Designation: D7327 – 17

Standard Specification for HFC Blend B (CH_2FCF_3, CHF_2CF_3, and CO_2)[1]

This standard is issued under the fixed designation D7327; 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 specification covers requirements for HFC Blend B as a fire-fighting medium.

1.2 This specification does not address the fire-fighting equipment or hardware that employs HFC Blend B or the conditions of employing such equipment (for example, handhelds, fixed installations, etc.).

1.3 This specification does not address the storage or transportation of HFC Blend B. Storage, handling, and transportation issues are addressed in Practice D7326.

1.4 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

1.5 *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.* Specific cautionary statements are given in Section 4.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D7326 Practice for Handling, Transportation, and Storage of HFC Blend B (CH_2FCF_3, CHF_2 CF_3, and CO_2)

D6806 Practice for Analysis of Halogenated Organic Solvents and Their Admixtures by Gas Chromatography

2.2 *ISO Standard:*[3]

ISO 3427 Gaseous Halogenated Hydrocarbons (Liquefied Gases)–Taking of a Sample

2.3 *ASHRAE Standard:*[4]

ASHRAE 34 Designation and Safety Classification of Refrigerants

2.4 *U.S. Government Standards:*[5]

CFR Title 49, Part 172, Subpart D, U.S. Department of Transportation (DOT), Marking Requirements of Packaging for Transportation

CFR Title 49, Part 172.101 Tables of Hazardous Materials and Special Provisions

2.5 *AHRI Standard:*[6]

2008 Appendix C for Analytical Procedures for AHRI Standard 700-2014

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *HFC*—hydrofluorocarbon; a chemical compound in which the compound molecule is comprised exclusively of hydrogen, chlorine, fluorine and carbon atoms.

3.1.2 *HFC Blend B*—tertiary blend comprised of HFC-134a (1,1,1,2-tetrafluoroethane), HFC-125 (pentafluoroethane), and carbon dioxide (CO_2); a compound used to inert, extinguish, or suppress a fire or explosion hazard.

3.1.2.1 *Discussion*—The terminology system for fluorine-containing compounds (described in detail in ASHRAE Standard 34) provides a convenient means to reference the structure of individual compounds. By definition, the first digit of the numbering system represents one less than the number of carbon atoms in the compound molecule; the second digit, one more than the number of hydrogen atoms in the compound molecule; and the third digit, the number of fluorine atoms in the compound molecule. Unaccounted for valence requirements are assumed to be chlorine atoms. For example, the designation HFC-123 indicates two carbon atoms (1 + 1), two hydrogen atoms (3-1), and four fluorine atoms (4). The "a" designation at the end of the naming convention relates to the

[1] This specification 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.

Current edition approved Feb. 1, 2017. Published February 2017. Originally approved in 2007. Last previous edition approved in 2012 as D7327-12. DOI: 10.1520/D7327-17.

[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 American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, http://www.ashrae.org.

[5] Available from U.S. Government Publishing Office (GPO), 732 N. Capitol Street, NW, Washington, DC 20401-0001, http://www.gpo.gov.

[6] Available from Air-Conditioning, Heating, and Refrigeration Institute (AHRI), 2111 Wilson Blvd., Suite 500, Arlington, VA 22201, http://www.ahrinet.org.

symmetry of the molecule.
Example: CH_2FCF_3 = HFC-134a

4. Material Requirements

4.1 *Type I Mixtures of HFC Blend B and Nitrogen:*

4.1.1 The nitrogen (N_2) partial pressure shall be such that the safe working pressure of the receiving vessel is not exceeded. To prevent excessive pressure, the fill density of HFC Blend B within a container should not exceed that needed to achieve complete filling of the container at the maximum envisaged storage temperature. For example, for the U.S. DOT 4BA500 cylinder, the nitrogen partial pressure shall not exceed 316 psig at 70 °F (21.8 bar at 21 °C) for a 58 lb/ft^3 (930 kg/m^3) fill density (yielding a total pressure of 360 psig at 70 °F (25.8 bar at 21 °C). For this example, the safe working pressure of the 4BA500 cylinder is not exceeded for temperatures below 130 °F (54 °C).

4.1.2 HFC Blend B shall conform to the requirements prescribed in Table 1 when tested by appropriate test methods, such as those listed in Section 6.

4.1.3 When a material analysis is required, by agreement between the purchaser and the supplier, the total pressure in the HFC Blend B container, partial pressure of the N_2, the fill density of HFC Blend B within the container, and the maximum safe storage temperature shall be part of the material analysis (certification). The pressure shall be reported in pound-force per square inch gage (preferred) or bar. The fill density shall be reported in pounds per cubic foot at 70 °F (preferred) or kilograms per cubic meter at 21 °C. The maximum safe storage temperature of the HFC Blend B container shall be reported in degrees Fahrenheit (preferred) or in degrees Celsius and shall conform to applicable regulations for the HFC Blend B container design and use.

4.2 *Type II, HFC Blend B* shall conform to the requirements of Type I, as listed in 4.1, and shall contain no more than 1.5 % by volume non-absorbable non-condensable gases in vapor phase, expressed as air when tested by the appropriate test method(s) listed in Section 6.

4.3 By agreement between the purchaser and the supplier, analysis may be required and limits established for elements or compounds not specified in Table 1.

4.4 Unless otherwise specified, Type II is assumed.

TABLE 1 Requirements

Property	Requirement
Purity	99 %, mol/mol, min (exclusive of any N_2 present)
HFC-134a Content	86 ± 5 %, mol/mol
HFC-125 Content	9 ± 3 %, mol/mol
CO_2 Content	5 ± 2 %, mol/mol
Acidity	1.0 ppm by mass, as HCL, max
Water content	20 ppm by mass, max
Nonvolatile residue	0.01 % by weight, max
Suspended matter or sediment	none visible

4.5 **Warning—**Prolonged exposure to concentrations of HFC Blend B in excess of 7.5 % by volume in air during periods of elevated adrenaline could produce cardiac arrhythmia in some personnel.

5. Sampling

5.1 Samples of HFC Blend B, taken from the liquid phase, shall be taken from filled containers in accordance with the method specified in ISO 3427. The sampling cylinder shall be capable of safely resisting the vapor pressure of the sample at the highest temperature that could be encountered.

5.2 The HFC Blend B selected in accordance with 5.1 shall be tested for quality conformance in accordance with Table 1. The presence of one or more defects shall be cause for rejection.

6. Test Methods

6.1 *Purity*—Conduct the analysis in accordance with Practice D6806.

6.2 *Acidity*—Conduct the analysis in accordance with the method specified in 2008 Appendix C to AHRI Standard 700-2014, Part 1.

6.3 *Water Content*—Conduct the analysis in accordance with the method specified in 2008 Appendix C to AHRI Standard 700-2014, Part 2.

6.4 *Nonvolatile Residue*—Conduct the analysis in accordance with the method specified in 2008 Appendix C to AHRI Standard 700-2014, Part 3.

6.5 *Suspended Matter or Sediment*—While performing the nonvolatile residue analysis, examine visually for any suspended matter or sediment. Observation of any suspended matter or sediment shall constitute failure of the test.

7. Container, Packaging, and Package Marking

7.1 Containers used for shipping and storage of HFC Blend B conforming to this specification shall be marked in accordance with Code of Federal Regulations (CFR) Title 49, Part 172, Subpart D. The proper shipping name is "UN3163, Liquefied Gas, N.O.S., 2.2 (contains 1,1,1,2-Tetrafluorethane, Pentafluoroethane, Carbon Dioxide)." In addition to DOT requirements, containers should be marked with the following information as a minimum:

7.1.1 Supplier's name and address,

7.1.2 HFC Blend B, and

7.1.3 Statement that material conforms to Specification D7327.

8. Keywords

8.1 1,1,1,2-tetrafluoroethane; carbon dioxide; CF_3CF_2H; CF_3CFH_2; CO_2; HFC-134a; HFC Blend B; fire extinguishant; fire suppressant; Halotron[7] II; pentafluoroethane

[7] Halotron is a registered trademark of American Pacific Corporation.