifier is then to be operated in the signal condition and the input voltage then increased to 110% of rated voltage.

There shall be no ignition of the gas-air mixture during 10 min of exposure.

- 5.5** Equipment designed to be operated in hazardous use locations of automotive service garages shall meet requirements for Class I, Division 2 locations identified in Standard UL 1604.
- 5.6** The equipment shall be provided with connection fittings to the refrigerant storage container and to the mobile air-conditioning system as identified by SAE J639.

5.7 Test Equipment and Program

- 5.7.1** The test apparatus shall consist of 13.6 kg (30 lb) test cylinders filled with 5 kg (or other appropriate amount) of the test mixtures detailed in 5.8.
- 5.7.1.1** The manufacturer shall declare the purity level prior to testing. Testing will be conducted at that purity level and at three test points of a purity level above (except for 98% declared) and below the declared level.

CAUTION—Certain Mixtures of Refrigerants and Hydrocarbons and Certain Mixtures of R134a and Air May Be Combustible. Care Must be Taken When Conducting This Test.

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5.8 Test Mixtures

5.8.1 For equipment intended to identify R12, the test mixtures shall consist of the following:

Prior to identifying each specific test mixture, the equipment shall be tested using pure R12 and the test sequence shall be performed twice to assure proper operation of the equipment.

- a. Base Material—R12, with mineral oil - 4000 ppm by weight and air - 300 ppm by weight and with 5, 10, 15, or 20% air (by weight at 21 °C.)
- b. Other Materials—Added to base material one at a time at either 2, 4, 6, 8, or 10% by weight:
 1. R134a
 2. R22
 3. R124
 4. R142b
 5. hydrocarbons¹

5.8.2 For equipment intended to identify R134a, the test mixture shall consist of the following:

Prior to identifying each specific test mixture, the equipment shall be tested using pure R134a and the test sequence shall be performed twice to assure proper operation of the equipment.

- a. Base Material—R134a with 50/50% by volume mixture PAG and POE Oil² 500 ppm by weight, and air 150 ppm of air by weight and with 5, 10, 15, or 20% air (by weight at 21 °C).
- b. Other Materials—Added to base material, one at a time at either 2, 4, 6, 8, or 10% by weight.
 1. R12
 2. R22
 3. R124
 4. R142b
 5. hydrocarbons³

5.9 The test shall be conducted with the equipment and test cylinders in an ambient of 21 °C ± 2 °C. To confirm the equipment operates properly at ambient temperatures of 10 to 49 °C, at least three test points (for each refrigerant) shall be repeated at 10 °C ± 2 °C and also at 49 °C ± 2 °C.

Connect the equipment to each cylinder tabulated in 5.8 and operate equipment following the manufacturer's instructions. The equipment will be tested with both liquid and vapor sample unless the manufacturer's instructions indicate the equipment for use with vapor only or liquid only. The equipment shall comply with 5.1 and 5.2.

PREPARED BY THE SAE INTERIOR CLIMATE CONTROL COMMITTEE

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1. The hydrocarbon shall be 1/3 each, by weight, of propane, N-butane and iso-butane. Each hydrocarbon shall be 99% pure.
 2. The PAG and POE oil shall be commercially available approved oil for mobile air-conditioning compressor use.
 3. Same as 1.