



400 Commonwealth Drive, Warrendale, PA 15096-0001

# SURFACE VEHICLE STANDARD

SAE J1627

Issued 1993-06-02

Submitted for recognition as an American National Standard

## RATING CRITERIA FOR ELECTRONIC REFRIGERANT LEAK DETECTORS

**Foreword**—The purpose of this SAE Standard is to establish a rating method for determining the sensitivity of 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 Documents**—The following publication forms a part of this specification to the extent specified herein. 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."

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

#### 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 ### minutes," 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 m<sup>3</sup>, and proportionally lower sensitivity for larger volumes.

$$Time = \frac{Concentration}{0.05 \cdot 10^{Class}} \quad (\text{Eq.1})$$

where:

Time = evaporator test accumulation time in minutes

Concentration = concentration in ppmv which causes the detector to alarm

Class = the detector class as determined by this specification

#### 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 determine the sensitivity of the 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 the below leak rate requirements:

##### a. Test Leak Standard at Standard Conditions

8-10x10<sup>-5</sup> cm<sup>3</sup>/s      (8-10x10<sup>-11</sup> m<sup>3</sup>/s)

##### b. Approximate 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.

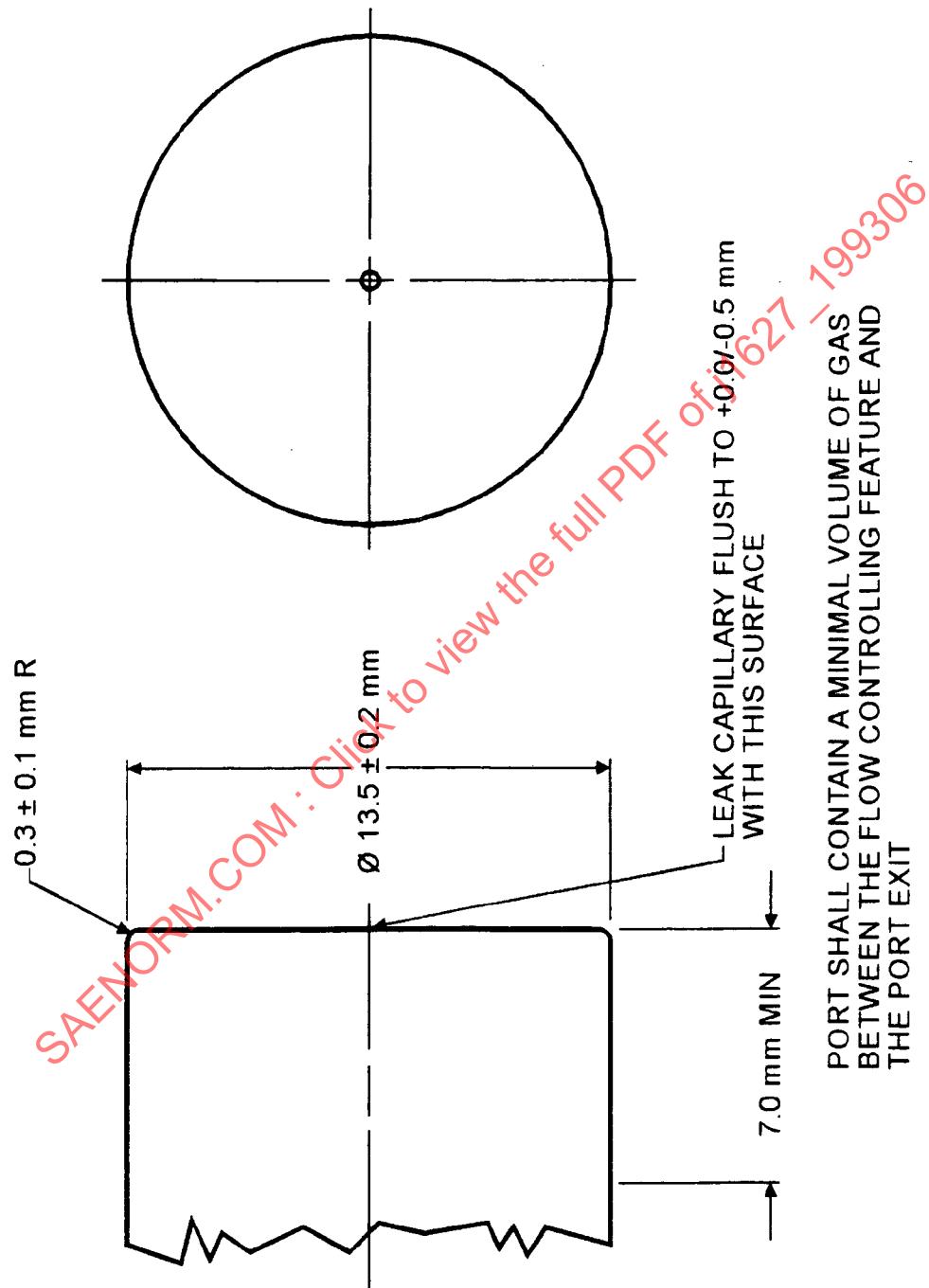
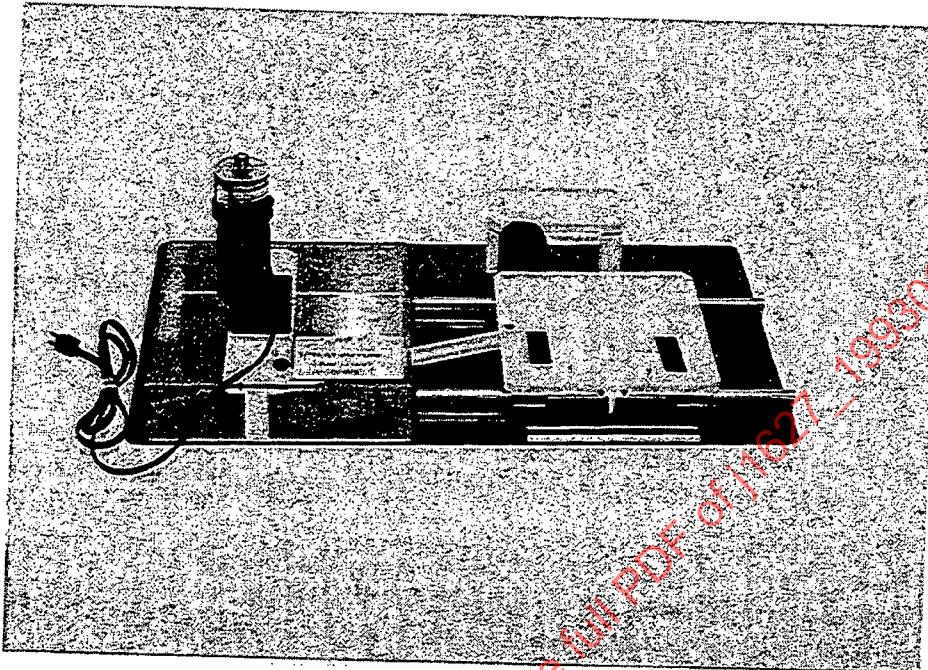


FIGURE 1 – LEAK STANDARD PORT CONFIGURATION

**6.2 Test Equipment—(See Figure 2.)**



**FIGURE 2—TEST EQUIPMENT**

**6.2.1** The tests shall be conducted in an enclosure containing still pure air at constant  $22^{\circ}\text{C} \pm 2^{\circ}\text{C}$  ( $68^{\circ}\text{F} \pm 3.8^{\circ}\text{F}$ ) 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  $80\text{ mm}$  ( $3.0\text{ in}$ ) 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  $100\text{ mm}$  (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  $3\text{ mm}$  (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.

**6.3.6** Adjust the distance from the end of the orifice to the tip of the probe so that at their closest point they are no closer than  $5.0\text{ mm} \pm 0.5\text{ mm}$  ( $0.25\text{ in} \pm 0.02\text{ in}$ ). Any angle or offset of the probe relative to the orifice is allowed, if noted in the operating instructions, to optimize the test.