



400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J2296

Issued 1996-09

Submitted for recognition as an American National Standard

RETEST OF REFRIGERANT CONTAINER

1. Scope—To provide a procedure to inspect a refrigerant cylinder used in equipment servicing mobile air-conditioning systems. This includes the pressure cylinder used for refrigerant recovery/recycling and charging equipment.

2. References

2.1 Applicable Documents—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 CGA SPECIFICATIONS—Available from Compressed Gas Association, Crystal Gateway #1, Suite 501, 1235 Jefferson Davis Highway, Arlington, VA 22202.

CGA S-1.1—Cylinders for Compressed Gases

CGA C-61—Cylinders for Compressed Gases

2.1.2 DOT SPECIFICATIONS—Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

DOT Specification 39—Disposable Cylinders

DOT Specification 49, Section 1809

DOT 49CFR Chapter 1 (10-1-92) Edition, Sections 173.34 (e) and 173.3(d)

2.1.3 UNDERWRITERS LABORATORIES—Available from Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL1769—Cylinder Valves

UL 1963—Standard for Refrigerant Recovery/Recycling Equipment, First Edition 1993, Copyright 1989

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 J513, 1976—Refrigeration Tube Fittings

SAE J1990, 1989—Extraction and Recycle Equipment for Mobile Automotive Air-Conditioning Systems

SAE J2197, 1991—HFC-134a Service Hose Fittings

SAE J2209, 1991—Standard for Purity for Recycled HFC-134a for use in Mobile Air-Conditioning Systems

SAE J2210—HFC-134a Recycling Equipment for Mobile Air-Conditioning Systems

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2.2.2 ARI PUBLICATION—Available from ARI, 4301 North Fairfax Drive, Suite 425, Arlington, VA.

ARI Guideline K 1990—Cylinders for Recovered Fluorocarbon Refrigerants

2.2.3 DOT PUBLICATION—Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Part III Environmental Protection Agency, 40CFR Part 82—Protection of Stratospheric Ozone: Labeling Supplemental Proposal Final Rule

3. **Storage Containers (Cylinder/Tank)**

3.1 Federal Requirements—The container stores the refrigerant and protects it from outside contamination. Most refrigerants are under pressure at ambient temperatures. Refrigerants should never be charged and stored in unapproved containers such as DOT Specification 39 disposable cylinders.

3.1.1 DOT STANDS FOR THE U.S. DEPARTMENT OF TRANSPORTATION—Federal law forbids transporting DOT 39 cylinders if refilled and penalties up to a \$25,000 fine and 5 years imprisonment may be expected [(Title 49 U.S.C. (United States Code) Sec. 1809)].

3.1.2 Proper storage containers are DOT approved refillable containers which are stamped with the information in Figure 1:

DOT-4BA400 (302, 350)
 Serial Number [Inspector's Initials]
 ("Container Manufacturer's Name") [Inspector's Initials]
 W.C. 47.6 T.W. 28
 4-91
 "1st RETEST DATE - 96
 TEST EVERY 5 YRS
 THEREAFTER"

FIGURE 1—INFORMATION FOR CONTAINERS

3.1.2.5 The sample information is for a tank commonly called a "50-lb tank." Other size tanks shall have the appropriate W.C. and T.W. markings.

3.1.3 The first line is the DOT code for a container rated at 400 psig (2760 kPa) or 302 psig (2084 kPa) or 350 psig (2415 kPa) working pressure.

3.1.3.1 The second line is the container manufacturer serial number.

3.1.3.2 The third line is the container manufacturer identification number.

3.1.3.3 The fourth line W.C. is the water capacity in pounds when completely filled and T.W. is the cylinder tare weight in pounds. Since common refrigerants are heavier than water, this tank can safely be filled with 23 kg (50 lb) for R-12 or 21 kg (46 lb) of R-134a.

3.1.3.4 The fifth line is the manufacturer's date code, which is important for the retested date.

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3.2 The containers and valves should meet UL Standard 1963 which requires that:

- 3.2.1** The storage container shall comply with DOT Specifications, 49 CFR, and have a service pressure rating not less than the recovery equipment's pressure limiting device.
- 3.2.2** The cylinder valve shall comply with the Standard for Cylinder valves, UL1769. The pressure relief device shall comply with Compressed Gas Association Pamphlet S-1.1.
- 3.2.3** The tank assembly shall be marked to indicate the first retest date, which shall be 5 years from date of manufacture. Also the marking shall indicate that retest must be performed every subsequent 5 years. The marking shall be in letters at least 0.25 in (6 mm) high.
- 3.2** ARI Guideline K describes a color coding scheme for refrigerant cylinders. The color for recovered and recycled refrigerants, and refrigerant on its way back to a reclaim facility, is gray with a yellow top. Some recycling equipment manufacturers have provided light blue cylinders with yellow tops for automotive R-134a applications.
- 3.3** Most storage containers are equipped with SAE 6.4 mm (1/4 in) refrigeration flare fittings. For automotive R-134a applications, both new refrigerant cylinders (DOT 39) and refillable storage containers are fitted with special SAE 12.7 mm (1/2 in) threads.

4. Container Labeling—EPA regulations require labeling refrigerant tanks containing Class I (CFC) and Class II (HCFC) refrigerants. Each container shall bear the following warning statement:

WARNING—Contains (Insert refrigerant), a substance which harms public health and environment by destroying ozone in the upper atmosphere.

5. Filling Containers—Care must be exercised when filling storage containers because liquid refrigerants expand when heated. Referring to Figure 2, the tank on the left is filled to an 80% level at 21 °C (70 °F). The tank on the right shows that same amount of refrigerant warmed to 70 °C (158 °F).

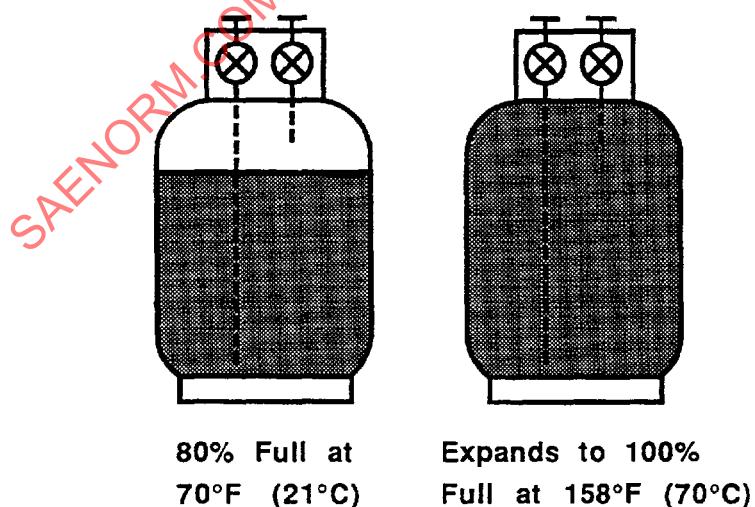


FIGURE 2—EXPANSION OF LIQUID REFRIGERANT WHEN HEATED

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5.1 When a container is overfilled and subsequently exposed to higher temperatures, hydraulic expansion can cause the relief valve to open and vent refrigerant, and even can lead to a ruptured container. SAE and UL standards require a container overfill protection based upon 80% liquid fill at 24 °C (70 °F).

5.2 A full container condition can be determined by monitoring weight while filling. A predetermined load deflects the load cell to trip a limit switch. An electronic scale used for charging will also detect a tank overfill condition (Figure 3).

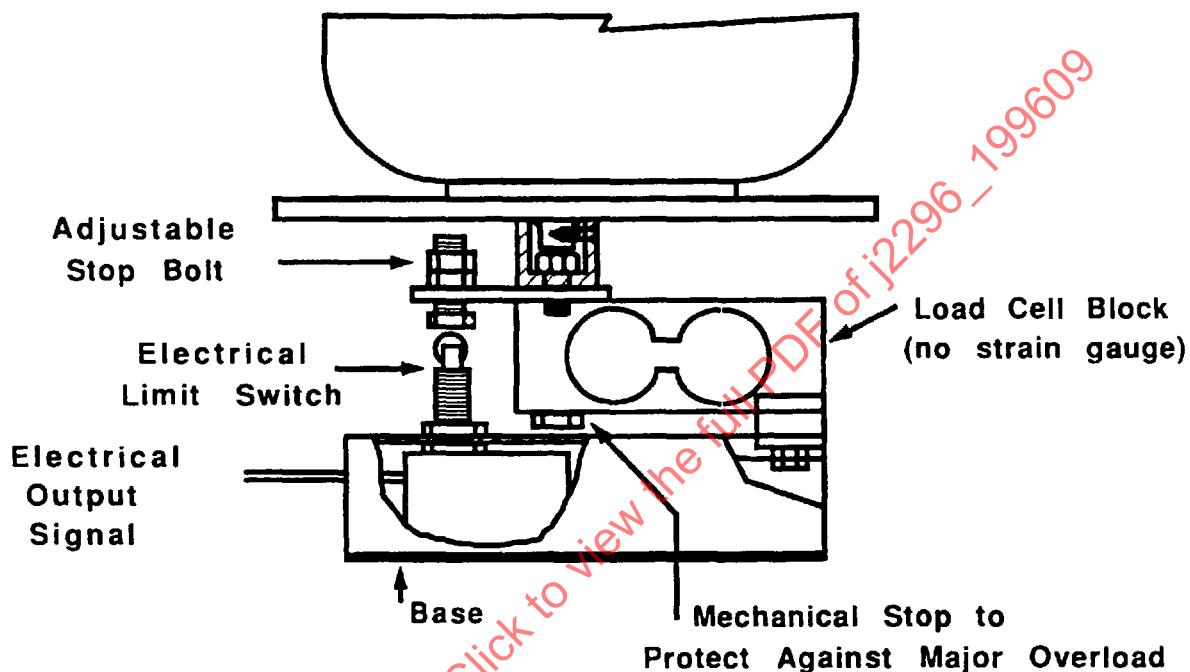


FIGURE 3—MECHANICAL-ELECTRICAL LOAD CELL TANK OVERFILL PROTECTION

5.2.1 For recovery units handling more than one refrigerant, allowable weight limits must be based on the refrigerant with the lowest density to prevent overfilling the container.

5.3 Float switches, or other liquid level sensors, can be used to detect full containers. They correctly gauge the fill level no matter the refrigerant type or oil content in the container.

6. Retesting Cylinders—DOT regulations require that cylinders be retested every 5 years.

6.1 The appropriate categories are DOT-3A, DOT-3AA, DOT-3A480X, DOT-4B, DOT-4BA, DOT-4BW, and DOT-4E containing fluorinated hydrocarbons and mixtures thereof which are commercially free from corroding components.

6.2 External Visual Examination with Hydrostatic Test

6.2.1 Retest at 5-year intervals.

6.2.2 An authorized retester must perform a visual examination using CGA pamphlet C-61.

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6.2.2.1 If the cylinder has a float switch, remove it and insert a plug prior to the hydrostatic test. Examine the float assembly for corrosion and visual damage.

6.2.3 Conduct a hydrostatic test by filling the cylinder with distilled water and pressurizing it at 2 times the normal service pressure.

6.2.4 Measure expansion during the hydrostatic test.

6.2.5 Condemn the cylinder when the tank leaks, has external corrosion, denting, bulging, or evidence of rough usage, or when the permanent expansion exceeds 10% of the total expansion after the hydrostatic test.

6.2.5.1 If the cylinder is returned to service replace the corroded or damaged float assembly or reinstall the original assembly.

6.2.5.2 Assure that the float assembly is checked for calibration as identified in 6.2.8.

6.2.6 Owners must keep records showing the result of reinspection and retesting until the cylinder is again reinspected or retested.

6.2.7 Mark each cylinder passing retest with the cylinder tester's identification number set in a square pattern, between the month and year of the retested date in characters not less than 3 mm (1/8 in) high with the first character occupying the upper left corner of the square pattern. For example, a cylinder retested in May 1984 by approved retester, A123 would be stamped as shown in Figure 4:

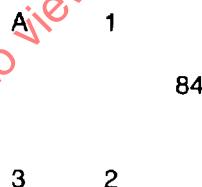


FIGURE 4—EXAMPLE OF A CYLINDER TESTED IN MAY 1984

6.2.8 RETEST OF FLOAT SWITCH ASSEMBLY

6.2.8.1 The cylinder is to be placed on a calibrated scale and the weight recorded. Connect an ohmmeter to the wire leads (or terminals) attached to the top float switch. Mount the cylinder upright. Gradually fill the cylinder with distilled water until the ohmmeter indicates that the float switch is activated. Immediately stop filling the cylinder. Record the final weight of the cylinder filled with water. Subtract the initial cylinder weight from the final recorded weight of the cylinder to obtain the amount of water kg (lb) required to activate the float switch. The weight of the water required to activate the float switch shall not exceed the W.C. marking on the cylinder multiplied by 0.8 (example $47.6 \times 0.8 = 38.08$).

6.3 Removal of Moisture and Container Valve Inspection

6.3.1 After completing the pressure test in 6.2.3 the container must be gravity drained for 30 min.