



# Standard Practice for Handling, Transportation, and Storage of HFC-125, Pentafluoroethane (C<sub>2</sub>HF<sub>5</sub>)<sup>1</sup>

This standard is issued under the fixed designation D6268; 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 reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice covers guidance and direction to suppliers, purchasers, and users in the handling, transportation, and storage of HFC-125, pentafluoroethane (C<sub>2</sub>HF<sub>5</sub>).

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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:<sup>2</sup>

[D6231 Specification for HFC-125 \(Pentafluoroethane, C<sub>2</sub>HF<sub>5</sub>\)](#)

### 2.2 CGA Standards:<sup>3</sup>

[C-1 Methods for Hydrostatic Testing of Compressed Gas Cylinders](#)

[C-6 Standards for Visual Inspection of Steel Compressed Gas Cylinders](#)

[C-7 Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Containers](#)

[P-1 Safe Handling of Compressed Gases in Containers](#)

[SB-1 Hazards of Refilling Compressed Refrigerant \(Halogenated Hydrocarbon\) Gas Cylinders](#)

[SB-5 Safety Bulletin: Hazards of Reusing Disposable Refrigerant \(Halogenated Hydrocarbon\) Gas Cylinders](#)

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D26 on Halogenated Organic Solvents and Fire Extinguishing Agents and is the direct responsibility of Subcommittee D26.09 on Fire Extinguishing Agents.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from the Compressed Gas Association (CGA), 14501 George Carter Way, Suite 103, Chantilly, VA 20151, <http://www.cganet.com>.

[SB-18 Safety Bulletin: Use of Refrigerant \(Halogenated Hydrocarbons\) Recovery Cylinders](#)

### 2.3 U.S. Government Standards:<sup>4</sup>

[Code of Federal Regulations \(CFR\) Title 40, Part 82.106, Environmental Protection Agency, Warning Statement Requirements](#)

[CFR Title 49, Part 172, U.S. DOT Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements](#)

[CFR Title 49, Part 172.101, U.S. DOT Tables of Hazardous Materials and Special Provisions](#)

[CFR Title 49, Part 173, U.S. DOT Shippers-General Requirements for Shipping and Packaging](#)

[CFR Title 49, Part 178, U.S. DOT Specification for Packagings](#)

[CFR Title 49, Part 180, U.S. DOT Continuing Qualification and Maintenance of Packagings](#)

## 3. Terminology

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

3.1.1 *containers*—storage vessels for HFC-125.

3.1.2 *cylinders*—containers of HFC-125.

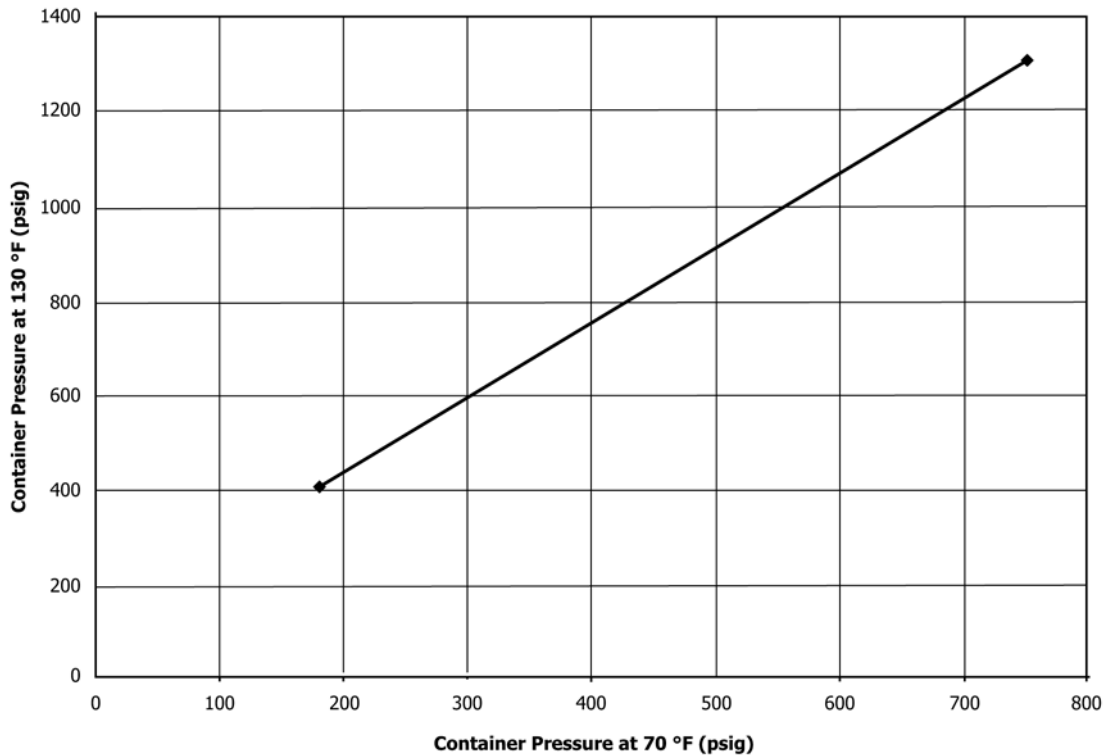
3.1.3 *HFC-125*—pentafluoroethane, a compound used to inert, extinguish or suppress a fire or explosion hazard.

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-125 encountered in distribution through both commercial and military channels. It is intended to insure that HFC-125 is handled, transported, and stored in such a way its physical properties are not degraded. Transport may be by various means, such as, but not limited to, highway, rail, water, and air.

<sup>4</sup> Available from U.S. Government Publishing Office, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.gpo.gov>.



NOTE 1—Applicable to a container fill density of 57.5 lb/ft<sup>3</sup> only.

FIG. 1 Effect of Temperature on Storage Cylinder Pressure (HFC-125 Mixed with Nitrogen)

## 5. Practice

5.1 To ensure safe handling, loading, unloading, storing, and transporting of material, personnel shall be trained in the CGA publications and Title 49 CFR regulations as listed in 2.2 and 2.3, respectively.

### 5.2 Handling:

5.2.1 Handling shall be in accordance with CGA P-1, Safe Handling of Compressed Gases in Containers, and as specified by the manufacturer.

5.2.1.1 Personnel who handle or store, or both, cylinders of HFC-125 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.

5.2.2 All HFC-125 transfers between storage containers and recycling processes shall be performed by personnel trained in handling procedures.

5.2.2.1 HFC-125 recycling and transfer processes shall be in conjunction with the equipment specified by the manufacturer.

5.2.3 HFC-125 handling shall be in nonsmoking, heater-free, ventilated areas to preclude product accumulation. Provisions shall be made to ensure that service areas limit HFC-125 concentrations to not exceed 10 % for 1 min and 0.1 % for 8 h.

5.2.4 Cylinders shall not be overfilled. The maximum permitted filling density shall be 59 lb/ft<sup>3</sup> (945 kg/m<sup>3</sup>). The liquid portion of the liquefied gases must not completely fill the container's internal volume at any temperature up to and including 130°F (54°C). Filling density requirements are specified in Title 49 CFR, 173.304 and Title 49 CFR, 173.305.

5.2.5 Handling of materials should be done in a manner that prevents contamination or co-mingling of materials other than HFC-125.

5.2.6 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.

5.3.1.1 Shipment of materials between collectors, recyclers, and reclaimers should be within approved DOT guidelines for Class 2, Division 2.2, regulated materials. Any further provisions for special transportation or packaging should be agreed upon between the collectors, recyclers, and reclaimers.

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 subject 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 CGA P-1, in qualified cylinders in accordance with Parts 173 and 178 of Title 49 CFR.

5.4.2 Cylinders 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 constructed and oriented 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 minimum required test pressure of the cylinder. Safety relief valves should be set not less than 75 %, nor more than 100 % of the minimum required test pressure of the cylinder. Safety valves shall be in contact with the vapor space of the cylinder.

5.4.3.1 Periodic hydrostatic testing and re-inspection of cylinders used for HFC-125 shall comply with Title 49 CFR, Part 180.

5.4.4 Containers shall be clearly marked and labeled to identify whether the HFC-125 contained conforms to Specification **D6231**.

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.

5.4.6.1 If HFC-125 meeting the standards of Practice D6268 is stored in the same area as material not meeting the standards, storage shall be segregated or clearly identifiable as not being similar.

## 6. Inspection

6.1 HFC-125 that is reclaimed using HFC-125 manufacturer-approved reclamation systems may be released for reissue, provided test examination to validate the material to specification is fulfilled.

6.1.1 Reclaimed HFC-125 that cannot be proven to comply with Specification **D6231** shall not be reissued. The material will be processed by environmentally safe methods until conformance to the product standard is achieved.

## 7. Keywords

7.1 C<sub>2</sub>H<sub>F</sub><sub>5</sub>; compressed gas; compressed liquefied gas; cylinders; explosion suppressant; FE-25™; fire suppressant; handling; HFC-125; pentafluoroethane; storage; transport

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