



# Standard Practice for Handling, Transportation, and Storage of HFC-23 (FE-13<sup>TM</sup>), Trifluoromethane, CHF<sub>3</sub>)<sup>1</sup>

This standard is issued under the fixed designation D 6127; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

## 1. Scope

1.1 This practice covers guidance and direction to suppliers, purchasers, and users in the handling, transportation, and storage of HFC-23.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

D 6126 Specification for HFC-23 trifluoromethane (CHF<sub>3</sub>)<sup>2</sup>

### 2.2 CGA Standards:

No. C-1, Methods for Hydrostatic Testing of Compressed Gas Cylinders<sup>3</sup>

No. C-4, American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained<sup>3</sup>

No. C-6, Standards for Visual Inspection of Steel Compressed Gas Cylinders<sup>3</sup>

No. P-1, Safe Handling of Compressed Gases in Containers<sup>3</sup>

No. SB-1, Hazards of Refilling Compressed Refrigerant (halogenated hydrocarbon) Gas Cylinders<sup>3</sup>

### 2.3 U.S. Government Standards:

Code of Federal Regulations (CFR) Title 40, Part 82.106<sup>4</sup>

Code of Federal Regulations (CFR) Title 40, Part 173, U.S. Department of Transportation (DOT) Specifications, Shippers-General Requirements for Shipping and Packagings<sup>4</sup>

DOT Exemption DOT-E 9491 to Code of Federal Regulations (CFR) Title 40, Part 173,

U.S. Department of Transportation (DOT) Specifications, Shippers-General Requirements for Shipping and Packagings<sup>4</sup>

Code of Federal Regulations (CFR) Title 40, Part 178, U.S. DOT Specifications for Packagings<sup>4</sup>

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *containers*—storage vessel for HFC-23.

3.1.2 *cylinders*—containers of HFC-23.

3.1.3 *HFC-23*—trifluoromethane, a compound used to inert or suppress a fire or explosion hazard.

3.1.4 *insulated*—placed in an isolated situation to protect and prevent the transfer of damage.

## 4. Significance and Use

4.1 This practice provides requirements for the handling, transportation, and storage of HFC-23 encountered in distribution through both commercial and military channels. It is intended to ensure that HFC-23 is handled, transported, and stored in such a way its physical property values are not degraded. Transport may be by various means, such as, but not limited to, highway, rail, water, and air.

## 5. Practice

5.1 Personnel shall be trained in Title 49 CFR, Part 172, Subpart H, to ensure safe handling, loading, unloading, storage and transportation of material.

### 5.2 Handling:

5.2.1 Handling shall be in accordance with C.G.A. Publication No. P-1.

5.2.2 Personnel who handle or store, or both, cylinders of HFC-23 shall be trained properly to recognize and identify the characteristics of the product and the proper methods of safely handling full, partly full, and empty cylinders.

5.2.3 Facility personnel must be trained in applicable Title 49 CFR, Parts 173 and 178, and the GCA documents referenced in 2.2.

5.2.4 Halon handling shall be in nonsmoking, heater-free, ventilated areas to preclude product accumulation. Provisions shall be made to ensure that service areas limit HFC-23 concentrations to not exceed 10 % for 1 min and 0.1 % for 8 h.

5.2.5 Cylinders shall not be over filled. The maximum permitted filling density shall conform to specifications as

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 15.05.

<sup>3</sup> Available from the Compressed Gas Association.

<sup>4</sup> Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20036.

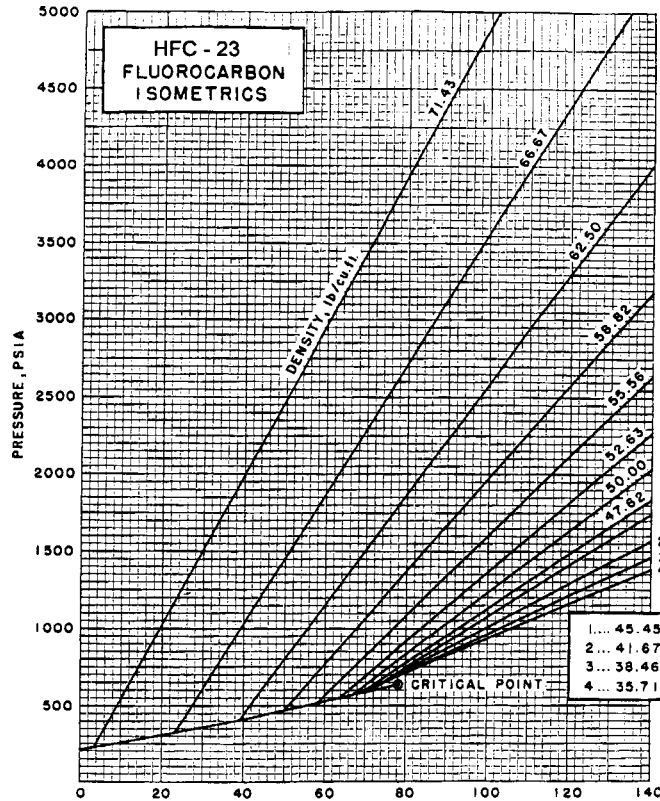


FIG. 1 HFC-23 Fluorocarbon Isometrics

listed in DOT-E 9491. The pressure at the critical temperature does not exceed one and one-fourth times the service pressure of the cylinder. Filling density requirements are specified in Title 49 CFR, 173 and Title 49 CFR, 173.305.

5.2.6 Handling of materials should be done in a manner that prevents contamination or commingling of halons other than HFC-23.

5.2.7 Cylinders shall be free of dirt and contamination that would contribute to or would cause deterioration of the product during shipment or storage. Precautions should be taken to prevent the entry of oil, water, or any other foreign matter into the container. Unique coatings or preservatives applied prior to shipment to protect the containers are not considered contamination.

5.3 *Transportation:*

5.3.1 Transportation shall be as specified in accordance with DOT regulations of Title 49 CFR.

5.3.2 Transportation shall be in suitable vehicles to preclude cylinder damage by excessive mechanical vibration, shock, freezing, or deleterious high temperatures throughout the entire transport route.

5.3.2.1 Should cylinders be expected to be subjected to unacceptable transport conditions, the cylinders should be placed under insulated conditions.

5.3.3 Compressed gas cylinder permanent marking requirements shall be as specified under Part 178 of Title 49 CFR and must be maintained in legible condition as required by Part 173 of Title 49 CFR. Warning labels shall be affixed to the cylinders conforming to requirements of Part 82.106 of Title 40 CFR.

5.4 *Storage:*

5.4.1 Storage shall be in accordance with C.G.A. Publication No. P-1, in qualified cylinders in accordance with Parts 173 and 178 of Title 49 CFR.

5.4.2 Cylinder should be stored in areas that will protect vessels from physical and environmental damage, and tampering from unauthorized personnel.

5.4.2.1 Facilities should be in construction and orientation so that safety requirements are fulfilled for storage of pressurized cylinders.

5.4.3 Storage cylinders shall be fitted with pressure release mechanisms to limit vessel pressure to not more than the rated working pressure of the container in use at any particular time.

5.4.3.1 Periodic hydrostatic testing and re-inspection of cylinders used for HFC-23 shall comply with Part 173.34 of Title 49 CFR.

5.4.4 Containers shall be clearly marked and labeled to identify whether the HFC-23 contained conforms to Specification D 6126.

5.4.5 Insulation shall be placed on pallets or shoring and provisions should be made to prevent excessive shock or thermal fluctuations to cylinders.

5.4.6 Cylinders shall be stored in a manner that will prevent contamination from external sources.

6. **Keywords**

6.1 CHF<sub>3</sub>; compressed gas; compressed liquefied gas; cylinders; explosion suppressant; FE-13<sup>™</sup>; fire suppressant; handling; HFC-23; storage; transport; trifluoromethane

 **D 6127**

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