

(R) PERFORMANCE CRITERIA FOR ELECTRONIC REFRIGERANT LEAK DETECTORS

Foreword—This Document has also changed to comply with the new SAE Technical Standards Board format.

The purpose of this SAE Standard is to establish minimum performance criteria for electronic probe-type leak detectors intended for use in servicing mobile air-conditioning systems.

1. **Scope**—This SAE Standard applies to electronic probe-type leak detectors used to service motor vehicle passenger compartment air-conditioning systems. This document does not address any safety issues concerning their design or use.

2. **References**

2.1 **Applicable Publication**—The following publication forms a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue of SAE publications shall apply.

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

SAE J1628—Technician Procedure for Using Electronic Refrigerant Leak Detectors for Service of Mobile Air Conditioning 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 15 to 49 °C (60 to 120 °F).

3.2 The equipment shall be certified that it meets this specification by a qualified independent certifying 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 following the end of the production run for a certified unit.

3.3 The equipment shall have a label which states "Design Certified by (Certifying Agent) to Meet SAE J1627 for #" in bold-type letters, a minimum of 3 mm in height, where "#" is replaced by the designation for the refrigerant(s) for which the equipment was certified. As an example, for a device which is certified as meeting this specification for CFC-12, HCFC-22, and HFC-134a by XYZ Company, the label would read—"Design Certified by XYZ Company to Meet SAE J1627 for R12, R22, and R134a."

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4. **Operating Instructions**

- 4.1 The equipment manufacturer shall provide operating instructions, including calibration, sensor replacement, and use instructions. The use instructions shall include the SAE J1628, Section 3 for Electronic Probe Type Detectors. Also to be included are any other necessary maintenance procedures, source information for replacement parts and repair, and safety precautions.
- 4.2 For the instructions included with the detector, 3.9.1 of SAE J1628 shall be replaced by "The accumulation time for evaporator testing is ### min" where ### is calculated as in Equation 1. This calculation provides roughly the same sensitivity as the basic scanning sensitivity for an evaporator case volume of 0.0015 m³, and proportionally lower sensitivity for larger volumes.

$$\text{Time} = \frac{\text{Concentration}}{5.0} \quad (\text{Eq. 1})$$

where:

Time = Evaporator test accumulation time in minutes

Concentration = Concentration in ppm_v which causes the detector to alarm

5. **Functional Description**

- 5.1 The equipment shall self-calibrate or be user calibrated per the manufacturer's operating instructions. The equipment shall be equipped with all tools, instruments, and standards needed (if any) for user calibration if they are not typical of a service garage.
- 5.2 Once calibrated to the manufacturer's specifications, the equipment shall maintain stability in a service garage environment, or warn of significant change.

6. **Testing of Electronic Probe-Type Leak Detectors**—This test procedure and its requirements shall be used to test the performance of leak detector equipment.

6.1 **Leak Standards**

- 6.1.1 Leak standards used in this testing shall be calibrated by methods and instruments traceable to NIST. Washington, DC 20234 (National Institute of Standards and Technology) to meet leak rate requirements as follows:
- a. Test Leak Standard at Standard Conditions— $8 \cdot 10 \times 10^{-5} \text{ cm}^3/\text{s}$ ($8 \cdot 10 \times 10^{-11} \text{ m}^3/\text{s}$)
 - b. Leak Rate in Common Units—14 g/year (0.5 oz/year)
- 6.1.2 The opening of the leak standard shall conform to the dimensions in Figure 1.
- 6.1.3 Leak standards shall be manufactured for the specific refrigerant for which they will be used. Leak standards shall not be converted between different refrigerants, since even trace amounts of residual refrigerant can affect detector sensitivity.

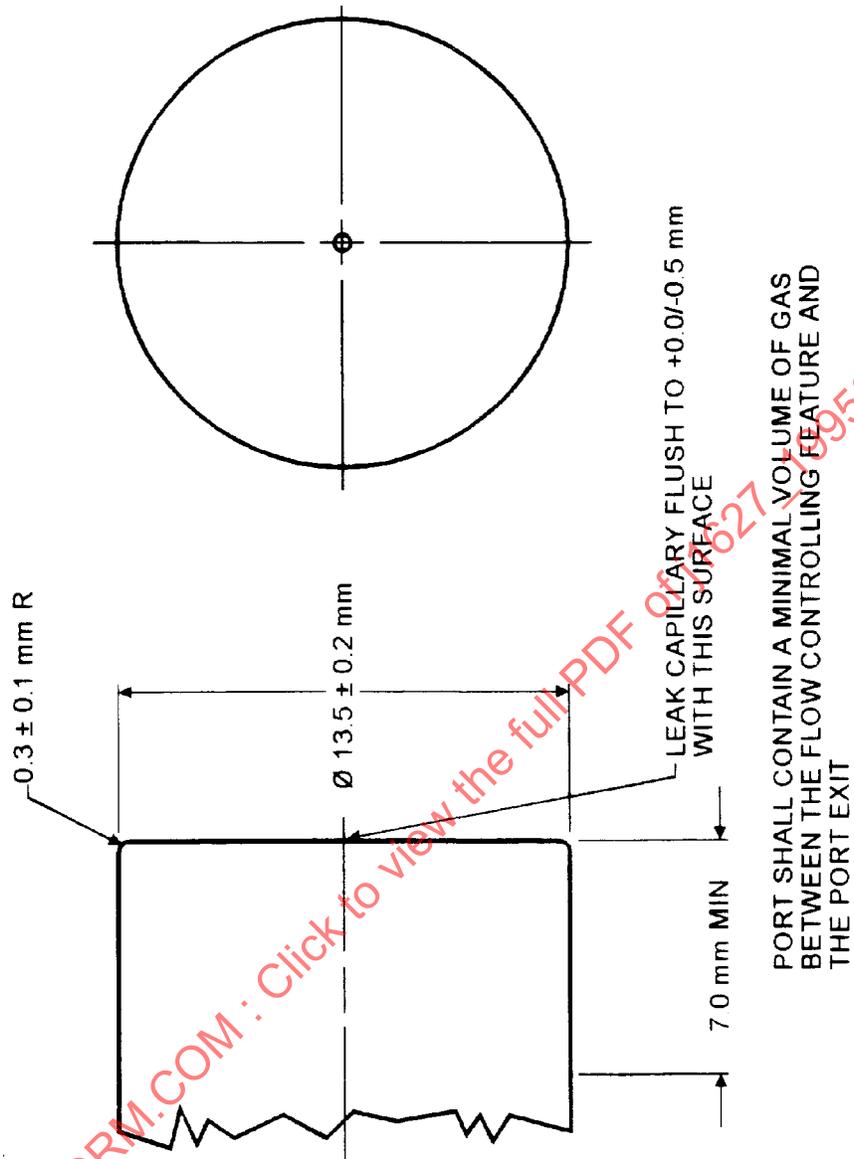


FIGURE 1—LEAK STANDARD PORT CONFIGURATION

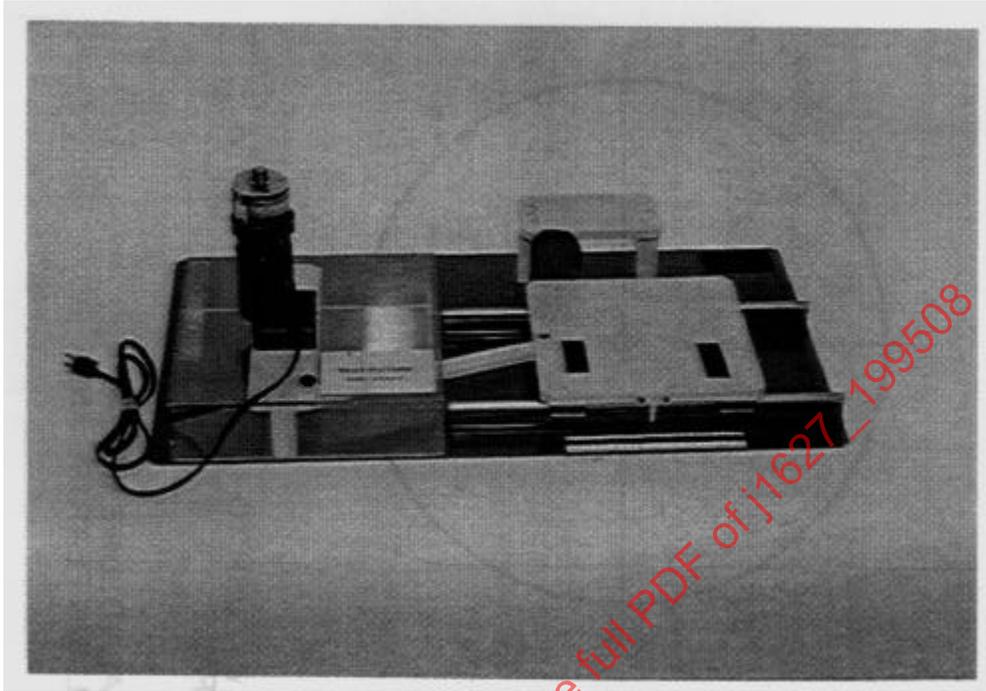
6.2 Test Equipment—Figure 2

FIGURE 2—TEST EQUIPMENT

- 6.2.1 The tests shall be conducted in an enclosure containing still pure air at constant $22\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($68\text{ }^{\circ}\text{F} \pm 4\text{ }^{\circ}\text{F}$) at $101\text{ kPa} \pm 3\text{ kPa}$ absolute.
- 6.2.2 A table capable of supporting and positioning the leak detector probe assembly and capable of horizontal movement of at least $100\text{ mm} \pm 10\text{ mm}$ ($4.0\text{ in} \pm 0.4\text{ in}$) displacement total at a rate of $50\text{ mm/s} \pm 5\text{ mm/s}$ ($2.0\text{ in/s} \pm 0.2\text{ in/s}$) over at least 80 mm (3.0 in) of its travel shall be installed in the enclosure. The time for one complete cycle (back and forth), measured at the center of travel, shall not exceed 8 s.
- 6.2.3 A stand for positioning the leak standard orifice at least 100 mm (4 in) above the base of the enclosure shall be provided. The leak standard shall rest on the stand so that the orifice end hangs over the edge of the stand by a distance of at least 3 mm (0.1 in), and is positioned at the midpoint of the probe table displacement.

6.3 Test Procedure

- 6.3.1 Turn on and calibrate the leak detector per the manufacturer's operation instructions.
- 6.3.2 Within the enclosure, mount the detector probe on the movable table.
- 6.3.3 Allow the detector to sit idle but turned on for 5 min to test stability.
- 6.3.4 Outside the enclosure, set the leak standard to the rate specified in 6.1.1.
- 6.3.5 Install the calibrated leak standard on the stand in the enclosure.