



Designation: D7326 – 21

Standard Practice for Handling, Transportation, and Storage of HFC Blend B (CH₂FCF₃, CHF₂CF₃, and CO₂)¹

This standard is issued under the fixed designation D7326; 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, reclaimers, purchasers, and users in the handling, transportation, and storage of HFC Blend B.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standard:*²

D7327 Specification for HFC Blend B (CH₂FCF₃, CHF₂CF₃, and CO₂)

2.2 *CGA Standards:*³

C-1 Methods for Pressure Testing Compressed Gas Cylinders

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

C-7 Guide to Classification and Labeling of Compressed Gases

P-1 Standard for Safe Handling of Compressed Gases in Containers

2.3 *U.S. Government Standards:*⁴

49 CFR Part 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans

49 CFR Part 172.101 Purpose and Use of Hazardous Materials Table

49 CFR Part 173 Shippers—General Requirements for Shipments and Packagings

49 CFR Part 178 Specifications for Packagings

49 CFR Part 180 Continuing Qualification and Maintenance of Packagings

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *containers, n*—storage vessels for HFC Blend B.

3.1.2 *cylinders, n*—containers of HFC Blend B.

3.1.3 *HFC Blend B, n*—tertiary blend comprised of HFC-134a (1,1,1,2-tetrafluoroethane), HFC-125 (pentafluoroethane), and carbon dioxide (CO₂); a compound used to inert, extinguish, or suppress a fire or explosion hazard.

3.1.4 *insulated, adj*—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 Blend B encountered in distribution through both commercial and military channels. It is intended to ensure that HFC Blend B is handled, transported, and stored in such a way that its physical property virtues are not degraded. Transport may be by various means, such as, but not limited to, highway, rail, water, and air.

⁴ Code of Federal Regulations (CFR) documents are available from U.S. Government Publishing Office (GPO), 732 N. Capitol Street, NW, Washington, DC 20401, <http://www.gpo.gov>.

¹ 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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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from Compressed Gas Association (CGA), 8484 Westpark Dr., Suite 220, McLean, VA 22102, <http://www.cganet.com>.

5. Practice

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

5.2 Handling:

5.2.1 Handling shall be in accordance with CGA Publication P-1.

5.2.1.1 Personnel who handle or store, or both, cylinders of HFC Blend B shall be trained properly to recognize and identify the characteristics of the product and the proper methods of safely handling full, partially full, and empty cylinders.

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

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

5.2.3 To preclude product accumulation and decomposition, HFC Blend B handling shall be performed in ventilated areas that are nonsmoking and free of portable heaters. Provisions shall be made to ensure that service areas limit HFC Blend B concentrations do not exceed 75 000 ppm (7.5 %) by volume for 1 min and 100 ppm by volume for a time-weighted exposure of 8 h.

5.2.4 Cylinders shall not be overfilled. The liquid portion of the HFC Blend B must not completely fill the container's internal volume at any temperature up to and including 130 °F (54 °C). The maximum permitted filling density for HFC Blend

B shall be 58 lb/ft³ (930 kg/m³). Filling density requirements are specified in 49 CFR Part 173.304 and 49 CFR Part 173.305.

5.2.5 Handling of materials should be done in a manner that prevents contamination or comingling of materials other than HFC Blend B.

5.3 Transportation:

5.3.1 Transportation shall be as specified in accordance with Department of Transportation (DOT) regulations of 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.

5.3.1.2 The minimum design pressure requirements shall be as indicated in 49 CFR Part 173.304. The pressure inside the container at 70 °F (21 °C) shall not exceed the service pressure for which the container is marked. The pressure inside the container at 130 °F (54 °C) shall not exceed 5/4 times the service pressure for which the container is marked. Fig. 1 and Fig. 2 illustrate the effect of temperature on a typical storage cylinder filled with HFC Blend B. Extinguisher filters filled with HFC Blend B may be under additional nitrogen pressurization and isometric diagrams for these conditions are provided in Figs. 3-6.

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

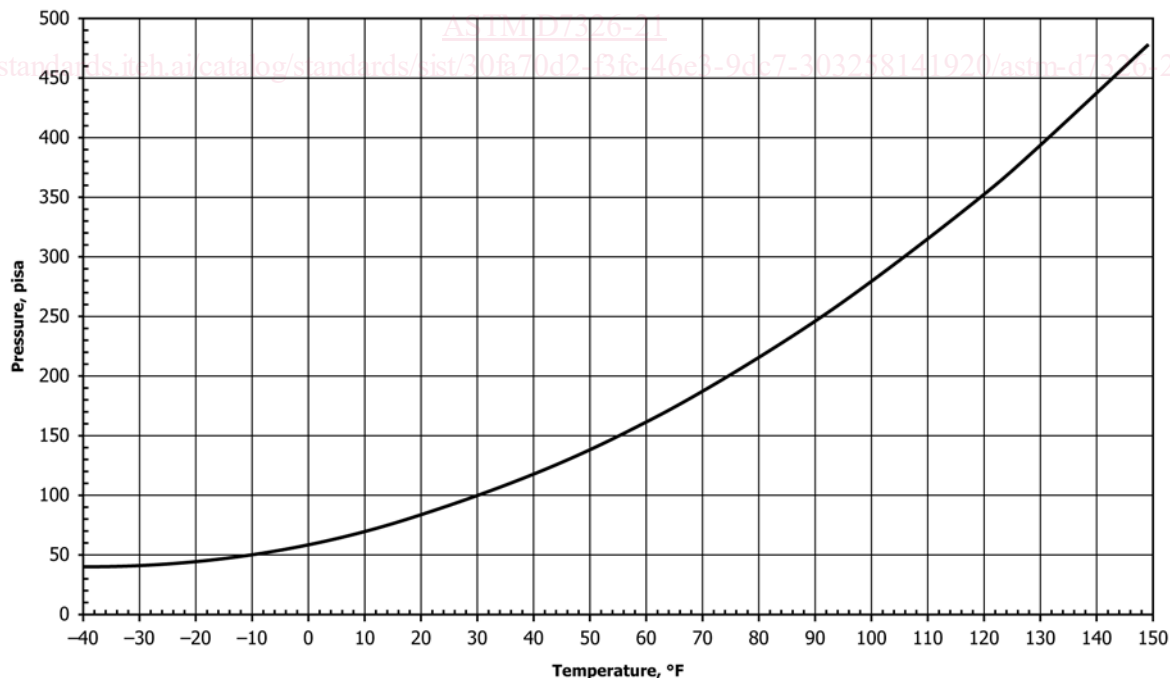


FIG. 1 Saturated Vapor Pressure of HFC Blend B—English Units

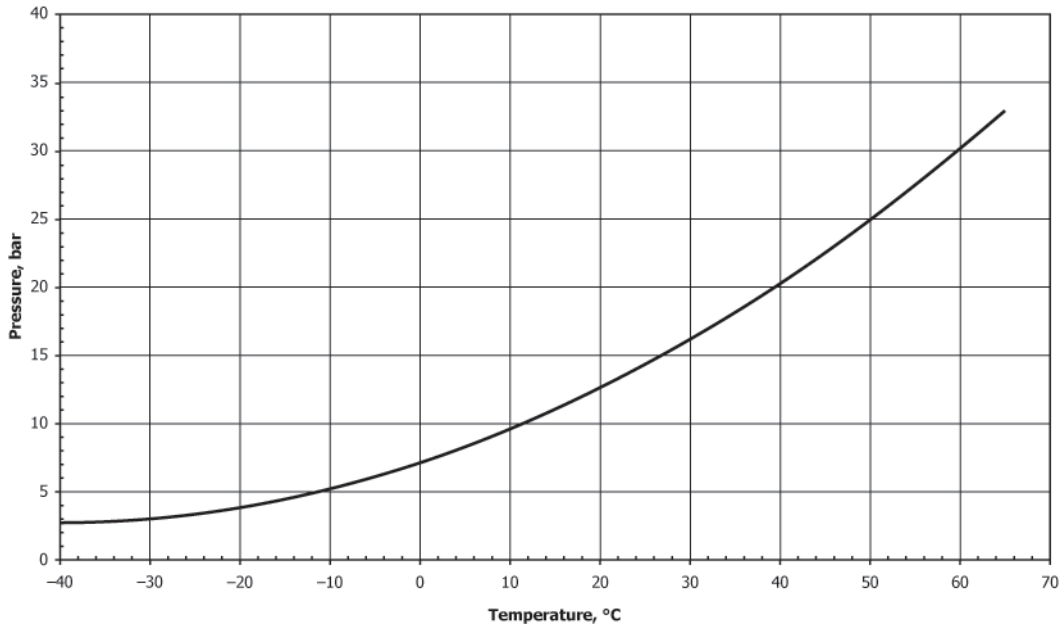


FIG. 2 Saturated Vapor Pressure of HFC Blend B-SI Units

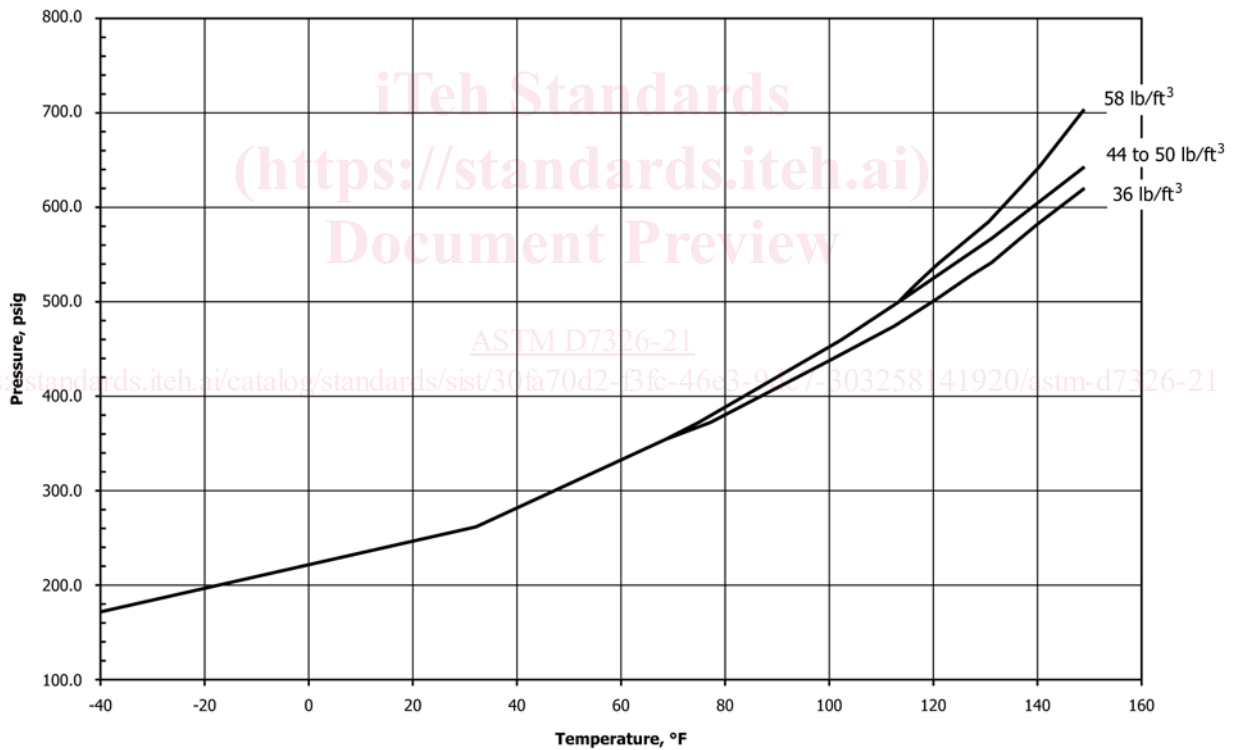


FIG. 3 Isometric Diagram of HFC Blend B Pressurized with Nitrogen to 360 psig at 70 °F-English Units

5.3.2.1 If cylinders are 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 49 CFR Part 178 and must be maintained in legible condition as required by 49 CFR Part 173.

5.4 Storage:

5.4.1 Storage shall be in accordance with CGA Publication P-1 in qualified cylinders in accordance with 49 CFR Parts 173 and 178.

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

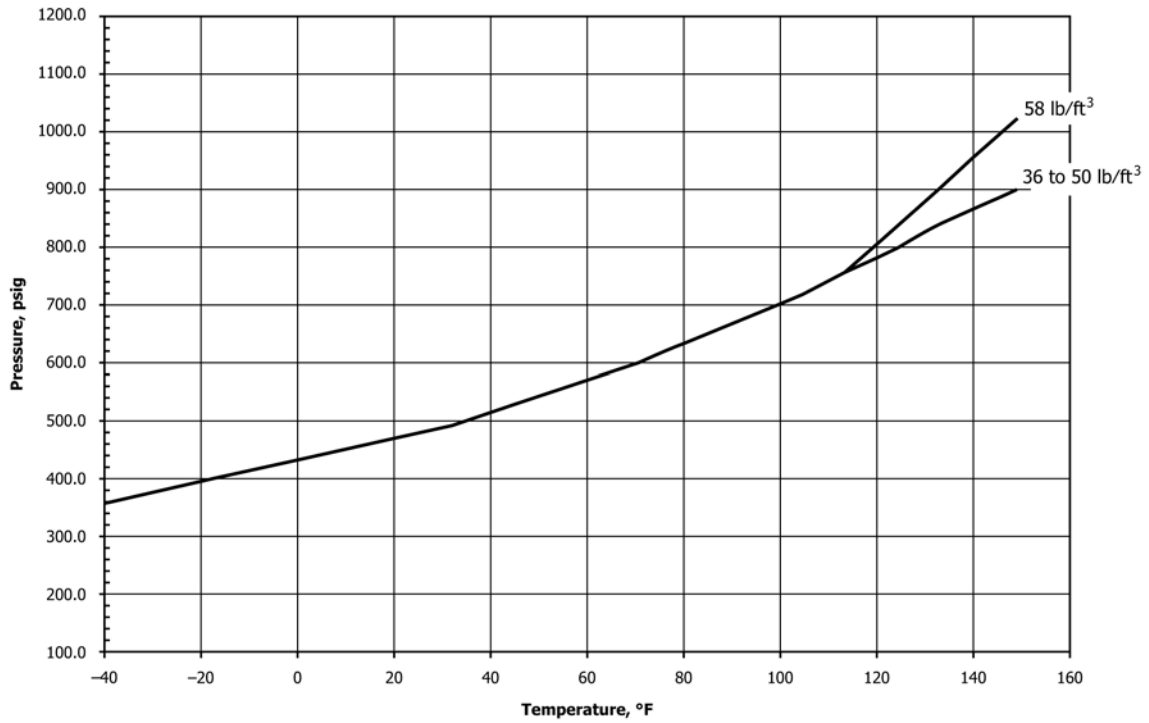


FIG. 4 Isometric Diagram of HFC Blend B Pressurized with Nitrogen to 600 psig at 70 °F—English Units

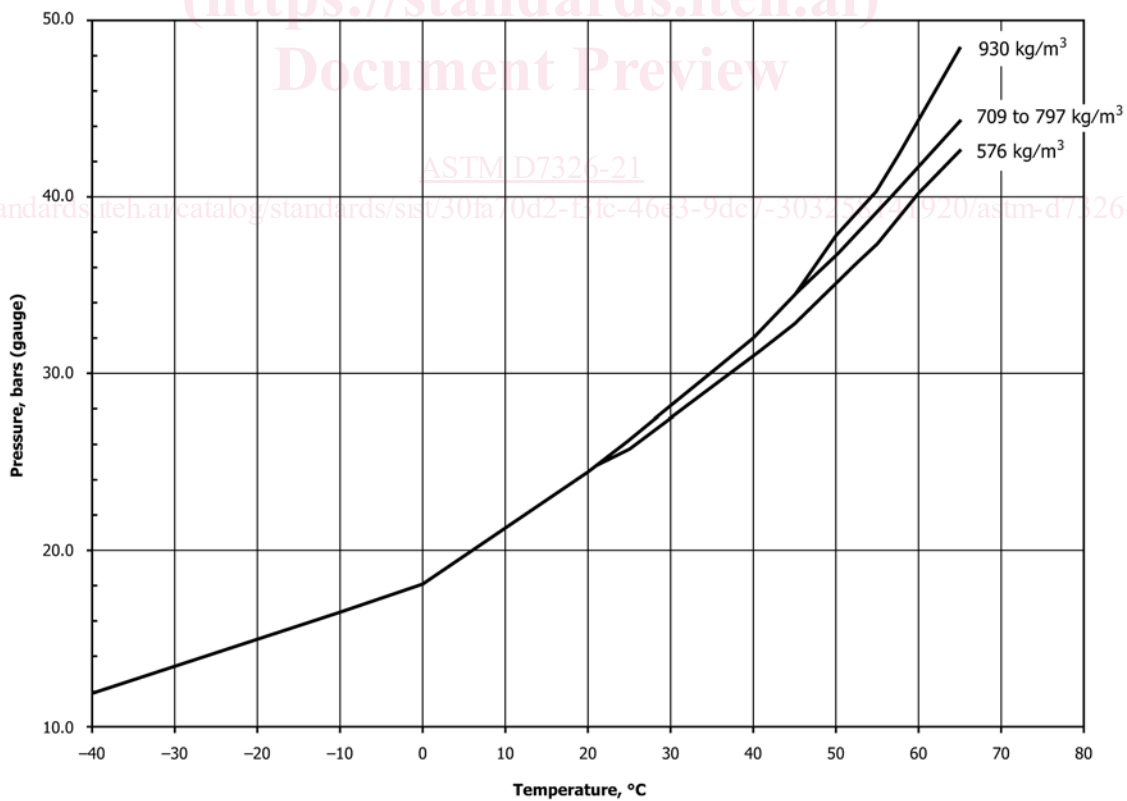


FIG. 5 Isometric Diagram of HFC Blend B Pressurized with Nitrogen to 25 bar at 21 °C—SI Units