SAE International

# SURFACE VEHICLE STANDARD

SAE J2296 JUN2012

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Superseding J2296 NOV1998

# Retest of Refrigerant Container

## RATIONALE

This standard has been updated to update references and clarify regional requirements as well as the five year re-test requirement.

## 1. SCOPE

To provide a procedure to inspect a refrigerant cylinder used in equipment servicing mobile air-conditioning (A/C) 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 Square #2, Jefferson Davis Highway, Arlington, VA 22202-4102.

CGA S-1.1 Pressure Relief Device Standards - Cylinders for Compressed Gases

CGA C-6 Standards for Visual Inspection of Steel Compressed Gas Cylinders

CGA C-6.1 Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders

#### 2.1.2 DOT Specifications

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

DOT 39 DOT approved cylinder specifications (except those operating under exemptions) are found in 49 Code of Federal Regulations (CFR) sections 178.1 through 178.68.





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**http://www.sae.org/technical/standards/J2296_201206**

2.1.3 Underwriters Laboratories

Available from Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 1769 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 SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J513 Refrigeration Tube Fittings - General Specifications

SAE J1990 Recovery and Recycle Equipment for Mobile Automotive Air-Conditioning Systems

SAE J2197 HFC-134a (R-134a) Service Hose Fittings for Automotive Air-Conditioning Service Equipment

SAE J2209 CFC-12 (R-12) Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems

SAE J2210 HFC-134a (R-134a) Recovery/Recycling Equipment for Mobile Air-Conditioning Systems

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 Manufacturers 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

3.1.2.1 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 for CFC-12 (R-12) or 21 kg of HFC-134a (R-134a).

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

3.2 The containers and valves should meet UL 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, UL 1769. The pressure relief device shall comply with the Pressure Relief Device Standard Part 1 - Pressure Relief Device Standards - Cylinders for Compressed Gases”, 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 subsequent5 years. The marking shall be in letters at least 6 mm high.

3.3 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 HFC134a (R-134a) applications.

3.4 Most storage containers are equipped with SAE 6.4 mm refrigeration flare fittings. For automotive HFC-134a (R-134a) applications, both new refrigerant cylinders (DOT 39) and refillable storage containers are fitted with special SAE 12.7 mm threads.

3.5 Storage Containers requirements may have different regional applicable requirements.

3.5.1 This standard contains informational content on the requirements of field pressure vessels. Federal transportation laws (examples: US DOT, ISO, Japanese-KHK) and/or pressure vessel codes (examples: ASME, CGA, ISO, Japanese-KHK) take precedence over the stated requirements of this SAE Standard whenever applicable in their regions of enforcement

## 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. The tank on the right shows that same amount of refrigerant warmed to 70 °C.

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.

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. (See Figure 3)



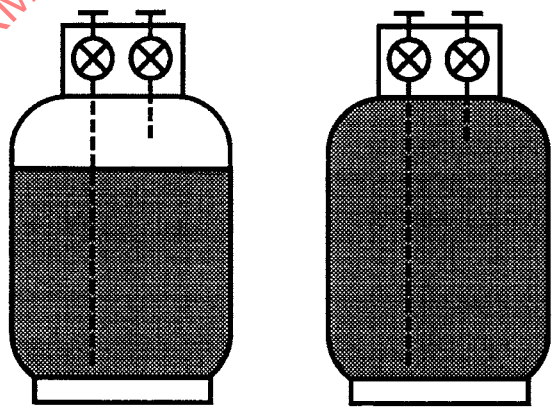


FIGURE 2 - EXPANSION OF LIQUID REFRIGERANT WHEN HEATED

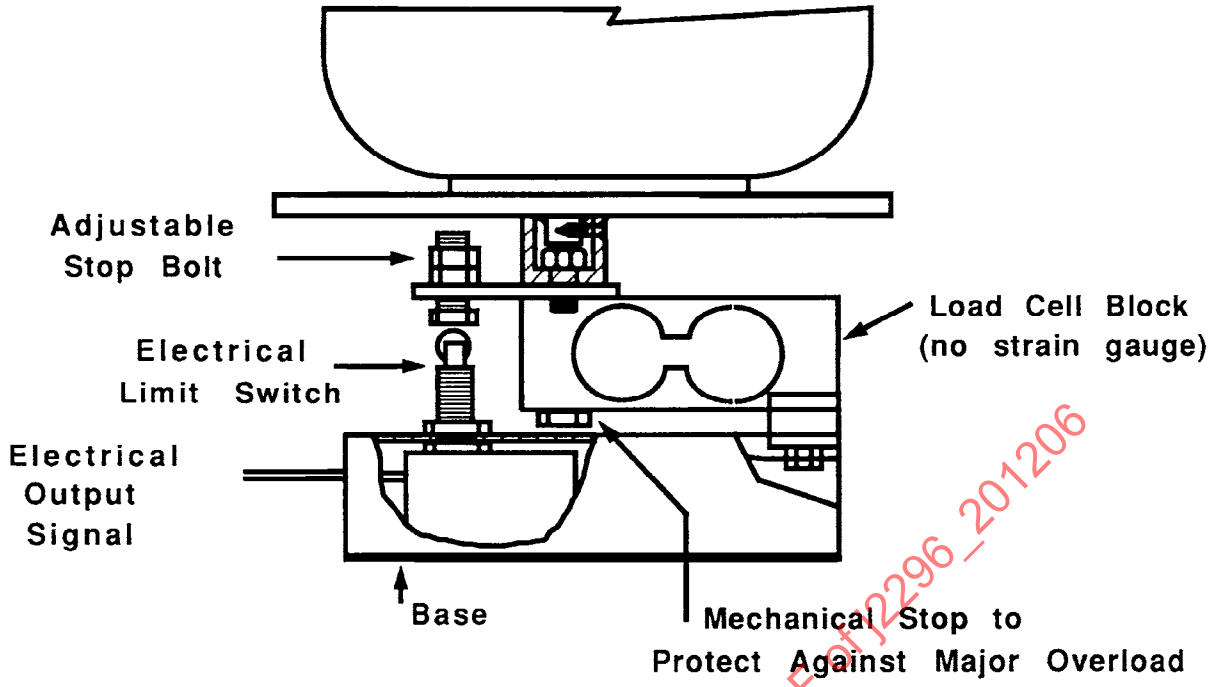


FIGURE 3 - MECHANICAL/ELECTRICAL LOAD CELL TANK OVERFILL PROTECTION

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 gauged 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 pamphlets C-6 and C-6.1.

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.