Designation: ~~D7815 – 17~~ D7815 – 21

Standard Practice for Handling, Transportation, and Storage of Halon 1211, Bromochlorodifluoromethane (CF_2BrCl)[1]

This standard is issued under the fixed designation D7815; 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, recyclers, reclaimers, purchasers, and users in the handling, transportation, and storage of Halon 1211.

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~~ safety, health, and ~~health~~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 Standards:*[2]

D7673/D7673M Specification for Halon 1211, Bromochlorodifluoromethane (CF_2BrCl)

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

~~SB-1 Safety Bulletin: Hazards of Refilling or Reusing Compressed Refrigerant (Halogenated Hydrocarbon) Gas Cylinders~~

~~SB-5 Safety Bulletin: Hazards of Reusing Disposable Refrigerant (Halogenated Hydrocarbon) Gas Cylinders~~

~~SB-18 Safety Bulletin: Use of Refrigerant (Halogenated Hydrocarbon) Recovery Cylinders~~

2.3 *U.S. Government Standards:*[4]

40 CFR ~~Title 40,~~ Part 82.106 ~~Environmental Protection Agency,~~ Warning Statement Requirements

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[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), ~~14501 George Carter Way, Suite 103, Chantilly, VA 20151, http://www.cganet.com.~~8484 Westpark Drive, Suite 220, McLean, VA 22102, https://www.cganet.com.

[4] ~~Available~~ Code of Federal Regulations (CFR) documents are available from U.S. Government Publishing Office (GPO), 732 N. Capitol Street, NW, Washington, DC ~~20401-0001,~~20401, http://www.gpo.gov.

49 CFR ~~Title 49,~~ Part 172 ~~U.S. DOT,~~ Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, ~~and Training Requirements~~Training Requirements, and Security Plans
49 CFR Part 172.101 Purpose and Use of Hazard Materials Table
49 CFR ~~Title 49,~~ Part 173 ~~U.S. DOT, Specifications, Shippers-General~~ Shippers—General Requirements for ~~Shipping~~Shipments and Packagings
49 CFR ~~Title 49,~~ Part 178 ~~U.S. DOT~~ Specifications for Packagings
49 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—*~~*containers, n—*storage vessel for Halon 1211.

3.1.2 ~~*cylinders—*~~*cylinders, n—*containers of Halon 1211.

3.1.3 *Halon ~~1211—~~1211, n—*bromochlorodifluoromethane; a compound used to suppress a fire.

3.1.4 ~~*insulated—*~~*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 Halon 1211 encountered in distribution through both commercial and military channels. It is intended to ensure that Halon 1211 is handled, transported, and stored in such a way that 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 To ensure safe handling, loading, storing, and transporting of material, personnel shall be trained in the CGA publications, CFR regulations, and other documents, as listed in 2.2 and 2.3, respectively.

5.2 *Handling:*

5.2.1 Handling shall be in accordance with CGA Publication ~~P-1~~P-1 and ~~Standard for 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 Halon 1211 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 Halon transfers between storage containers and recycling processes shall be performed by personnel trained in handling procedures.

5.2.3 Halon 1211 recycling and transfer processes shall be in conjunction with the equipment requirements specified by the manufacturer.

5.2.4 Halon 1211 handling shall be in nonsmoking, heater-free, ventilated areas to preclude product accumulation. Provisions shall be made to ensure that service areas limit Halon 1211 concentrations to not exceed 1 % by volume for 1 min and 0.01 % by volume for a time weighted exposure of 8 h.

5.2.5 Cylinders shall not be ~~over filled.~~ overfilled. The liquid portion of the liquefied gas shall not completely fill the container's internal volume and the pressure shall not exceed ~~five fourths~~ five-fourths the service pressure of the container at any temperature up to and including 130 °F (54 °C). To prevent excessive pressure in accordance with Specification D7673/D7673M, the fill density of Type 1 product within a container should not exceed that needed to achieve complete filling of the container at the maximum envisaged storage temperature. For example, for a U.S. ~~DOT~~ Department of Transportation (DOT) 4BW260 cylinder, the nitrogen partial pressure shall not exceed 129 psig at 70 °F (9.9 bar at 21 °C) for a 100 lb/ft^3 (1602 kg/m^3) fill density, which yields a total pressure of 150 psig at 70 °F (11.4 bar at 21 °C). For this example, the safe working pressure of the 4BW260 cylinder is not exceeded for temperatures below 131 °F (55 °C). Filling density requirements for Type II product (pure specification) are specified in 49 CFR ~~Title 49,~~ Part 173.304 and 49 CFR ~~Title 49,~~ Part 173.305. (See Figs. 1 and 2.)

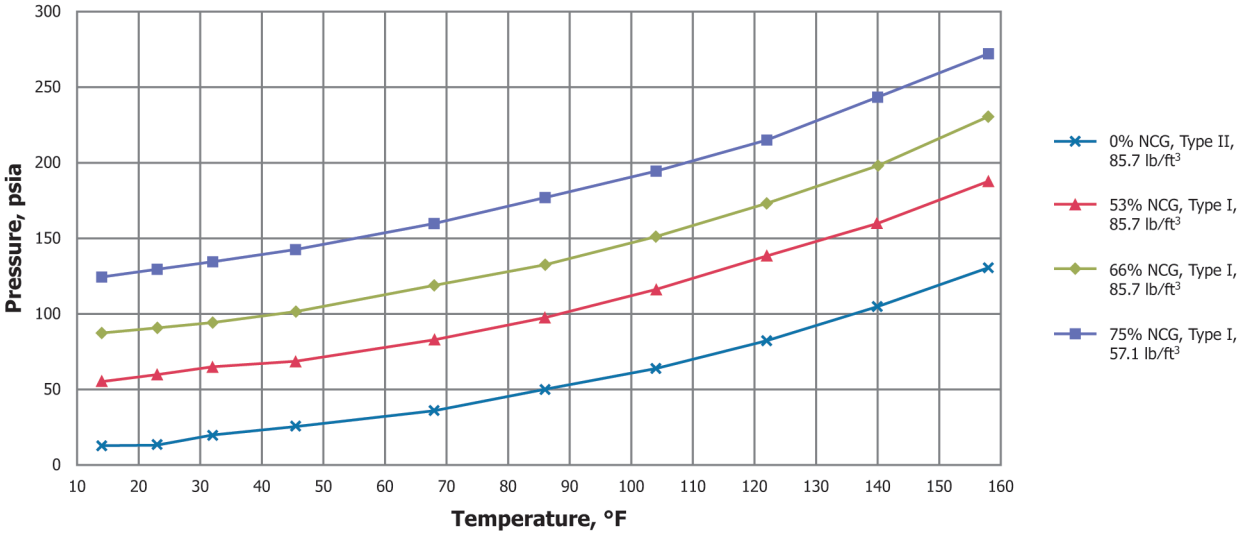

FIG. 1 Halon 1211 Pressure versus Temperature, English Units

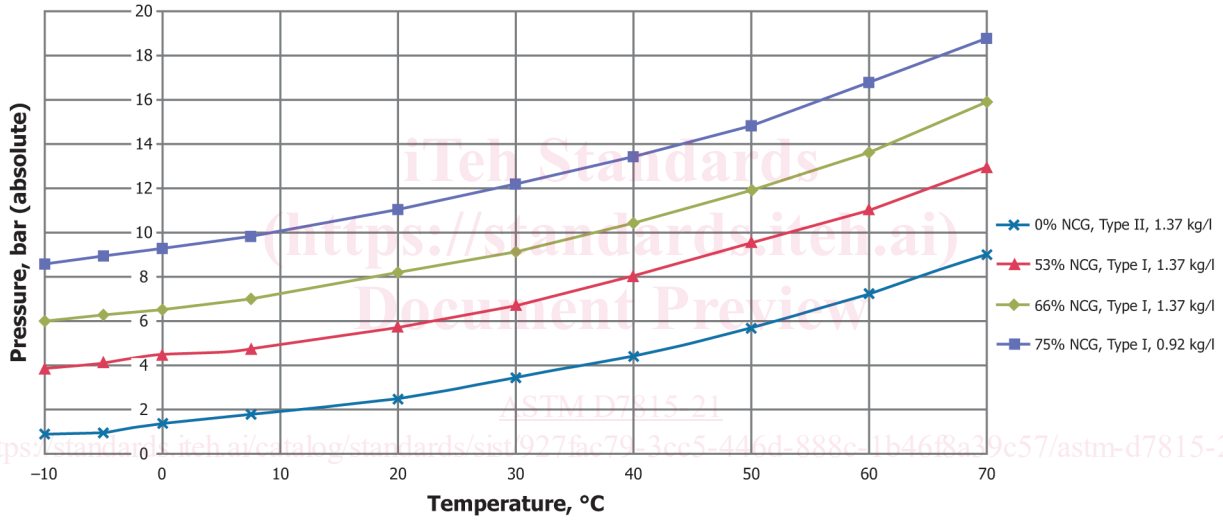

FIG. 2 Halon 1211 Pressure versus Temperature, SI Units

5.2.6 Handling of materials should be done in a manner that prevents contamination or commingling of materials other than Halon 1211.

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 ~~CFR Title 49.~~49 CFR.

5.3.1.1 Shipment of materials between distributors, collectors, recyclers, and reclaimers should be within approved DOT guidelines for Class 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 stated in 49 CFR ~~Title 49,~~ 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 five fourths the service pressure for which the container is marked. Figs. 1 and 2 illustrate the effect of temperature on cylinders filled with mixtures of Halon 1211 and nitrogen.

5.3.2 Where possible, transportation shall be by 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 If cylinders are likely 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 in accordance with 49 CFR ~~Title 49,~~ Part 178 and must be maintained in legible condition as required by 49 CFR ~~Title 49,~~ Part 173. Warning labels conforming to the requirements of 40 CFR ~~Title 40,~~ Part 82.106 shall be affixed to the cylinders.

5.3.4 Containers used for shipping of Halon 1211 conforming to Specification D7673/D7673M shall be marked in accordance with 49 CFR ~~Title 49,~~ Part 172, Subpart ~~D "Marking."~~D, Marking. The proper shipping name for Specification D7673/D7673M Type II (pure) Halon 1211 is "Chlorodifluorobromomethane or Refrigerant Gas R12B1 (do not list both)," UN 1974, Hazard Class 2.2 (nonflammable gas). The proper shipping name for nitrogen superpressurized Halon 1211 is "Liquefied Gas, nonflammable charged with nitrogen," UN1058, Hazard Class 2.2 (nonflammable gas).

5.4 *Storage:*

5.4.1 Storage shall be in accordance with CGA Publication ~~P-1~~P-1 in ~~Standard for Safe Handling of Compressed Gases in Containers, in~~ qualified cylinders in accordance with 49 CFR ~~Title 49,~~ 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.

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 containers shall be fitted with pressure-relief mechanisms to limit vessel pressure to not more than the minimum required test pressure of the cylinder. Safety relief valves shall be set at no less than 75 %, nor more than 100 %, of the minimum required test pressure of the cylinder. Safety relief 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 Halon 1211 shall comply with 49 CFR ~~Title 49,~~ Part 180.

5.4.4 Containers used for storage of Halon 1211 conforming to Specification D7673/D7673M shall be marked in accordance with 49 CFR ~~Title 49,~~ Part 172, Subpart ~~D "Marking,"~~D, Marking, and shall be clearly marked and labeled to identify whether the Halon 1211 contained conforms to either Type I or Type II of Specification D7673/D7673M. The proper storage name for Specification D7673/D7673M Type II (pure) Halon 1211 is "Chlorodifluorobromomethane or Refrigerant Gas R12B1 (do not list both)," UN 1974, Hazard Class 2.2 (nonflammable gas). The proper storage name for nitrogen superpressurized Halon 1211 is "Liquefied Gas, nonflammable charged with nitrogen," UN1058, Hazard Class 2.2 (nonflammable gas).

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 Halon 1211 in accordance with Specification D7673/D7673M is stored in the same area as material not in accordance with Specification D7673/D7673M, storage shall be segregated or clearly identifiable as not being similar.

5.5 *Extreme Elevated Temperature Considerations*—When Type I or Type II mixtures of Halon 1211 and nitrogen may be exposed to constant temperatures at or greater than 131 °F (55 °C) during transportation or storage, higher container pressures will be encountered that require alternative fill in the container to that specified in 5.2.5. A maximum non-condensable gas content of 1.5 % is recommended for long-term storage of Type II Halon 1211. Pressure versus temperature diagrams for Halon 1211 conforming to Specification D7673/D7673M are shown in Figs. 1 and 2.