Joint Service

REGULATION

Defense Logistics Agency (DLA)
Department of the Army
Department of the Navy
United States Marine Corps

DLAR (JP) 4145.25
AR 700-68
OPNAVINST 4440.27
MCO 10330.2D
JUL 17,2018
Incorporating Change 1, Sept 16,2019
DLA Logistics Operations (J3)

SUBJECT: Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders.

REFERENCES: See Enclosure 1.

1. PURPOSE:

a. Sanctioned by Reference (a):

(1) Establishes policy directed by the DoDM 4140.01, Volume 5, Defense Materiel Management Regulation.

(2) Reissues Reference (b).

b. Replaces and cancels DLAI 1513, "Storage and Handling of Compressed Gases and Cylinders."

c. Establishes uniform procedures for the procurement, storage, and handling of compressed gases and cylinders. It serves as a source of technical guidance and direction in the storage and handling of compressed gas cylinders and their contents.

d. Establishes and imposes policies, processes, and procedures necessary to achieve effective, efficient, and economical conduct of official business about the storage and handling of compressed gases and cylinders.

e. Improves safety, workforce confidence, and compliance with legal requirements about storage and handling of compressed gases and cylinders. The focus conducted during hazardous materials processing is ensuring distribution operations are efficient, effective, safe, compliant, and satisfy customer orders for items at the right price, and right time.

f. Several compressed gases used in commercial industry are not discussed in this document.

2. APPLICABILITY:

a. The issuance applies to the DOD components. Where there is conflict between the rules of this Issuance, Federal Laws, the host nation, or Status of Forces Agreements used by the Services, the stricter requirement must apply.

b. DOD worldwide locations that receive, store, issue, use, keep, recondition, and perform associated services on the compressed gases and their cylinders.

3. DEFINITIONS: See Glossary.

4. POLICY:

a. It is DOD policy to establish procedures governing the identification, acquisition, distribution, and disposal of compressed gases in full and empty cylinders and provide the guidance required to ensure a safe workplace when handling compressed gases and cylinders.

b. Protect DOD personnel from accidental death, injury, or occupational illness, under Reference (c).

5. RESPONSIBILITIES: See Enclosure 2.

6. PROCEDURES: See Enclosure 3.

7. INFORMATION REQUIREMENTS: None.

8. INTERNAL CONTROLS: Internal control will be by compliance reviews and annual audit readiness requirements.

9. RELEASEABILITY: UNLIMITED. This regulation is approved for public release. It is available on the internal DLA Issuance Website at (https://issuances.dla.mil/pages/default.aspx).

10. EXPIRATION DATE: This Regulation will be reissued or canceled by the fifth anniversary of its publication date. If not, it will automatically expire effective September 16, 2029.

BY ORDER OF THE DLA DIRECTOR

OPATZ.DAVID.JOHN.1137860356 Digitally signed by OPATZ.DAVID.JOHN.1137860356 Date: 2019.09.19 09:06:36 -04'00'

For: WILLIAM M. BOWERS

Director, DLA Transformation

Chief, United States Air Force

Chief, United States Army

Chief, United States Marine Corps

Chief of Naval Operations

Enclosures:

Enclosure 1- Reference
Enclosure 2- Responsibilities
Enclosure 3- Procedures
Enclosure 4- Characteristics of Gases
Enclosure 5- Characteristics of Cylinders
Enclosure 6- Inspection of Cylinders
Enclosure 7- Safe Use, Storage, and Handling
Enclosure 8- Maintenance of Cylinders
Enclosure 9- Disposal of Compressed Gases or Liquids in Cylinders
Enclosure 10- Disposal of Compressed Gas Cylinders
Enclosure 11- Classification of Cylinders in Supply Condition Codes
Enclosure 12- Reporting Receipts or Inventory Adjustments
Enclosure 13- Compressed Gas Cylinder Requalification Facilities
Enclosure 14- Managing the Defense Reserve of Ozone Depleting Substances
Glossary

ENCLOSURE 1

REFERENCES

(a) DoDM 4140.01, Volume 5, "DOD Supply Chain Material Management Procedures Delivery of Material," February 10, 2014
(b) DLA Instruction 4145.25/AR 700-68/NAVSUPINST 4440.128D/AFJMAN 23-227(I)/MCO 10330.2D, "Storage and Handling of Liquefied and Gaseous Compressed Gasses and Their Full and Empty Cylinders," June 16, 2000
(c) DOD Directive 4715.1E, "Environment, Safety, and Occupational Health (ESOH)," March 19, 2005
(d) DOD 4160.21M, "Defense Material Disposition Manual," October 22, 2015
(e) DLM 4000.25-2, "Military Standard Transaction Reporting and Accountability Procedures (MILSTRAP)," June 13, 2012
(f) MIL-STD-1411B, "Inspection and Maintenance of Compressed Gas Cylinders," June 8, 2010
(g) Title 49 Code of Federal Regulations (CFR), "Transportation," February 11, 2016[1]
(h) MIL-STD 101, "DOD Standard Practice Color Code for Pipelines and for Compressed Gas Cylinders," August 26, 2014
(i) Title 40 Code of Federal regulations (CFR)[2]
(j) National Fire Protection Agency (NFPA) 30, "Flammable and Combustible Liquids Code"
(k) Compressed Gas Association, (CGA), C-6, "Standards for Visual Inspection of Steel Compressed Gas Cylinders," 1993[3]
(l) Title 29, Code of Federal Regulations (CFR), "Labor," February 28, 2014[4]
(m) AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAI 4145.3, "Preparing Hazardous Materials for Military Air Shipments," 2014
(n) OPNAVINST 5100.23G (Change 1), "Navy Safety and Occupational Health," July 21, 2011
(o) Air Force Occupational Safety and Health (AFOSH) STD 48-137, AFI 48-137, "Respiratory Protection Program," July 15, 2014
(p) TB Med 502/DLAM 1000.2, "Occupational and Environmental Health Respiratory Protection Program"
(q) MIL-STD-129R, "Military Marking for Shipment and Storage"
(r) Air Force/Navy Joint TO 42B-1-2(NAVAIR 06-20-2) "Gas Cylinders (Storage Type), Use Handling, and Maintenance"

[1] Title 49 Code of Federal regulation (CFR), Transportation, http://www.ecfr.gov/cgi-bin/text-idx?SID=1d49a3b137cb1b6fc45251074e634b44&tpl=/ecfrbrowse/Title49/49tab_02.tpl
[2] Title 40 CFR, Protection of Environment, http://www.ecfr.gov/cgi-bin/txt-idx?SID=59f388bc81aa919ba235eefa46cb99dd&mc=true&tpl=/ecfrbrowse/Title40/40tab_02.tpl
[3] Compressed Gas Association (CGA), https://www.cganet.com/customer/Publication.aspx
[4] Title 29, CFR, Labor, http://ecfr.gov/cgi-bin/text-idx?SID=59f388bc81aa919ba235eefa46cb99dd&mc=true&tpl=/ecfrbrowse/Title29/29tab_02.tpl

ENCLOSURE 2

RESPONSIBILITIES

1. DIRECTOR, DEFENSE LOGISTICS AGENCY (DLA), by the authority, direction, and control of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)), through the Assistant Secretary of Defense for Logistics and Material Readiness (ASD (L&MR)), must:

a. Supervise and oversee:

(1) Identification, certification, storage, handling, and general management of compressed gases (liquefied and non-liquefied) in cylinders.

(2) Hydrostatic testing and reconditioning of U. S. Government-owned cylinders at locations throughout the world.

b. Keep this document current, and reissue policy if necessary to maintain an effective storage and handling program of compressed gases in cylinders and ensure compliance with International, Federal, State, and local laws.

2. SECRETARIES OF THE MILITARY DEPARTMENTS AND AGENCIES must:

a. Ensure compliance with this regulation and its enclosures.

b. Ensure a quality control program is established for compressed gases and gas cylinders procured or managed by the Service department, conduct inspections and maintain inspection records.

c. Ensure compliance with reference (c) to promote an environmental and safety program.

d. Provide quality control and related technical updates to DLA, as needed to ensure requirements herein are current.

e. Ensure all personnel who use, handle, maintain, recondition, or store compressed gases (liquefied and non-liquified) contained in cylinders are properly trained and comply with this joint regulation and its enclosures.

3. COMMANDERS OF DLA SUPPLY CENTERS, DLA DISTRIBUTION, and DOD STORAGE AND USING ACTIVITIES must:

a. Ensure to incorporate quality standards in procurements of compressed gases and gas cylinders and properly managed.

b. Provide guidance as needed to all DOD activities that: Use, handle, maintain, retest, recondition, or store, compressed gases to keep a satisfactory and constant safety and quality control program.

c. Annually, review the quality control and related technical contents of this Regulation and its Enclosures, and in collaboration with HQ DLA, keep the correct principle parts current.

d. Assign condition codes to on-hand cylinders, and report to the managing activity IAW with the requirements of this Regulation and its enclosures.

e. Ensure the quality control program is established for the compressed gases and gas cylinders procured or managed, conduct inspections, and maintain inspection records.

f. Assure the use of Government-owned cylinders, for the procurement of all compressed gases when an approved dedicated Government-owned cylinder can be identified and made available.

g. Develop and keep accountability for all commercially owned cylinders used to supply compressed gases from local distributors using their ownership symbols and serial numbers.

h. Report to the managing activity all cylinders stored or used by the National Stock Number (NSN) to include the Department of Transportation (DOT) Spec (3AA), Service pressure (2265), Capacity (252 CF), Dimensions (9 by 51 inches), and Product (oxygen). Also, report the appropriate Condition Code for all excess Government-owned industrial compressed gas cylinders to DLA Aviation, all excess Government-owned medical compressed gas cylinders to DLA Troop Support, and all Government-owned Aerospace Energy compressed gas cylinders to DLA Energy, for disposition instructions.

i. Identify and return all contractor-owned, leased, or rented cylinders to their rightful owners and ensure they are not reported to a DLA Center as excess.

j. Request disposition instructions from the proper managing activity when a cylinder cannot be identified to a valid NSN or its ownership cannot be determined.

4. DIRECTOR, DLA DISPOSITION SERVICES must:

a. Receive serviceable, unserviceable and condemned, compressed gas cylinders from authorized activities IAW Reference (d), and enclosure 10 of this Regulation.

b. Keep all fully serviceable cylinders (Supply Condition Code A) in a safe and usable condition.

c. Dispose of serviceable, unserviceable, and condemned compressed gas cylinders IAW Reference (d).

ENCLOSURE 3

PROCEDURES

1. Compressed Gases used by DOD Activities. Manufacturing and quality requirements for each gas product are provided in Military, Federal, and commercial specifications.

a. All DOD activities located in the Continental United States (CONUS) are required to procure their gas products from commercial sources.

b. Each contractor is to provide the desired gas product and the necessary services to retest and recondition the applicable cylinders to ensure they remain in safe and serviceable condition.

c. Overseas military requirements must first be satisfied from CONUS depots or suppliers, unless urgent requirement is needed, the host country commercial suppliers may satisfy the requirement.

2. Verification. The product quality is conducted at the site of manufacture or at the product distributor's warehouse. The supplier's personnel under the surveillance of a Government representative perform necessary testing, or records of the examination and tests are maintained by the supplier and made available to the Government upon request. Inspection and/or supplier verification testing is conducted under the surveillance of a Government Quality Assurance Representative (QAR). The quality of the gas product contained under pressure in a compressed gas cylinder will not change under normal storage and handling conditions. However, the condition of the cylinder may decline and make the cylinder unsafe for further use (See Enclosures 6 and 7).

3. Procurement of Compressed Gases in Cylinders. Gas cylinders procured for the storage and shipment of compressed gas products for DOD activities are procured IAW with Military, Federal, UN/EU/ISO, and or commercial specifications. These specifications supplement DOT manufacturing requirements with the necessary military design and marking requirements.

a. The key mechanism for implementing this requirement is the acquisition process and its' supported Automated Information Systems (AISs). These mechanisms ensure that items are procured and delivered with the appropriate discriminatory markings, and that the SDS for the precise formulation delivered is provided by the supplier. Although highly recommended, there are no mandatory requirements (regulations or laws) requiring these items be procured through DLA.

b. The next process mechanism is to make the SDS for each different item available to the receiving activity prior to its initial delivery. The central process mechanism that supports this requirement is the Hazardous Material Information Resource System (HMIRS). This is the central repository of technical information on hazardous materials entering the DOD supply system.

c. The basic cylinder is manufactured to the desired DOT specification (e.g., 3AA, 4BA, 8A), and assembled into a complete cylinder with the required Mil Spec valve, color code, and product identification appointing its specific use.

d. A Government QAR monitors manufacturer cylinder building and the first hydrostatic test, and or ultrasonic examination and recording of data by an independent inspection agency. Cylinders may be purchased and sent directly to a compressed gas filling installation for immediate use, or they may be shipped directly to a stock or depot storage facility where they may remain for an undetermined length of time. During storage, a cylinder's condition may decline, causing it to become unsafe for further use.

e. All persons who handle, use, and fill cylinders, must be able to recognize these declining conditions and begin action to have the cylinders reconditioned or removed from service.

f. Any person offering a compressed gas for shipment must assure the cylinder being used for that shipment meets all design and manufacturing requirements of the applicable Federal, Military, DOT, or UN/EU/ISO specifications. The person must also assure the cylinder had been requalified (re-tested) and reconditioned IAW Reference (f) and Reference (g).

4. Color-coded Identification of Compressed Gases in Cylinders. Safety precautions are applied in the storage, handling, and use of compressed gases and of the cylinders in which they are contained. This document provides primary precautions for compressed gases used by DOD. Besides written precautions, DOD has set up a color-coding system that identifies the primary and secondary safety hazards presented by each compressed gas or mixture of compressed gases. They are outlined in Reference (h). This enables the gas user or cylinder handler to immediately identify the gas and the hazardous nature of the material contained in each cylinder; e.g., flammable, Nonflammable, Corrosive, Poisonous, and Oxidizing.

5. Processing of Compressed Gases in Cylinders at DOD Storage Facility. Items delivered to storage facilities are to be carefully unloaded and handled as if they are hazardous materials regardless of the type of gas in the cylinder. The workers will focus on detecting any material releases, damaged packages, missing items, and other criteria relating to safety, security, and compliance concerns. Handling the cylinder should be as defined by its Safety Data Sheet (SDS). Detailed procedures for processing cylinders at storage facilities, inspection of cylinders from procurement and returns are defined in Enclosure 6, herein.

a. Deliver the Item. Shipments of compressed gases and cylinders are delivered to the main entry gate of the storage and distribution facility. An Advance Shipment Notice (ASN) may have been provided ahead of the delivery to ensure the receiving activity is aware of the type and amount of material involved. In many cases, the ASN is not provided and the receiving activity may be unaware that the delivery contains compressed gases or cylinders. Proper coordination by the Inventory Control Point (ICP) prior to the shipment of these items should have occurred to ensure that the accountable activity is properly advised about the movements and whereabouts of these items.

b. Process Item through Conveyance Control. The facilities security force normally controls the entry of conveyances (e.g., trucks) and provide direction on where they are to be unloaded. The driver's shipping papers and/or placards will be reviewed to determine what items are on the load. Based on this review, a decision is made with respect to facility protocol where to direct the vehicle. Depending on the type of items involved, they may be delivered to Central Receiving or the Specialized Storage area designated for them. Normally, full loads and partial loads that contain compressed gases or cylinders are routinely routed directly to the Hazardous Materials Storage facility or cylinder storage area designated for these items.

c. Process Item through Central Receiving. Compressed gases and cylinders arriving at Central Receiving need to be discriminated from non-hazardous items. Once the delivery is carefully screened, a decision is made about where the item(s) should be processed for receiving. Some items may be safe to process at Central Receiving. Other items may be too dangerous to process here and will be subsequently moved to the Hazardous Materials Storage Facility or moved directly to the cylinder yard or storage area designated for it. Compressed gases and cylinders are normally identified, segregated, and moved by local conveyance vehicles to specialized storage where they can be processed safely and effectively by qualified personnel who are specifically trained in this process.

(1) Receiving Inspection (Receipts from Procurement). A receiving inspection must be performed on all new or used, reconditioned, or filled cylinders received from a new procurement (commercial contractors) and returns from DOD customers. See enclosure 6 for detailed inspection of cylinders at the time of receipt.

d. Shipping Process. A customer order will cause a Material Release Order (MRO) to be generated by the managing activity to the storage activity. When the MRO is received, the storage activity is prompted to select the item requested. The item is then prepared for shipping to the customer IAW the priority timeframes established for it.

(1) Select the Item from Stock. Compressed gases and cylinders are selected IAW standard depot processing protocol of supporting systems. During this time, the segregation of items by the HCC should be maintained to the extent reasonable and practicable, and within the compliance of any requirements set forth by the license or local practice needs.

(2) Package/Pack the Material. Selected items are moved to the packing area. Separate lines may be designated for certain items or the HCCs involved. Here, the items must be properly prepared and certified for shipment. To the extent possible, the gas product orders are satisfied by shipping the items in their commercially procured packages. However, sometimes the empty cylinders are prepared for shipping and the gas is filled locally by the customer. The employees responsible for packaging these items and preparing them for movement must be properly trained and qualified to ensure they are readied to move by the specific mode of shipment planned for it.

(3) Offer Item for Transportation. Items that are packaged-certified are offered to transportation for document preparation and final shipment processing.

(4) Prepare Shipping Documentation. Shipping documentation includes preparing the shipping papers IAW the mode of movement. The workers in this functional area require special training on the preparation of these documents. To certify these shipments, a person(s) must be designated by the facility to act as the agent of the facility and sign the Dangerous Goods Certification and any other documentation needed for its legal movement.

(5) Ship the Item. Items are loaded IAW modal compatibility tables and other restrictions. The shipping container is sealed. The driver is provided with the proper placards to be placed on the shipment container, and shipping papers are provided to accompany the driver to the destination.

(6) Characteristics of Gases. See Enclosure 4 for characteristics of gases.

(7) Characteristics of Cylinders. The detailed characteristics are defined in Enclosure 5. The type, design, size, and normally capacity depend on the commodity of gas and the amount to be shipped in one cylinder. It may be necessary to occasionally identify a cylinder to exact specifications for a specific application in or with an end item or weapon system. The current method of procurement stipulates that all cylinders be procured using military or Federal specifications and standards to provide standardization in the cylinder program. These documents are continuously updated to reflect the new state-of-the-art applications. However, since the cylinder is a nonexpendable item and is continually cycled into and out of various applications, methods must be established for its accountability and reconditioning. The procedures outlined in Enclosure 6 have been developed to simplify the process.

(8) Inspection of Cylinders. A thorough and accurate inspection is essential to the safe handling and storage of both filled and empty compressed gas cylinders. The inspection imposed by this Regulation is divided into five separate inspections. The inspections are Receiving Inspection (Contractor Receipts), Receiving Inspection (Customer Returns), Receiving Inspection (Redistribution), Periodic Inspection, and Shipping Inspection. The various inspection elements are in Enclosure 6.

(9) Safe Use, Storage, and Handling. Personnel, who handle, store, use cylinders of compressed gases, must be trained to properly recognize and identify the characteristics of the various gas products and the proper methods of safely handling full and empty cylinders. People need to recognize and evaluate conditions needing change in the serviceability status of the cylinders or their contents. Under normal use and handling, the condition of the gas contents will not change. Provide essential safe handling rules and general guidelines to personnel using and handling compressed gas cylinders. All cylinders being filled in service or in transit shall be secured at the fill or workstation, on the hand truck, on the servicing cart or trailer, or on the transport container or vehicle. See Enclosure 7 for additional storage and handling procedures.

(10) Maintenance of Cylinders. See Enclosure 8 for detailed information.

(11) Disposal of Compressed Gases or Liquids in Cylinders. See Enclosure 9 for detailed information.

(12) Disposal of Compressed Cylinders. See Enclosure 10 for detailed information.

(13) Classification of Cylinders in Supply Condition Codes. See Enclosure 11 for detailed information.

(14) Reporting Receipts or Inventory Adjustments. See Enclosure 12 for detailed information.

(15) Compressed Gas Cylinder Requalification Facilities. See Enclosure 13 for detailed information.

(16) Managing the Defense Reserve of Ozone Depleting Substances. See Enclosure 14 for detailed information.

ENCLOSURE 4

CHARACTERISTICS OF GASES

1. General. Personnel having the responsibility of storing, handling, and/or using compressed gases and gas cylinders must have a working knowledge of the characteristics and hazards associated with each individual gas Specific and detailed information on the properties and/or hazards of any gas is best obtained from the manufacturer or supplier of the product through Safety Data Sheets (SDS) or brochures.

2. Gases and Their Characteristics. The gases most likely found in the DOD storage and support facilities inventories are listed below. The label requirements for each gas are displayed. For special handling and transportation, see the specific label requirements found in Reference (g), para 172.101 and Reference (i), part 82.

a. Acetylene Dissolved (Hazard Class 2.1, I.D. No. UN 1001, Flammable Gas Label). Acetylene is a compound of carbon and hydrogen in proportions by weight of about 12 parts carbon to 1-part hydrogen (92.3 to 7.7 percent). Pure acetylene is a colorless, highly flammable gas of agreeable unearthly odor. Acetylene of ordinary commercial purity has a distinctive garlic-like odor. It is soluble in acetone; 1 volume of acetone will dissolve 300 volumes of acetylene at 160 psig. It is slightly lighter than air. Acetylene is sent dissolved in acetone. Full cylinder pressure is 250 psi. Acetylene is a simple asphyxiant and an anesthetic. Low concentration of vapors has an anesthetic effect, and vapors in high concentrations or in enclosed spaces may cause suffocation. Acetylene in its free state under pressure; may decay violently. The higher the pressure, the smaller the first force needed to cause an explosion. Therefore, NEVER use the free gas outside the cylinder at pressures over 15 psig. Acetylene is highly flammable over a wide range and forms explosive mixtures with air (LFL 2.5 percent and UFL 100 percent). Always store, transport, and use Acetylene cylinders in an upright position to avoid loss of solvent (acetone) during use and to provide a safe position of the cylinder should a pressure relief device be activated during a fire. The vertical position of the cylinder will let the 15-foot spout of flame that can develop to harmlessly release the contents of the cylinder without cutting into another cylinder. Positioned any horizontal cylinders to an upright position for a minimum of at least 2 hours before its use. Some grades of commercial acetylene have toxic impurities; therefore, avoid breathing acetylene vapors in any concentration. Acetylene can cause cardiac irritability.

b. Air, Compressed (Hazard Class 2.2, I.D. NO. UN1002, Nonflammable Gas Label). Air, Refrigerated Liquid (Cryogenic Liquid) (Hazard Class 2.2, I.D. No. UN1003, Nonflammable Gas (primary) and Oxidizer (subsidiary) labels. Air is the natural atmosphere of the earth-a nonflammable, colorless, odorless gas that consists of a mixture of gaseous elements (with water vapor, a small amount of carbon dioxide, and traces of many other constituents). Combined air is made by combining pure oxygen and nitrogen and contains between 19.5 and 23.5 percent oxygen, with the balance nitrogen and with a major portion of the other ingredients removed. Dry air is noncorrosive. Liquefied air is transparent with a bluish cast and has a milky color when it contains carbon dioxide. Air is a mixture and not a compound and can be

separated into its ingredients. The common method is liquefaction of air by reducing its temperature to about -320°F (-195.6°C), then fractionally distilling to remove each of the constituents as fractions. Compressed air is nontoxic. It may act as an oxidizing material. Direct contact with the releasing high-pressure gas or the cryogenic liquid may cause frostbite.

c. Ammonia, Anhydrous (Hazard Class 2.3, I.D. NO. UN1005, Poison Gas (primary), And corrosive (subsidiary) Labels). Ammonia is the compound formed by the chemical combination of the two gases, nitrogen, and hydrogen, in the molar proportion of one-part nitrogen to three parts hydrogen. This is shown in the chemical symbol for ammonia, NH3. On a weight basis, the ratio is 14 parts nitrogen to 3 parts hydrogen or about 82 percent nitrogen to 18 percent hydrogen. The term ammonia is the name of the chemical compound, NH3, which is commonly called anhydrous ammonia. ANHYDROUS means without water and when used with ammonia shows the water content is less than 0.2 percent. This distinguishes it from the various widely used watery solutions of ammonia. At room temperature and atmospheric pressure, ammonia is a pungent, colorless gas. It may be compressed and cooled to a colorless liquid. Between the melting and critical point, liquid ammonia exerts a vapor pressure, which increases with rising temperature. When anhydrous ammonia in a closed container is in equilibrium with anhydrous ammonia vapor, the pressure with the container bears a definite relationship to the temperature. However, people will not willingly remain in an atmosphere of ammonia long enough to incur permanent physical damage. Ammonia vapors can form flammable and explosive mixtures in air (Lower Flammable Limit) (LFL) 15.5 percent, Upper Flammable Limit (UFL) 27 percent, Lower Explosive Limit (LEL) 16 percent, and Upper Explosive Limit (UEL) 25 percent); however, these concentrations are seldom faced. Liquid anhydrous ammonia is extremely cold, -28°F, and contact with skin may cause severe frostbite and serious eye damage.

d. Argon, Compressed (Hazard Class 2.2, I.D. NO. UN1006, Nonflammable Gas Label). Argon, Refrigerated Liquid (Cryogenic Liquid) (Hazard Class 2.2, I.D. NO. UN1951, Nonflammable Gas Label). Argon is nonflammable and nontoxic and will not support combustion. It is made as a cryogenic liquid with a normal boiling point of -302.6°F. As cryogenic fluid, it is stored and transported in special insulated and vacuum-jacketed cylinders (DOT 4L) with a water capacity of not over 1000 pounds (454.6 liters or 120 gallons) or in insulated tanks and cargo tank trucks. It is vaporized into its gaseous state and charged into high-pressure cylinders (DOT 3A or 3AA) of 1800 psig or greater. Argon, in its cryogenic liquid state, is normally stored in large insulated storage tanks at the manufacturing facility and is delivered in small quantities directly to the point of use or to a special storage facility designed for cryogenic liquids. Argon, as a cryogenic liquid, cannot be stored in a closed container because the liquid is continuously boiling (vaporizing) and building up pressure; therefore, it is stored in a container with an open vent or a vent that incorporates a controlled pressure relief device. The storage and handling of argon will be in its vapor or gaseous state in high-pressure DOT 3A, 3AA, or 3AL cylinders. Due to its ability to displace air, argon is a simple asphyxiant. Contact with the cryogenic liquid or its cold vapors and the escaping high pressure from a cylinder may cause frostbite and serious eye damage.

e. Carbon Dioxide (Hazard Class 2.2, I.D. NO. UN1013, Nonflammable Gas Label). Carbon dioxide in cylinders is in the form of a gas over liquid and at 70°F exerts a pressure of 838 psig. Humans cannot breathe air containing more than 10 percent carbon dioxide (by

volume) without losing consciousness. The gas is about 1.5 times heavier than air and is nontoxic, nonreactive, slightly acidic, and will not burn or support combustion or human life. Carbon dioxide gas interferes with proper mentation at 1.9 percent and is not tolerable at 3.5 - 5.0 percent. Carbon dioxide cylinders become extremely dangerous when heated to a temperature above 125°F. Never place near furnaces, radiators, or any other source of heat.

Contact with the liquid or high-pressure gas may cause frostbite and serious eye damage.

f. Carbon Monoxide, Compressed (Hazard Class 2.3, I.D. NO. UN1016, Poison Gas (primary), and Flammable Gas (subsidiary) Labels). Carbon monoxide is an extremely flammable gas (LFL 12.5 percent and UFL 74 percent). When pure, it is odorless and colorless and does not give warning of its presence; therefore, always place cylinders in a well- aired area away from sources of ignition or oxidizing gases. Prolonged breathing of low concentrations may cause headaches. Angina and heart attacks can result from exposure to people with cardiac problems. Breathing high concentrations of carbon monoxide may be fatal.

g. Chlorine (Hazard Class 2.3, I.D. NO. UN1017, Poison Gas (primary) and corrosive and oxidizer (subsidiary) labels. Chlorine is placed into cylinders as an amber liquid that turns to a nonflammable greenish-yellow gas at -29°F. Do not confuse Chlorine with swimming pool chemicals, such as calcium hypochlorite or sodium dichloroisocyanurate, sometimes wrongly called chlorine. Although chlorine is nonflammable, most flammable materials will burn in chlorine atmosphere as they do in an oxygen atmosphere, and flammable gases and vapors will form explosive mixtures with chlorine. Chlorine reacts explosively or forms explosive compounds with many common chemicals, especially acetylene, turpentine, ether, anhydrous ammonia, fuel gas, hydrocarbons, hydrogen, and finely divided metals. Chlorine gas is mainly a respiratory irritant; in high concentrations, it could cause serious physical damage. However, people will not willingly remain in an atmosphere of chlorine long enough to incur permanent damage. Liquid chlorine or high-pressure gas may cause frostbite and serious eye damage.

h. Chlorine Triflouride (Hazard Class 2.3, I.D. NO. UN1749, Poison Gas (primary), Oxidizer (subsidiary), and Corrosive (subsidiary) Labels). Chlorine trifluoride is a greenish-yellow liquid, which turns to a nearly colorless gas at its boiling point of 53°F. It is dangerously reactive. It will ignite most flammable materials. It reacts violently with water to form hydrogen fluoride and chlorine. It also reacts strongly with sand, silicon-containing compounds, glass, and asbestos. The liquid is toxic and corrosive. Contact with skin or eyes will cause deep, painful burns. Vapors will cause severe damage to the eyes, skin, respiratory tract, and mucous membranes, and may cause pulmonary edema.

i. Chlorofluorocarbons, Flammable (Hazard Class 2.1, I.D. NO. See below, Flammable Gas Label). Flammable chlorofluorocarbons, such as chlorodifluoromethanes R-142b, (UN2517) a refrigerant and low-temperature solvent, and difluoroethane R-152a, (UN1030) an intermediate, should never be confused with or mistaken for nonflammable, chlorofluorocarbons.

These materials are flammable and reactive. Health hazards are the same as for nonflammable chlorofluorocarbons.

j. Chlorofluorocarbons, Nonflammable (Hazard Class 2.2, I.D. NO. See below, Nonflammable Gas Label). Chlorofluorocarbon gases are most commonly used in refrigeration

and air conditioning applications. Although classed as nonflammable, chlorofluorocarbons mixed with flammable liquids or gases may be flammable and should be handled with caution. Partially halogenated compounds may be flammable and must be checked. Although the toxicity of chlorofluorocarbons is low, the possibility of injury or death exists in unusual situations or if the material is willfully misused. The vapors are several times heavier than air, and under static conditions, uniform distribution in an enclosed space might be slow. Provide good ventilation in areas where high concentrations of heavy vapors might increase and exclude oxygen. Chlorofluorocarbons meeting hot surfaces or open flames will produce fumes of irritating and toxic hydrogen chloride and hydrogen fluoride. Inhalation of chlorofluorocarbons in high concentration is dangerous and can be fatal. When treating people suffering toxic effects from exposure to chlorofluorocarbons, the use of epinephrine or similar drugs should be avoided because they may produce cardiac arrhythmias, including ventricular fibrillation.

Note: Chlorofluorocarbons identified in the following table (Group I and II) have been determined to be ozone-reducing substances and have been banned from further production. These compressed gases must now be captured (Recovered) and returned to the DOD reserve now managed by DLA Aviation. Products will be reissued to qualified activities for use in critical applications where alternates are yet to be found. Program instructions and procedures used for turning in of these products can be found in enclosure 14. (The list contains only compressed gases now in use by the DOD). The total list of products has been identified as Class I or Class II substances.

Group I	Group II
Trichlorofluoromethane R-11	Bromochlorodifluoromethane (Halon 1211)
Dichlorodifluoromethane R-12	Bromotrifluoroethane (Halon 1301)
Trichlorotrifluoroethane R-113	Dibromotetrafluoroethane (Halon 2402)
Dichlorotetrafluoroethane R-114	
Monochloropentafluoroethane R-115	

k. Cyclopropane (Hazard Class 2.1, I.D. NO. UN1027, Flammable Gas Label). Cyclopropane is a colorless, flammable (LFL 2.4 percent and UFL 10.3 percent) gas with a sweet, distinctive odor resembling that of petroleum naphtha. For its major use as an anesthetic medical gas, it must be supplied according to USP purity standards. Concentrations (by volume) of 6 percent result in unconsciousness, and as the concentration increases to 23 percent, moderate to deep anesthesia results. Concentrations in excess of 23 percent are fatal, causing respiratory failure. The principal hazard of cyclopropane is its flammability.

l. Ethylene Oxide, Pure or with nitrogen (Hazard Class 2.3, I.D. NO. UN1040, Poison Gas and Flammable Gas (Subsidiary) Labels. Ethylene oxide is a reactive colorless gas that condenses to a colorless liquid boiling at 50.7°F (10.4°C) and 14.7 psia. It is mixable in all proportions with water, alcohol, ether, and most organic solvents. The vapors of ethylene oxide are flammable and explosive. It is generally noncorrosive to metals and leaves no residual odor or taste. The major use of ethylene oxide is as a chemical intermediate for making ethylene glycol and higher glycols. Glycols are used as drying agents, antifreezes, and raw materials for making of other chemical derivatives. Ethylene oxide, both pure and; mixed with carbon dioxide or halocarbons, is used as a sterilant and fumigant for heat-sensitive materials. Ethylene oxide is

a toxic liquid and gas. The vapors from Ethylene oxide form flammable mixtures with air over a wide range (LFL 3 percent and UFL 100 percent). The vapor is heavier than air (vapor density 1.5) and may travel a large distance to a source of ignition and flash back. Ethylene oxide is dangerously reactive; it may rearrange chemically or polymerize violently with evolution of heat Ethylene oxide is moderately toxic by inhalation. Breathing and high concentrations may cause pulmonary edema. It is a severe, eye, skin, and respiratory irritant, and effects may be delayed. For specific health, hazards see the SDS, the DOD Hazardous Materials Information System, or the manufacturer, supplier, or seller for information.

m. Ethylene Oxide and nonflammable Gas Mixtures (Labeled According to Mixture). Due to the high flammability and explosive hazards of pure ethylene oxide, the need for its use as a sterilizer for medical equipment and material, a mixture of nonflammable gases is added to the material to reduce its hazard. The mixtures are usually 20 to 90 percent carbon dioxide or dichlorodifluoromethane by volume. The mixtures are less toxic than pure ethylene oxide but do pose a health threat when inhaled or when in direct contact with skin or eyes. For specific health hazards see the SDS, the DOD Hazardous Materials Information System, or the manufacturer, supplier, or vendor for information.

n. Helium, Compressed (Hazard Class 2.2, I.D. NO. UN1046, Nonflammable Gas) Helium, Refrigerated Liquid (Cryogenic Liquid) (Hazard Class 2.2, I.D. NO. UN1963, Nonflammable Gas Label) Helium is a colorless, odorless, and tasteless gas at room temperature and atmospheric pressure. Its principal source in the United States is from certain natural gas wells in which the natural gas may contain up to 9 percent helium. It is normally supplied as a non-liquefied compressed gas in high-pressure DOT 3A or 3AA cylinders at or above a pressure of 1800 psig at 70°F. Helium can be condensed into a cryogenic liquid when refrigerated to below its normal boiling point of -452.1°F, the lowest boiling point of any substance known. As a cryogenic liquid, it is stored and transported in special insulated and vacuum-jacketed cylinders (DOT 4L) with a water capacity of not over 1000 pounds (454.6 liters or 120 gallons) or in larger insulated and vacuum-jacketed tanks and cargo tank trucks. Helium, as a cryogenic liquid, is like argon and cannot be stored in a closed container because the liquid is continuously boiling (vaporizing) and building up pressure; therefore, it is stored in a container with an open vent or a vent that incorporates a controlled pressure relief device. The storage and handling of helium will be in its vapor or gas state in high-pressure cylinders. In high concentrations, helium acts as a simple asphyxiant, causing suffocation due to oxygen deficiency. Contact with the liquid or cold vapors may cause frostbite and serious eye damage.

o. Hydrogen (Hazard Class 2.1, I.D. NO. UN1049, Flammable Gas Label). Hydrogen is a colorless, odorless, flammable gas at room temperature and atmospheric pressure. It is the lightest gas known. It is usually shipped as a non-liquefied compressed gas in high-pressure DOT 3A or 3AA cylinders at a pressure greater than 1800 psig at 70°F. Hydrogen can be condensed into a cryogenic liquid when refrigerated below its normal boiling point of -423.0°F. As a cryogenic liquid, it is stored and transported in special insulated and vacuum-jacketed cylinders (DOT 4L) with a water capacity of not over 1000 pounds (454.6 liters or 120 gallons) or in larger insulated and vacuum-jacketed tanks and cargo tank trucks. Hydrogen, as a cryogenic liquid, is like argon and helium and cannot be stored in a closed container because the liquid is continuously boiling (vaporizing) and building up pressure; therefore, it is stored in a

container with an open vent or a vent that incorporates a controlled pressure relief device. The storage and handling of hydrogen, as addressed in this Regulation, will be in its vapor or gaseous state in high-pressure cylinders. Hydrogen burns in air with a pale blue, almost invisible, flame. Hydrogen will form flammable and explosive mixtures over a wide range with air (LFL 4 percent, UFL 74 percent, LEL 4.1 percent, and UEL 74.2 percent) and oxygen (LFL 4 percent, UFL 95 percent, LEL 4.7 percent, and UEL 93.9 percent). Unlike hydrogen at normal surrounding temperatures when it is lighter than air, the cold gas is released from the container is slightly heavier than air and may remain near ground level until it warms up. Fog formed when the cold gas meets the moisture in the air will show where the gas is spreading. However, explosive mixtures can exist outside the visible fog. Hydrogen is nontoxic but can cause suffocation. Contact with the cryogenic liquid or cold vapor can cause frostbite and serious eye damage.

p. Liquefied Petroleum Gases (LPG) (Hazard Class 2.1, I.D. NO. UN1075, Flammable Gas Label). The liquefied petroleum gases are butane, isobutane, propane, propylene (propene), butylenes (butenes), and any mixtures of these hydrocarbons as defined by the Reference (j), DOT, or other authority. They are flammable (butane LFL 1.8 percent and UFL 8.4 percent, butylene LFL 1.6 percent and UFL 10 percent, propane LFL 2.2 percent and UFL 9.5 percent, and propylene LFL 2 percent and UFL 11.1 percent), colorless, and noncorrosive. Most are odorless, so an odorant such as ethyl mercaptan is added to warn of the presence of the gas. (Propylene and butylenes have a foul odor.) High concentrations of LPG in air may cause central nervous system depression with symptoms including light-headedness, drowsiness, unconsciousness, and possibly death.

q. Methyl Acetylene and Propadiene. Mixtures, Stabilized, (MAPP) (Hazard Class 2.1, I.D. NO. UN1060, Flammable Gas Label). "MAPP gas is a trademarked name belonging to Linde Group, previously Dow, for a fuel gas based on a stabilized mixture of methylacetylene (propane) and propane. The name comes from the original chemical composition: methylacetylene-propadine propane. MAPP gas is also widely used as a generic name for UN 1060 stabilized methylacetylene-propadiene (unsterilized methylacetylene-propadine is known as MAPD). MAPP gas is considered a safer and easier-to-use substitute for acetylene. In the spring of 2008, true MAPP gas production ended in North America when production was stopped at the only remaining plant making it. Current products labeled "MAPP" are in fact MAPP substitutes. These versions are stabilized liquefied petroleum gas (LPG) with high levels of propylene. The proper name is methyl acetylene and propadiene mixtures, stabilized, and the gas is a stabilized mixture of methyl-acetylene (CH2CCH) and propadiene (CH2CCH2). It is a flammable gas; whose vapors form flammable mixtures in air over a narrow range (LFL 3.4 percent and UFL 10.8 percent). It's penetrating, foul, and persistent odor gives a good warning of its presence.

r. Methyl Bromide (Hazard Class 2.3, NO. UN1062, Poison Gas Label). Methyl Bromide is a colorless liquid or gas with almost no odor. It is a poisonous gas at room temperature and atmospheric pressure. At high concentrations, it has chloroform like odor. Detection of lower concentrations is often helped by a warning odorant, chloropicrin, which is added by the manufacturer. Methyl bromide is flammable only when in the presence of a high-energy source and in the narrow flammability range of 10 to 16 percent by volume in air. Its physical

properties do not meet the definition of a flammable gas as defined by the U.S. DOT. The onset of thermal decomposition occurs about 752°F (400°C). Methyl bromide primarily used as a fumigant to control insects infesting various grains and non-food material. It is used in small quantities in organic synthesis for methylations. Methyl bromide is not a compressed gas but is often found in gas cylinders. Vapor inhalation is harmful and can be fatal. Contact with the liquid can cause severe damage to the skin, eyes, or mucous membranes. Methyl bromide has a chloroform-like odor.

s. Methyl Chloride (Hazard Class 2.1, I.D. No. UN1063, Flammable Gas Label) Methyl Chloride is a colorless, flammable gas with a faintly sweet, nonirritating odor at room temperatures. It is shipped as a transparent liquid under its vapor pressure of about 59 psig at 70°F (407 kPa at 21.1°C). Methyl chloride burns feebly in air but forms mixtures with air that can be explosive within its flammability range. Dry methyl chloride is very stable at normal temperatures and in contact with air. In the presence of moisture, it hydrolyzes slowly, which results in forming corrosive hydrochloric acid. At temperatures above 700°F (371°C), methyl chloride may decay into toxic products (hydrochloric acid, phosgene, chlorine, and carbon monoxide). It is slightly soluble in water and soluble in alcohol, mineral oils, chloroform, and most organic liquids. Methyl chloride is flammable (LFL 8.1 percent and UFL 18.7 percent) and toxic in high concentrations. The recommended Threshold Limit Value for methyl chloride in air is 100 ppm. With its mild odor and narcotic effect, people may be exposed to large concentrations without being aware of the danger. The symptoms of poisoning include dizziness, headache, optical difficulties, nausea, and vomiting, and may be delayed for several hours.

t. Nitrogen, Compressed (Hazard Class 2.2, I.D. NO. UN1066, Nonflammable Gas Label), Nitrogen, Refrigerated Liquid (Cryogenic Liquid) (Hazard Class 2.2, I.D. No. UN1977, Nonflammable Gas Label). Nitrogen is an odorless, colorless, tasteless, nontoxic, and almost entire inert gas that makes up 78 percent of the earth's atmosphere. A colorless cryogenic liquid is not flammable and will not support combustion or human life. It is made as a cryogenic liquid with a normal boiling point of -320°F. As a cryogenic liquid, it is stored and transported in either special insulated and vacuum-jacketed cylinders (DOT 4L) with a water capacity of not over 1,000 pounds (454.6 liters or 120 gallons) or in insulated and vacuum jacketed tanks or cargo tank trucks. It is vaporized into the gaseous state and charged into high-pressure cylinders (DOT 3A, 3AA, or 3AL) 1800 psig or greater. Nitrogen in its cryogenic liquid state is stored in large storage tanks at the manufacturing facility and is delivered in small quantities directly to the point of use or to a special storage facility designed for cryogenic liquids. Nitrogen, as a cryogenic liquid like other cryogenic liquids, cannot be stored in a closed container because the liquid is continuously boiling (vaporizing) and building up pressure; therefore, it is stored in containers with an open vent or with a vent that incorporates a controlled pressure relief device. Alternate methods of producing nitrogen gas conforming to the physical characteristics of Commercial Item Description (CID) A-A-59503 may be produced using the pressure swing adsorption cycle or the use of membrane technology. The storage and handling of nitrogen as addressed in this Regulation will be in its vapor or gas state in high-pressure DOT 3A, 3AA, or 3AL cylinders. Unlike nitrogen at normal surrounding temperatures when it is lighter than air, the cold gas as it is vented or released from the cryogenic container is slightly heavier than air and may remain near ground level until it warms up. In this case, nitrogen can act as an

asphyxiate, displacing air and causing suffocation due to oxygen shortage. Fog formed when the cold gas contacts the moisture in the air will show where the gas is spreading. Contact with the liquid or cold gas can cause frostbite and serious eye damage.

u. Nitrous Oxide, Compressed (Hazard Class 2.2, I.D. NO. 1070) and Nitrous Oxide, Refrigerated Liquid (Hazard Class 2.2, I.D. NO. 2201) (Nonflammable Gas Label). Nitrous oxide at normal temperatures and pressures is a colorless, nearly odorless and tasteless, nontoxic gas. It is shipped as nitrous oxide, compressed, or nitrous oxide, refrigerated liquid. Nitrous oxide is nonflammable, but, being a mild oxidizing agent, will support combustion of flammable materials. It is used as an inhalant type of anesthetic or analgesic gas. When inhaled in high concentrations for a few seconds, it affects the central nervous system and may induce symptoms closely resembling alcoholic intoxication. Its colloquial name, "laughing gas," stems from some people show hilarity after inhaling nitrous oxide. Continued inhalation without an enough supply of oxygen, results in simple asphyxia.

v. Oxygen, Compressed (Hazard Class 2.2, I.D. NO. UN1072, Nonflammable Gas (primary) and Oxidizer (subsidiary) Labels) Oxygen, Refrigerated Liquid (Cryogenic Liquid) (Hazard Class 2.2, I.D. No. UN1073, Nonflammable Gas (primary), and Oxidizer (subsidiary) Labels). Oxygen in the gaseous state is colorless, odorless, tasteless, nontoxic, and nonflammable but supports combustion vigorously. It is necessary to continue life, and it makes about 20 percent, by volume, of the earth's atmosphere. As a cryogenic liquid, it is pale blue in color and, its normal boiling point of -297°F, is slightly heavier than water. It is made as a cryogenic fluid by fractional distillation of liquefied air or is made as a gas using an electrolytic generator. Oxygen produced by the pressure swing adsorption cycle is a maximum of 94% oxygen with the rest consisting of Argon. This process does not meet MIL-PRF-27210 buying for gaseous aviators breathing oxygen. Therefore, it should not be stored in a high-pressure cylinder appointed as aviators breathing oxygen. As a cryogenic liquid, it can be stored or transported in special insulated and vacuum-jacketed cylinders (DOT 4L) with a water capacity of not over 1000 pounds (454.6 liter or 120 gallons) or in insulated and vacuum-jacketed tanks or cargo tank trucks. It is also vaporized into the gas state and charged into high-pressure cylinders (DOT 3A, 3AA, or 3AL) of 1800 psig or greater. Oxygen, in its cryogenic liquid state, is normally stored in large storage tanks at the manufacturing facility and is delivered in small quantities directly to the point of use or to a special storage facility designed for cryogenic liquids. As with other cryogenic fluids, it cannot be stored in a closed container because the liquid is continuously boiling (vaporizing) and building up pressure; therefore, it is stored in containers with an open vent or with a vent that incorporates a controlled pressure relief device. The storage and handling of oxygen as addressed in this Regulation will be in its vapor or gas state in high-pressure DOT 3A, 3AA, or 3AL cylinders. Contact with the cryogenic liquid or the cold vapor may cause frostbite and serious eye damage. The cold gas, as it is vented or released from the cryogenic container, is slightly heavier than air and will remain near ground level until it warms up. Fog formed when the cold gas meets the moisture in the air will show where the gas is spreading. Materials that are flammable in air, burn more vigorously in oxygen. Combustibles, such as oil and grease, burn with nearly explosive violence in an oxygen atmosphere, if ignited. Oxygen itself is nonflammable. Keep containers free of oil, grease, and any other organic or hydrocarbon contamination and do not handle with oily hands, gloves, or greasy equipment. Use of perchloroethylene, trichloroethylene, or 1, 1, 1, -trichloroethane to

clean cylinders is forbidden and may create an explosive atmosphere with a resulting fire or explosion.

w. Sulfur Dioxide, Liquefied (Hazardous Class 2.3, I.D. NO. UN 1079, Poison Gas Label). Sulfur dioxide is a colorless nonflammable gas with a sharp pungent odor. It liquefies at temperatures below 14°F. The gas is irritating to the eyes and respiratory tract. Credit its irritant properties to the speed with which it forms sulfurous acid on contact with moist membranes. Sulfur dioxide is on the National Primary and Secondary Ambient Air Quality Pollution Standard List. Immediately report any leak to proper authorities.

x. Sulfur Hexafluoride (Hazard Class 2.2, I.D. NO. UN1080, Nonflammable Gas Label) (domestic)/Sulphur Hexafluoride (international) Sulfur hexafluoride (domestic)/Sulphur Hexafluoride (international). Sulfur Hexafluoride is colorless, odorless, nontoxic, nonflammable, and is one of the most chemically inert gases known. It is shipped as a liquefied compressed gas at a pressure of 310 psig. Sulfur hexafluoride (domestic)/Sulphur Hexafluoride (international) is nontoxic; however, it can act as a simple asphyxiant by displacing air in enclosed spaces. Lower fluorides of sulfur are made when sulfur hexafluoride (domestic)/Sulphur hexafluoride (international) is subject to electrical discharge, and gases produced are toxic by inhalation.

3. Other Gases. Many gases, like the ones listed below, are less likely to be encountered in DOD.

a. Dimethylamine, Anhydrous (Hazardous Class 2.1, I.D. NO. UN1032, Flammable Gas Label). Dimethylamine is a flammable, alkaline, colorless gas at room temperature and atmospheric pressure. It has a characteristic fishy odor in lower concentrations. In higher concentrations (100 to 500 ppm), the fishy odor is no longer detectable, and the odor is more like that of ammonia. Already liquefied and shipped in steel cylinders as liquefied gas under its own vapor pressure of 11.3 psig at 21.1°C.

b. Ethyl Chloride (Hazardous Class 2.1, I.D. NO. 1037, Flammable Gas Label). Ethyl Chloride, at room temperature and atmosphere pressure, is a flammable gas with a pungent, ethereal odor. Ethyl chloride has narcotic properties, but overexposure can cause toxic effects. Already liquefied and shipped in steel cylinders and drums as a liquid under its own vapor pressure of 37 kPa (5.36 psig) at 21.1°C. Flammable range (LFL 3.6 percent and UFL 15.4 percent).

c. Hydrogen Chloride, anhydrous (Hazardous Class 2.3, I.D. No. UN1050 Poison Gas (primary) and corrosive (subsidiary) labels). Hydrogen Chloride, Refrigerated Liquid (Hazard Class 2.3, ID No. UN2186, Poison Gas (primary) and Corrosive (subsidiary) labels). Hydrogen chloride is a pungent, toxic, corrosive gas having suffocation odor. It is heavier than air, and fumes strongly in moist air. It is soluble in water and ethyl alcohol, and ethyl ether. It is shipped in cylinders as a liquefied gas under its own vapor pressure of 4230 kPa (613 psig) at 21.1°C.

d. Hydrogen Sulfide, (Hazard Class 2.3, I.D. NO. UN1053, Poison Gas (primary) and

Flammable Gas (subsidiary) Labels). Hydrogen Sulfide, at room temperature and atmospheric pressure, is a color less, flammable, toxic gas having an offensive odor described as that of rotten eggs. It is shipped in steel cylinders as a liquefied gas under its own vapor pressure of 1737 kPa (252 psig) at 21.1°C. Flammable range (LFL 4.0 percent and UFL 44 percent).

e. Neon, compressed (Hazardous Class 2.2, I.D. NO. UN1065 for gaseous, UN1913 for refrigerated liquid (cryogenic liquid), Nonflammable Gas Label). Neon is a member of Group VIIIA elements, called noble gases, inert gases, and aerogens. Neon is a colorless, odorless, and tasteless monatomic gas. It exists in minute traces in the atmosphere (18.18 ppm by volume). Neon is normally available compressed in cylinders at varying pressures depending on the cylinder size, and in 1-liter quantities in glass flasks at atmospheric pressure.

f. Phosgene (Hazardous Class 2.3, I.D. NO. UN1076, Poison Gas and Corrosive (Subsidiary) Labels. Phosgene, at ordinary temperatures and pressures, is a colorless, nonflammable, highly toxic gas with an odor like that of musty hay. It is readily liquefied to a colorless to light yellow liquid and shipped in steel cylinders as a liquefied gas under its own vapor pressure of 74 kPa (10.7 psig) at 21.1°C. Phosgene is a lung irritant and causes severe damage to the alveoli of the lungs. Edema follows resulting in suffocation. Inhalation of the gas produces catching of the breath, choking, immediate coughing, tightness of the chest, tearing, difficulty, and pain in breathing, and cyanosis. Serious symptoms may not develop until several hours after exposure, for the immediate symptoms produced by even a fatal dose may be relatively mild since phosgene elicits no marked respiratory reflexes. A person, who seems to be slightly gassed immediately after exposure, may become a casualty several hours later. The most pronounced symptoms of phosgene poisoning are coughing with bloody sputum and weakness, which may last for months.

ENCLOSURE 5

CHARACTERISTICS OF CYLINDERS

1. Basic Cylinder Types. Compressed gas cylinders in use by DOD activities and other Government activities are of three basic types: high pressure, low pressure and low pressure for gas solution. High-pressure cylinders are marked with a service pressure of 900 psig (6200 kilopascal (kPa) or greater). Low-pressure cylinders are marked with a service pressure of 900 psig (6200 kPa) or less.

The differentiating pressure types of cylinders are identified as DOT labels 3, 4, or 8 with an applicable suffix to identify the specification that was used in manufacturing the cylinder. All cylinders procured and/or requalified for use by DOD and other Government activities must be manufactured, inspected, and tested, IAW Reference (g), Parts 173 and 178 or to its designated Military or Federal Specification. Each entity who represents they make or performs retesting as outlined in Reference (g) must be approved by and have a registration number issued by DOT. Instructions for getting such a registration number are contained in Enclosure 13.

a. Cylinder Types. DOD uses cylinders managed by DLA and identified by DOT specifications: 3, 3A, 3AA, 3AL, 4, 4A, 4AA, 4B, 4BA, 4BW, 4L, 8, and 8AL. (For a complete listing of cylinder types, see Reference (g).

Cylinder markings may be arranged on one side of the shoulder or head of the cylinder as follows:

(1) DOT 3AA2265

(2) CX428813TW

(3) US GOVT

In this case, the DOT specification is 3AA, the service pressure is 2265 psig at 70°F, the purchasing agency is CX (DLA Aviation), the serial number is 428813, the manufacturer is TW (Taylor-Wharton), and the owner is the United States Government. These same markings could be arranged in a horizontal line around the shoulder and might appear as follows: DOT 3AA2265 CX428813TW US GOVT. Complete requirements for markings on cylinders are found in the applicable cylinder specification in Title 49 CFR, Part 178, and in the Government procurement specification.

b. Cylinder Interchangeability. Depending on product and application, cylinders of a given basic type are interchangeable. For instance, DOT 3A and 3AA cylinders are inter-changeable when the shatterproof characteristic is not a prime reason in their use. DOT 4B, 4BA, and 4BW are also interchangeable when the materials of construction are compatible with the product used.

DOT 4A and 4AA cylinders are used in the military supply system for anhydrous ammonia and should not be substituted by any other specification 4 cylinder unless use is approved by DOT.

The specification 8 and 8AL cylinders are packed with a porous material that, even when the cylinders are empty, makes them much heavier than would normally be expected. These cylinders are solely used for acetylene; no other product may be used with these cylinders. When newly made, the porous material in these cylinders is filled with acetone.

c. Cylinder Sizes. The physical size (diameter and height) of the cylinders in the DOD inventory are continuously changing to meet new design and application requirements. The Government has accumulated various size and capacity cylinders for each of the compressed gas applications. This is more predominating in the DOT 4 and 8 specification cylinders. A variation of the cylinder size to + 2 inches in diameter and + 6 inches in height is found with some refrigerant and acetylene cylinders having a common volumetric capacity. Group cylinders based on the common capacity under one or more appointed National Stock Numbers (NSNs). Grouping is available for cylinders not within the size criteria, but within the capacity criteria of the set up NSNs. An NSN has been set up for a cylinder with critical size, or critical end item application such as where the cylinder must fit; the cylinders must be within the named tolerances. Varying cylinder size is not as prevalent with the DOT 3 series cylinders. Tolerances of these cylinders shall not exceed +1/4-inch diameter and + 1 inch in height from the set up NSN description. As with the low-pressure DOT 4 and 8 cylinders, there are specific requirements for DOT 3 series cylinders that must be mounted in holding fixtures. Consider the appointed tolerances for proper cylinder identification or cylinder procurement. Most DOT 4 and 8 cylinders not identified for a specific end use in which the size is critical may be identified only as cylinders with the same capacity for a given gas under one NSN.

d. Cylinder Pressures. Compressed gas cylinders are designed and built to meet the specific needs of storing, using, and transporting compressed gases safely. All cylinder designs or types are controlled and made IAW DOT specifications. Each cylinder has been marked with a DOT specification and working (service) pressure, which is stamped (not stenciled) into the shoulder of the cylinder as cited in subparagraph A, above. The cylinder selected for use with a product is based on the stabilized pressure of the product at a surrounding temperature of 130ºF, which shall not exceed 5/4 times the service pressure (at surrounding temperatures) of the cylinder. Materials used in making the cylinder must be compatible with the product. Exceptions apply for certain charged cylinders depending on the product, such as acetylene, liquefied nitrous oxide, or liquefied carbon dioxide.

e. Cylinder Pressure Substitutions. Cylinders of the same type made to the same specification (3A, 3AA, 3AL, 4B, 4BA, or 4BW) with a greater service pressure than is necessary for the named product may be substituted for the named cylinder of lower pressure provided the prescribed valve and cylinder characteristic requirements for the product and application are met. The minimum service pressure of a cylinder for a compressed gas that is filled by weight (gas in the liquid state) is determined by the vapor pressure of the gas product at a temperature of 130ºF. The approved cylinders and the regulated service pressures are found in Title 49 CFR and in the product and cylinder description listings for Federal Supply Classes (FSC) 6505, 6830, 8120, and 9135. High-pressure cylinders DOT 3A and 3AA with service

pressures of 1800 psig or greater will vary in capacity based on the service pressure and the product. DOT cylinders 3A2000, 3AA2000, 3A2260, and 3AA2260 were purchased in the past for helium service, and NSNs were assigned as necessary. It has been necessary to convert some of these cylinders to other services where a specific NSN does not apply. The following cylinders have been consolidated: DOT 3A2000 with 3AA2015, 3A2260 with 3AA2265.

f. Non-shatterable and Shatterproof Cylinders. The term "non-shatterable" as used refers only to specification 3A and 3AA high-pressure cylinders. This name is not considered applicable to specification 4 or 8 cylinders. This cylinder type is required in all aircraft and shipboard applications where fragmentation must be controlled to minimize loss of life and damage to vital systems. The name is applied to high-pressure DOT 3A or 3AA cylinders made of a high grade of steel that will not separate into more than two pieces when ruptured by a .50 caliber projectile when the cylinder is filled to its service pressure. Cylinders meeting this need have been identified by item description in FSC 8120. Many non-shatterable cylinders are identified by the words "NONSHATTERABLE," "NON-SHAT," or "SHATTERPROOF" stamped, not stenciled, into the shoulder of the cylinder. In other instances, non-shatterable cylinders can be identified as follows:

(1) All cylinders stamped DOT 3AA that are made of 4130x steel.

(2) All cylinders stamped DOT 3A with one of the following specification numbers on the shoulder:

(a) SPS 843 (INT)

(b) SPS 1022 (INT)

(c) 51-C-26 and 51-C-26 (INT)

(d) 51-C-41 and 51-C-41 (INT)

(3) Cylinders marked with specification 51-C-31 o 51-C-31 (INT) are also Non-shatterable if the initial (earliest) hydrostatic test date is 6-44 or later. Cylinders made before 6-44 are non-shatterable only if they are identified so by the manufacturer. Cylinders not identified by any of the above markings will not be classed and identified by NSN as non-shatterable. Changes in NSNs or Condition Codes that result from reidentifying cylinders from shatterable to non-shatterable will be reported to DLA Aviation IAW Reference (e), Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP).

2. Cylinder Requalification. (NOTE. When there is a conflict between DOD cylinder specifications and the specifications needed by the host nation, the stricter requirements shall apply.) Compressed gas cylinders will not be refilled if the prescribed service period between cylinders has expired. Each time a cylinder is requalified, the date test or inspection, showing the month and year, is stamped into the shoulder, collar, or foot ring of the cylinder with a steel stamp. This date is used to decide the next scheduled requalification date. The DOT registration identification number of the requalification facility shall be stamped between the month and

year. This marking will provide traceability to the last facility that performed a requalification on the cylinder.

a. Periodic qualification of cylinders. Each specification cylinder that becomes due for periodic requalification, as specified in the following table must be requalified and marked in conformance with the requirements of this subpart. Requalification records must be maintained in accordance with §180.215 of reference (g). Table 1 follows:

TABLE 1—REQUALIFICATION OF CYLINDERS[1]

Specification under which cylinder was made	Minimum test pressure (psig)[2]	Requalification period (years)
DOT 3	3000 psig	5.
DOT 3A, 3AA	5/3 times service pressure, except noncorrosive service (*see* §180.209(g))	5, 10, or 12 (*see* §180.209(b), (e), (f), (h), and (j).
DOT 3AL	5/3 times service pressure	5, 10 or 12 (*see* §180.209(e), (j) and §180.209(m)[3]).
DOT 3AX, 3AAX	5/3 times service pressure	5, 10 (*see* §180.209(e).
3B, 3BN	2 times service pressure (*see* §180.209(g))	5 or 10 (*see* §180.209(e), (f)).
3E	Test not required.	
3HT	5/3 times service pressure	3 (*see* §§180.209(k) and 180.213(c)).
3T	5/3 times service pressure	5.
4AA480	2 times service pressure (*see* §180.209(g))	5 or 10 (*see* §180.209(e) or (h)).
4B, 4BA, 4BW, 4B-240ET	2 times service pressure, except non-corrosive service (*see* §180.209(g))	5, 10, or 12 (*see* §180.209(e), (f), and (j)).
4D, 4DA, 4DS	2 times service	5.
DOT 4E	2 times service pressure, except non-corrosive (*see* §180.209(g))	5 or 10 (*see* §180.209(e)).
4L	Test not required.	
8, 8AL		10 or 20 (*see* §180.209(i)).
Exemption or special permit cylinder	See current exemption or special permit	See current exemption or special permit.

Foreign cylinder (*see* §173.301(j) of Reference (g) for restrictions on use)	As marked on cylinder, but not less than 5/3 of any service or working pressure marking	5 (*see* §§180.209(l) and 180.213(d)(2)).

[1]Any cylinder not exceeding 2 inches outside diameter and less than 2 feet in length is excepted from volumetric expansion test.

[2]For cylinders not marked with a service pressure, see §173.301a(b) of reference (g).

[3]This provision does not apply to cylinders used for carbon dioxide, fire extinguisher or other industrial gas service.

b. DOT 3A or 3AA cylinders. (1) A cylinder conforming to specification DOT 3A or 3AA with a water capacity of 56.7 kg (125 lbs.) or less that is removed from any cluster, bank, group, rack, or vehicle each time it is filled, may be requalified every ten years instead of every five years, provided the cylinder conforms to all of the following conditions:

(1) The cylinder was manufactured after December 31, 1945.

(2) The cylinder is used exclusively for air; argon; cyclopropane; ethylene; helium; hydrogen; krypton; neon; nitrogen; nitrous oxide; oxygen; sulfur hexafluoride; xenon; chlorinated hydrocarbons, fluorinated hydrocarbons, liquefied hydrocarbons, and mixtures thereof that are commercially free from corroding components; permitted mixtures of these gases (*see* §173.301(d) of this Reference (g); and permitted mixtures of these gases with up to 30 percent by volume of carbon dioxide, provided the gas has a dew point at or below minus (52 °F) at 1 atmosphere.

(3) Before each refill, the cylinder is removed from any cluster, bank, group, rack, or vehicle and passes the hammer test specified in Reference (k).

(4) The cylinder is dried immediately after hydrostatic testing to remove all traces of water.

(5) The cylinder is not used for underwater breathing.

(6) Each cylinder is stamped with a five-pointed star at least one-fourth of an inch high immediately following the test date.

(7) If, since the last required requalification, a cylinder has not been used exclusively for the gases specifically identified in paragraph (b)(1)(ii) of this section, but currently conforms with all other provisions of paragraph (b)(1) of this section, it may be requalified every 10 years instead of every five years, provided it is first requalified and examined as prescribed by §173.302a(b) (2), (3) and (4) of Reference (g).

(8) Except as specified in paragraph (b)(2) of this section, if a cylinder, marked with a star, is filled with a compressed gas other than as specified in paragraph (b)(1)(ii) of this section, the star following the most recent test date must be obliterated. The cylinder must be requalified five years from the marked test date, or prior to the first filling with a compressed gas, if the required five-year requalification period has passed.

c. DOT 4-series cylinders. A DOT 4-series cylinder, except a 4L cylinder, that at any time shows evidence of a leak or of internal or external corrosion, denting, bulging or rough usage to the extent that it is likely to be weakened appreciably, or that has lost five percent or more of its official tare weight must be requalified before being refilled and offered for transportation. (See CGA Pamphlet C-6 or C-6.3, as applicable, regarding cylinder weakening.) After testing, the actual tare weight must be recorded as the new tare weight.

d. Cylinders 5.44 kg (12 lbs.) or less with service pressures of 300 psig or less. A cylinder of 5.44 kg (12 lbs.) or less water capacity authorized for service pressure of 300 psig or less must be given a complete external visual inspection at the time periodic requalification becomes due. External visual inspection must be in accordance with CGA Pamphlet C-6 or C-6.1 (IBR, see §171.7 of Reference (g). The cylinder may be proof pressure tested. The test is successful if the cylinder, when examined under test pressure, does not display a defect described in §180.205(i)(1) (ii) or (iii). Upon successful completion of the test and inspection, the cylinder must be marked IAW §180.213, Reference (g).

e. Proof pressure test. A cylinder made in conformance with DOT Specifications 4B, 4BA, 4BW, or 4E protected externally by a suitable corrosion-resistant coating and used exclusively for non-corrosive gas that is commercially free from corroding components may be requalified by volumetric expansion testing or proof pressure testing every 10 years instead of every 5 years. When subjected to a proof pressure test, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

f. Poisonous materials. A cylinder conforming to specification DOT 3A, 3AA, 3B, 4BA, or 4BW having a service pressure of 300 psig or less and used exclusively for methyl bromide, liquid; mixtures of methyl bromide and ethylene dibromide, liquid; mixtures of methyl bromide and chloropicrin, liquid; mixtures of methyl bromide and petroleum solvents, liquid; or methyl bromide and nonflammable, nonliquefied compressed gas mixtures, liquid; commercially free of corroding components, and protected externally by a suitable corrosion resistant coating (such as galvanizing or painting) and internally by a suitable corrosion resistant lining (such as galvanizing) may be tested every 10 years instead of every five years, provided a visual internal and external examination of the cylinder is conducted every five years in accordance with CGA Pamphlet C-6. The cylinder must be examined at each filling, and rejected if a dent, corroded area, leak, or other condition indicates possible weakness.

g. Visual inspections. A cylinder conforming to a specification listed in the table in this paragraph and used exclusively in the service indicated may, instead of a periodic hydrostatic test, be given a complete external visual inspection at the time periodic requalification becomes due. External visual inspection must be in accordance with CGA Pamphlet C-6 or C-6.3, as applicable (IBR, see §171.7 of reference (g)). When this inspection is used instead of hydrostatic

pressure, testing, subsequent inspections are required at five-year intervals after the first inspection. After May 31, 2004, inspections must be made only by persons holding a current RIN and the results recorded and maintained in accordance with §180.215, Reference (g). Records must include: date of inspection (month and year); DOT specification number; cylinder identification (registered symbol and serial number, date of manufacture, and owner); type of cylinder protective coating (including statement as to need of refinishing or recoating); conditions checked (*e.g.,* leakage, corrosion, gouges, dents or digs in shell or heads, broken or damaged foot ring or protective ring or fire damage); disposition of cylinder (returned to service, returned to cylinder manufacturer for repairs or condemned). A cylinder passing requalification by the external visual inspection must be marked in accordance with §180.213, Reference (g). Specification cylinders must be in exclusive service as shown in the following table:

Cylinders conforming to—	**Used exclusively for—**
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4AA480	Anhydrous ammonia of at least 99.95% purity.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW	Butadiene, inhibited, that is commercially free from corroding components.
DOT 3A, DOT 3A480X, DOT 3AA, DOT 3B, DOT 4AA480, DOT 4B, DOT 4BA, DOT 4BW	Cyclopropane that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Chlorinated hydrocarbons and mixtures thereof that are commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Fluorinated hydrocarbons and mixtures thereof that are commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Liquefied hydrocarbon gas that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Liquefied petroleum gas that meets the detail requirements limits in Table 1 of ASTMI 1835, Standard Specification for Liquefied Petroleum (LP) Gases (incorporated by reference; see §171.7 of Reference (g) or an equivalent standard containing the same limits.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Methylacetylene-propadiene, stabilized, that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW	Anhydrous mono, di,trimethylamines that are commercially free from corroding components.

DOT 4B240, DOT 4BW240	Ethyleneimine, stabilized.
DOT 4BW	Alkali metal alloys, liquid, n.o.s., Alkali metal dispersions or Alkaline earth metal dispersions, Potassium, Potassium Sodium alloys and Sodium that are commercially free of corroding components.

h. Cylinders containing anhydrous ammonia. A cylinder conforming to specification DOT 3A, 3A480X, or 4AA480 used exclusively for anhydrous ammonia, commercially free from corroding components, and protected externally by a suitable corrosion-resistant coating (such as paint) may be requalified every 10 years instead of every five years.

i. Requalification of DOT-8 series cylinders.

(1) Each owner of a DOT-8 series cylinder used to transport acetylene must have the cylinder shell and the porous filler requalified. (IBR, see §171.7 of reference (g)). Requalification must be performed in accordance with the following schedule:

Date of cylinder manufacture	Shell (visual inspection) requalification		Porous filler requalification	
	Initial	Subsequent	Initial	Subsequent
Before January 1, 1991	Before January 1, 2001	10 years	Before January 1, 2011	Not required.
On or after January 1, 1991	10 years[1]	10 years	5 to 20 years[2]	Not required.

[1]Years from the date of cylinder manufacture.
[2]No sooner than 5 years, and no later than 20 years from the date of manufacture.

(2) Unless requalified and marked before October 1, 1994, an acetylene cylinder must be requalified by a person who holds a current RIN.

(3) If a cylinder valve is replaced, a cylinder valve of the same weight must be used, or the tare weight of the cylinder must be adjusted to compensate for valve weight differential.

(4) The person performing a visual inspection or requalification must record the results as specified in §180.215.

(5) The person performing a visual inspection or requalification must mark the cylinder as specified in §180.213.

j. Cylinder used as a fire extinguisher. Only a DOT specification cylinder used as a fire extinguisher and meeting Special Provision 18 in §172.102(c)(1) of Reference (g) may be requalified in accordance with this paragraph (j).

(1) A DOT 4B, 4BA, 4B240ET or 4BW cylinder may be tested as follows:

(a) For a cylinder with a water capacity of 5.44 kg (12 lbs.) or less, by volumetric expansion test using the water jacket method or by proof pressure test. A requalification must be performed by the end of 12 years after the original test date and at 12-year intervals thereafter.

(b) For a cylinder having a water capacity over 5.44 kg (12 lbs.)—

1. By proof pressure test. A requalification must be performed by the end of 12 years after the original test date and at 7-year intervals; or

2. By volumetric expansion test using the water jacket method. A requalification must be performed 12 years after the original test date and at 12-year intervals thereafter.

(2) A DOT 3A, 3AA, or 3AL cylinder must be requalified by volumetric expansion test using the water jacket method. A requalification must be performed 12 years after the original test date and at 12-year intervals thereafter.

k. 3HT cylinders. In addition to the other requirements of this section, a cylinder marked DOT-3HT must be requalified in accordance with CGA C-8 (IBR, see §171.7 of Reference (g).

l. Requalification of foreign cylinders filled for export. A cylinder manufactured outside the United States, other than as provided in §§171.12(a) and 171.23(a) of Reference (g), that has not been manufactured, inspected, tested and marked in accordance with part 178 of Reference (g) may be filled with compressed gas in the United States, and shipped solely for export if it meets the following requirements, in addition to other requirements of Reference (g):

(1) It has been inspected, tested and marked (with only the month and year of test) in conformance with the procedures and requirements of this subpart or the Associate Administrator has authorized the filling company to fill foreign cylinders under an alternative method of qualification; and

(2) It is offered for transportation in conformance with the requirements of §171.12(a)(4) or §171.23(a)(4) of Reference (g).

m. DOT-3AL cylinders manufactured of 6351-T6 aluminum alloy. In addition to the periodic requalification and marking described in §180.205, Reference (g), each cylinder manufactured of aluminum alloy 6351-T6 used in self-contained underwater breathing apparatus (SCUBA), self-contained breathing apparatus (SCBA), or oxygen service must be requalified and inspected for sustained load cracking in accordance with the non-destructive examination method described in the following table. Each cylinder with sustained load cracking that has expanded into the neck threads must be condemned in accordance with §180.205(i), Reference (g). This provision does not apply to cylinders used for carbon dioxide, fire extinguisher or other industrial gas service.

REQUALIFICATION AND INSPECTION OF DOT-3AL CYLINDERS MADE OF ALUMINUM ALLOY 6351-T6

Requalification requirement	Examination procedure[1]	Sustained Load Cracking Condemnation Criteria[2]	Requalification period (years)
Eddy current examination combined with visual inspection	Eddy current—In accordance with Appendix C of this part Visual inspection—In accordance with CGA Pamphlet C-6.1 (IBR; see §171.7 of Reference (g)	Any crack in the neck or shoulder of 2 thread lengths or more	5

[1]The requalified performing eddy current must be familiar with the eddy current equipment and must standardize (calibrate) the system in accordance with the requirements provided in Appendix C to this part.

[2]The eddy current must be applied from the inside of the cylinder's neck to detect any sustained load cracking that has expanded into the neck threads.

n. Requalification Identification. Each cylinder passing the requalification test and inspection must be marked with the facilities assigned identification number set in a square pattern, between the month and year of the requalification date. This number shall be stamped in characters not less than 1/8-inch high with the first character occupying the upper left corner of the square pattern. The second character must be in the upper right, the third in the lower right, and the fourth in the lower left. Example: A cylinder requalified in May 1984 and approved by a facility that has been issued identification number A123 would be stamped:

A 1
5 84
3 2

Variations from the marking needs may be allowed on written request to, and approval issued by, the Director, Associate Administrator for Hazardous materials Safety at PHMSA. Stamping must be IAW the location requirements of the cylinder specification. Previous requalification dates must not be destroyed. Cylinders subject to a modified requalification and cylinders free from requalification need not be marked with a registration identification number.

o. Requalification Exemptions. All cylinders not exceeding an outside diameter of 2 inches and a length of 2 feet, and all cylinders labelled 3E and 4C are freed from hydrostatic requalification.

p. Requalification Requirements. The requirement for a cylinder to be retested after the end of a specific service period is further clarified to show that after the end of the service period, the cylinder shall not be recharged until the requalification is performed. This implies a visually serviceable full cylinder is considered fully serviceable until the product is used up, and then cannot be refilled until a requalification test and inspection is performed. An exception to this extension of the retest period for cylinders still full of product is the specific requirements for cylinders used as fire extinguishers. Such cylinders (extinguishers) must be removed from service, emptied, and requalified at intervals not to exceed those intervals named in Table L-1, Paragraph 1910.157f, and Reference (l)." All periods cited here meet or exceed the requalification needs outlined in Reference (g). DOD activities will requalify cylinders as cited here. IMPORTANT: All cylinders must be requalified by a facility that has been inspected and registered with DOT (see enclosure 13).

q. Acetylene Cylinder Requalification (8 or 8AL).

(1) The owner of a DOT 8 or 8AL cylinder used in the transport of flammable acetylene must have the cylinder (s) shell and porous filler requalified the requalification must be performed by an approved requalification facility and IAW the following schedule:

SHELL REQUALIFICATION

Date of cylinder make	Initial Inspection	Following Inspection
Before 1 JAN 1991	Before 1 JAN 2001	Every 10 years after that
From 1 JAN 1991	10 years from Date of make	Every 10 years after that

POROUS FILLER REQUALIFICATION

Date of cylinder make	Initial Inspection	Following Inspection
Before 1 JAN 1991	Before 1 JAN 2011	Not needed
From 1 JAN 1991	3 to 20 years*	Not needed

*For cylinders made from 1 JAN 1991, requalification of the porous filler must be performed no sooner than 3 years, and before 20 years from the date of make.

(a) Acetylene cylinders must be requalified by a person who holds a valid re-testers identification number in conformance with paragraph 180.209 of Reference (g). Each cylinder successfully passing a shell or filler requalification must be marked with the testers' identification number and paragraph 3-3B of this document. In addition, the cylinder must be suitably marked to identify the type of requalification performed. For example, the letter AS@ for a shell requalification and the letter AF@ for a porous filler requalification.

(b) If a cylinder valve is replaced, a cylinder valve of the same weight must be used, or the tare weight of the cylinder must be adjusted to compensate for the valve weight differential.

3. Cylinder Valves. The physical and functional design of the compressed gas cylinder valve is critical to its named application with a specific gas product. Each valve is designed with an outlet connection, which prevents the cylinder from being connected to a system not compatible with the gas product. Examples: To prevent an oxidizing gas cylinder, (such as one containing oxygen), to be connected to a flammable gas system such as a system containing acetylene or prevent a life-threatening gas from being connected to a medical, dental, or veterinary gas system for respiratory use. Cylinder valve outlet connection adapters must only be used within the same commodity group with compatible applications. All valves bought for use on Government-owned cylinders shall meet all CID-A-A-59860 Series, Valves, Cylinder gas (For Compressed or Liquefied Gases), General Specifications (and the specific; specification sheets within the CID-A-A-59860 series). Information on the various cylinder valve outlet designs and their specific assigned gas applications is provided in Federal Standard (FED STD) H28, Screw-Thread Standards for Federal Services, and FED STD H28/9, Gas Cylinder Valve Outlet and Inlet Threads. These documents incorporate the detailed design and manufacturing needs published in the industry standard identified as the Compressed Gas Association (CGA) Pamphlet V-1, Compressed Gas Cylinder Valve Outlet, and Inlet Connections.

a. Valve Buying. CID-A-A-59860 and all its added specification sheets have been developed to provide all necessary data to competitively buy cylinder valves for each gas product used by the Government. A type designator has been assigned to each valve that identifies the specification sheet, the assigned valve outlet connection number, and, if applicable, the standard pressure relief device. Valves installed on Government-owned cylinders may not always conform to the latest issue of CID-A-A-59860; however, they must have an outlet connection compatible with the product contained in the cylinder. Replacement of nonconforming valves is only needed if the valve is defective, is not properly marked, does not have the proper outlet connection, or has an improper pressure relief device that cannot be changed. Several of the compressed gas cylinders used by DOD have valve outlet connections that are common for several different gases based on the properties of the gases. When a suitable outlet connection cannot be identified by visual inspection, it is recommended that a valve outlet connection nipple and a nut from a regulator of a known compatible application be tried on the outlet. This method is preferred overusing an outlet plug or cap because some connections employ the same size thread but the bore depth to accept the connection nipple is different to prevent cross connection. Valve design and outlet connection number assignments have not been accomplished on all gases or gas mixtures. Contact DLA Aviation-FAJ for valves, specific valve designs, and cylinder designs not identified in CID-A-A-59860.

b. Medical Valves. Materials sanctioned by the National Aeronautics and Space Administration (NASA) is named for medical cylinder valves. Materials routinely used in the commercial marketplace, such as neoprene, have been found to be harmful in high-pressure oxygen systems. Valves that are chromium plated should have approved materials, as recommended by NASA, and as named for valves management by DLA Troop Support.

Cylinder valves on refillable medical gas cylinders that are not chromium plated shall be replaced.

c. Fire Extinguishing System Cylinder Valves. Fire extinguishing system cylinder valves for carbon dioxide and bromotrifluoromethane (Halon 1301) will be different. Navy fire extinguishing system cylinder valves, as prescribed by MIL-V-17360 for carbon dioxide, and MIL-E-24572 for Halon 1301, will be used.

4. Color Coding. All personnel who handle or use compressed gas cylinders must be familiar with the purpose of color-coding cylinders to the needs of Reference (h). Color-coding is provided as a hazard warning and should be used with other characteristics such as physical size, valve outlet connection, nomenclature stamped on the valve, nomenclature stenciled on the cylinder, type, and service pressure of the cylinder, to identify the contents of the cylinder.

Any of the following six colors on the body, top, or as a band (s) on compressed gas cylinders shall serve as a hazard warning: Yellow (flammable), Brown (toxic and poisonous), Blue (anesthetic and harmful), Green (oxidizers), Gray (dangerously high pressure and an asphyxiant), and Red (fire protection). Contact DLA Aviation and or DLA Energy Aerospace immediately on any doubts to the contents of the cylinder and store the cylinder as a poison gas until the contents are verified.

ENCLOSURE 6

INSPECTION OF CYLINDERS

1. Criteria of Inspection Elements.

a. Cylinder Identification. Assignment or identification of cylinders to an NSN will be performed by considering the following characteristics: Shatterable, Nonshatterable, Impact resistant, ICC or DOT Specification, Service Pressure, Color Code, Valve Outlet Connection, Cylinder Dimensions (see paragraph 3-2c), and Chemical name of the gas.

To help in the proper identification of compressed gas cylinders, DLA Aviation has developed a method of setting up a specific reference number (PN) that will aid in the search for the assigned NSN. Develop a reference number using the characteristics listed above and the table of approved item name codes (INC) found in the Federal Item Identification Guide No. T-162.

Example: 3AA2265/49502/9.25X51-540-252CF

3AA	Represents the ICC or DOT Manufacturing Spec.
2265	Represents the Service Pressure of the Cylinder
49502	Represents the Item Name Code for Aviator's Breathing Oxygen
9.25x51	Represents the physical dimensions of the cylinder
540	Represents the valve outlet connection no. for oxygen A-A-59860
252CF	Represents the capacity of the cylinder is cubic feet, this can also express as pounds (lb.) for liquid filled cylinders and gallons (gal) for medical gases expressed in gallons of gaseous products.

b. Cylinder Count. Verify cylinder count to make sure the quantity agrees with the shipping documentation.

c. Government Ownership. Before the central management of compressed gases and their cylinders, each government agency managed, and bought their own cylinders. To identify the buying activity and the owner of the cylinder, each agency got from the then ICC, an ownership name in the form of a number and an appointed code. The code could be a trademark or a series of letters representing an acronym of the activity. Some of the agencies, when buying cylinders had their appointed code combined in the serial number. It usually appeared as a prefix with the letters running horizontal in line with the serial number. In others, the letters were put vertically at the beginning of the serial number. And still others, the code was just stamped on the shoulder of the cylinder to show ownership.
Each cylinder, which is procured centrally by DLA Aviation or DLA Energy Aerospace

San Antonio will have a serial number that is prefixed with “CX” for Richmond and “DLAE” for San Antonio to identify the buying agency and the letters “U S GOVT” stamped into the shoulder of the cylinder below the serial number to show government ownership. The following list provides all known codes used over the years to buy cylinders for the various government agencies.

Since all cylinders are now circulated to all DOD and other government agencies, each code now only represents the cylinder is a government owned cylinder.

(1) Cylinder ownership symbols used over the years by various government agencies are as follows:

AF	U.S. AIR FORCE
CWSUSA	CHEMICAL WARFARE SERVICE
DA	DEPT OF THE ARMY
EAD-O	CORP OF ENG. U.S. ARMY
FBVE	TREASURY DEPT.
LH	DEPT OF COMMERCE, LIGHTHOUSE DIST.
LHS	U.S. DEPT FOR COMMERCE, LIGHTHOUSE DIST
MDSFGP	DEFENSE LOGISTICS AGENCY
MDUSA	DEFENSE LOGISTICS AGENCY
NFBC	U.S. ENGINEER CORPS.
TP&USA	TREASURY DEPT
TPSUSA	TREASURY DEPT
USA	U.S. ARMY
USAF	U.S. AIR FORCE
US ARMY	U.S. ARMY
USBM	U.S. BUREAU OF MINES
USBOM	U.S. BUREAU OF MINES
USBR	DEPT OF INTERIOR, BUREAU OF RECLAMATION
USCEC	U.S. CORPS OF ENGS, DEPT OF ARMY
USCG	U.S. COAST GUARD
USDA	U.S. DEPT OF AGRICULTURE
USDA-NU	U.S. DEPT OF AGRICULTURE
USDAARC	U.S. DEPT OF AGRICULTURE AGRICULTURE RESEARCH CENTER
USDABACE	U.S. DEPT OF AGRICULTURE, BUREAU OF AGRICULTURE CHEM.&ENG
USDABEPB	U.S. DEPT OF AGRICULTURE BUREAU OF ENTOMOLOGY & PLANT QUARANTINE
USDAFS	U.S. DEPT OF AGRICULTURE

	BUREAU OF SOILS
USDANRRL	U.S. DEPT OF AGRICULTURE AGRICULTURE RES. ADMINISTRATION
USDASCS	U.S. DEPT OF AGRICULTURE SOIL CONSERVATION SERVICES
USECP	ENG. CORP, U S ARMY.
USED	U.S. ENG CORPS.
USGOVT	DEFENSE LOGISTICS AGENCY
USLHS	U.S. DEPT OF COMMERCE, LIGHTHOUSE DIST.
USN	U.S. NAVY
USNAVY	U.S. NAVY
USSIGC	U.S. SIGNAL CORPS.
WD	WAR DEPT U.S. ARMY
WDE	U.S. ENG. OFFICE

(2) The total name of a DOD or other government agency may be stamped into the shoulder of the cylinder or embossed on the neck ring of the cylinder.

(3) A Military or Federal Specification Number may be stamped into the shoulder of the cylinder when the cylinder is made to a specific Mil or Fed Specification besides or instead of a DOT specification. See Enclosure 5 (1) (a).

(4) Place cylinders not identified by one of the above criteria in Condition Code J and determine the proper ownership. DLA Aviation-FAJ (DSN 695-3230) has a database of about 10,000 military and commercial ownership symbols that have been compiled by the DOT. These codes represent the ownership codes that have been recorded from the first assigned code through the year 1969, when DOT no longer recorded the codes. Newly assigned codes from then are now recorded by the Compressed Gas Association. These codes are recorded and published in the CGA Pamphlets C-16 and C-16.1. If the person having charge of the cylinder can identify all the marking on the shoulder of the cylinder, usually the rightful owner of the cylinder can be found. The person having charge of the cylinder will contact the owner for the return of the cylinder.

d. Obsolete, Unserviceable, and Unauthorized Cylinders. The following cylinders will be considered unserviceable regardless of their physical appearance and shall be removed from service:

(1) All cylinders made by Taylor Division, Cuneo Press. These cylinders may be Identified by the symbol "cTd" stamped under or near the serial number or hydrostatic test date.

(2) Cylinders made by the Taylor-Wharton Iron and Steel Company during the period 1942 to 1944, with a service pressure that has increased from 1800 to 2015 psig. These cylinders will have the manufacturer's symbol of "TW" stamped near the serial number on the shoulder of the cylinder, and evidence the service pressure has been re-stamped to 2015. The date of make is identified as the earliest hydrostatic test date found on the cylinder.

(3) Cylinders not made, inspected, and tested IAW the applicable DOT specifications as set forth in Reference (g), Part 178, Subpart C, and requalified (retested) IAW Reference (g), Section 173 (see enclosure 5 (1)). A cylinder made by an approved source will contain at least the permanent markings required by Reference (g). These markings must include:

(a) a DOT specification number followed by the service pressure.

(b) a serial number followed by an identifying symbol of the maker or buyer

(c) an approved inspector's official mark and the date of test.

Exceptions will be cylinders made to a Military Specifications for a specific military application. In such cases, the MIL SPEC will be stamped on the cylinder instead of the DOT specification. The retest criteria are founded on the cylinder design and its application as cited in the design specification.

e. Physical Condition. Visually inspect all cylinders for physical defects as outlined in:

(1) CGA Pamphlets C-6, Standards for Visual Inspection of Compressed Gas Cylinders

(2) C-6.1, Standards for Visual Inspection of High-Pressure Aluminum Compressed Gas Cylinders

(3) C-6.2, Guidelines for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders

(4) C-6.3, Guidelines for Visual inspection and Requalification of Low-Pressure Aluminum Compressed Gas Cylinders

(5) Guidelines for Visual Inspection and Requalification of Acetylene Cylinders.

Cylinders with defects equal to or greater than the limits imposed by the CGA Pamphlets must be condemned and a DD Form 1577, Unserviceable (Condemned) Tag-Materiel, attached to the cylinder.

The visual inspection requirements, cited above and referenced in CGA pamphlet C-6, are also found in detail in Reference 1 (r). Either document may be used by DOD activities when performing a visual inspection.

f. Permanent Markings. The permanent marking requirements for compressed gas cylinders
are found in the applicable DOT specification in Part 178 of Reference (g) and in the Government procurement specification. These markings must be preserved in legible condition as required by Part 173 of Reference (g).

g. Outside Finish. The quality of the outer finish shall be based on the following criteria:

(1) Remove rust, scale, caked paint, and all remnants of adhesive labels or decals before painting as outlined in Reference (f).

(2) Properly and uniformly, apply the correct primer and paint IAW Reference (f).

(3) The proper color code and chemical name for the product contained in the cylinder must be IAW Reference (h).

(4) The color bands and stenciling are sharp and distinct, of proper size, and in the correct location.

h. Requalification Inspection and Test. Requirements are as follows:

(1) Requalification needs shall be decided using the criteria cited in paragraph 3-3D.

(2) Carry out requalification IAW Reference (g) and Reference (f).

(3) Requalification must be done by facilities that have been approved and registered with DOT.

(4) Cylinders must be: Requalified, Modified, and Marked, to allow charging to a pressure 10 percent more than their marked service pressure only when named in the contract or delivery order and when all data necessary to satisfy the needs of Reference (g) Section 173 are available and the cylinder is supplied with a frangible type pressure relief device rated for use with the service pressure of the cylinder. The rupture pressure rating for the frangible disk is stamped on the cap, which holds the disk in place.

(5) The requalification date represented by the month and year must be stamped into the shoulder of the cylinder. Stamp the DOT approved registration name of the requalifying facility between the month and year.

i. Valves or Plugs. Requirements are as follows:

(1) Valves or Plugs.

(a) They are serviceable and functionally equal to new valves in operation and cleanliness.

(b) They are supplied with a fully serviceable, and properly rated, pressure relief device for the cylinder in which they are or will be installed.

(c) They are equipped with the proper CGA valve outlet connection for the CID-A-A- 59860 valve type named for the cylinder assembly (specific gas application).

(d) Identification (if any) on the side of the valve is that of the appointed compressed gas application and is compatible with the outlet connection. If the valve is otherwise acceptable but unmarked, the name of the gas (see CID-A-A-59860) must be applied by a decal. Fire extinguishing system cylinders, CO2 and Halon, do not have CID-A-A-59860 type valves.

(2) Use a combination frangible disk-fusible plug type pressure-relief device with a stamped bursting pressure of 3000 psig and a temperature of 165°F (Type S-4) or 212°F (Type S-5) is approved for cylinders with service pressures of 1800 through 2400 psig. This device meets all needs of both DOT and CGA for high-pressure gas applications (see CID-A-A-59860 for approved applications). This device cannot be used for any cryogenic application or with any cylinder that has been requalified and stamped (+ mark after the last retest date) for 10 percent over pressurization. Type 1 pressure relief devices must be used with such cylinders. (NOTE: Certain gases must be put into cylinders without a pressure relief device and must have valve protection caps, e.g., phosgene.)

(3) Valves must be free of insects, insect webs, dirt, corrosion, oil, or grease. The bore, throat and threads of the valve outlet must be free of any paint splatter or over spray caused by lack of protection when painting the cylinder. Use minimal concern for paint on other parts of the valve unless it affects its operation. Do not mistake thread compound as oil or grease, or the other way around.

(4) Metal valve outlet caps or plugs as named in CID-A-A-59860, designed to form a secondary seal is needed on full chlorine and phosgene cylinders. Valve outlet caps/plugs designed to prevent contamination of the valve outlet port are needed on cylinders of aviator's breathing and medical oxygen, medical carbon dioxide, medical oxygen-helium mixtures, nitrous oxide, and air for respiration (human or veterinary). Valve outlet caps or plugs are not mandatory on certain empty cylinders; however, securely install on the valve outlet a cap or plug attached to the cylinder. Added needs for caps and plugs are the responsibility of the using DOD activity.

(5) A valve designed for a hand wheel must have the hand wheel in place, not broken, cracked or otherwise defective.

(6) A valve designed for a pressure relief device must be set up with the proper type and pressure rating for the cylinder in which it is installed.

(7) All cylinder valves (except oxygen) must be installed using an approved grade anti-seize thread compound or tape that is compatible with the gas that is charged into the cylinder. Oxygen cylinder valves must be installed using “Teflon” tape equivalent to that described in Fed Spec A-A-58092, Tape, Anti-seize, Polytetrafluorethylene.

(8) New valves must be installed with a maximum of five and a minimum of three threads showing. New valves installed with less than three threads showing (necessary to provide a seal) shall be removed and the cause determined.

(9) Cylinder valves must be replaced when the following conditions exist:

(a) When less than one inlet thread is exposed on valves installed in cylinders needing internal maintenance or requalification inspection and testing.

(b) When less than one-half inlet thread is exposed on valves installed in cylinders not requiring internal maintenance or requalification inspection and testing.

(c) Cylinder valves on refillable medical gas cylinders that are not chromium plated must be replaced.

(10) A used or reconditioned serviceable cylinder valve must be reinstalled in the cylinder from which it was removed, with a maximum of five and a minimum of one thread showing.

(11) Remove banned lead thimble inserts, sometimes used to compensate for thread wear.

(12) Plugs, when installed instead of valves, must be steel plugs with 3/8-18NGT, 2-14NGT, 3/4-14NGT, or 1-11 1/2NGT, as needed. The plugs must be equipped with wrench flats. Plugs must be installed wrench tight, using thread compounds referenced in subparagraph 7, above.

j. Neck Rings (Flanges) and Foot Rings. Requirements are as follows:

(1) Rings will be in place and secure.

(2) Neck ring threads must be in serviceable condition, capable of securely holding the valve protection cap with the cap installed to full thread engagement.

(3) Foot rings must be securely welded to the bottom of the cylinder and not cracked or bent.

k. Valve Protection Caps. Requirements are as follows:

(1) Valve protection caps must be installed on all cylinders designed with neck rings or flanges.

(2) Protection caps must be of correct size and installed on all cylinders designed with neck rings or flanges.

(3) Caps must be painted to comply with the color code of the cylinder on which they are installed as outlined in Enclosure 5 (4).

l. Cleanliness. Cylinders must be free of oil, grease, and all foreign matter. Anti-seize

compound may be found where the valve is inserted into the cylinder. This is not considered foreign matter. All excess thread compound shall be removed, and the area wiped clean.

m. Labels and Tags. **NOTE**: When there is a conflict between DOD label and tag specifications wanted by the host nation; the stricter needs must apply.

Cylinders must be labeled or tagged, and shipping documents noted IAW the requirements of the contract or delivery order to comply with Reference (g), Part 173, Subpart E, Reference 1 (i), Part 82 and with Reference (q). Cylinders must also have a label or tag attached with the statement "Dangerous-Compressed Gas Cylinder -Only Trained Personnel Should Handle." All cylinders containing a Chlorinated Fluorocarbon: (CFC) refrigerant gas must also contain a label with the following warning: "WARNING; CONTAINS A SUBSTANCE WHICH HARMS PUBLIC HEALTH AND ENVIRONMENT BY DESTROYING OZONE IN THE UPPER ATMOSPHERE."

n. Condition Codes. Condition Codes A, D, F, H, J, K, or L, as defined in Enclosure 11, will be assigned as applicable.

o. Leakage Test. A leakage test must be performed on all cylinders that have been filled with a compressed, gas IAW the fill contract or delivery orders. Each cylinder must be tested at all points that may provide a point of escape for the cylinder contents. Points to inspect are the pressure relief devices in the head and bottom of acetylene cylinders; points on each cylinder valve, such as: The stem, the pressure relief device, the valve inlet threads, and the valve outlet. Tests shall be done IAW paragraph 5.4.4 of Reference (f).

2. Receiving Inspection. (Receipts from Procurement). A receiving inspection must be performed on all new, reconditioned, or filled cylinders received from a commercial contractor. Discrepancies shall be reported on Standard Form (SF) 364, Report of Discrepancy, and IAW Enclosure 12 (2) (b). Applicable inspection elements are pointed out within the following paragraphs:

Inspection Element	Enclosure
a. Cylinder Identification	6 (1)(a)
b. Cylinder Count	6 (1)(b)
c. Government-Owned Cylinders	6 (1)(c)
d. Obsolete Cylinders	6 (1)(d)
e. Physical Condition (Internal Inspection Not Required)	6 (1)(e)
f. Permanent Markings	6 (1)(f)
g. Exterior Finish	6 (1)(g)
h. Requalification Inspection and Test	6 (1)(h)
i. Valves or Plugs	6 (1)(i)
j. Neck Rings (Flanges) and Foot Rings	6 (1)(j)

k.	Valve Protection Caps	6 (1)(k)
l.	Cleanliness	6 (1)(l)
m.	Labels and Tags	6 (1)(m)
n.	Condition Codes	6 (1)(n)
o.	Leakage Test	6(1)(o)

Match the item to its Safety Data Sheet (SDS). This is a “critical” step in the process. The items must not be inducted into the operating system until there is a perfect match established between the item being processed and the SDS or product information that applies to it in the Hazardous Materials Information Resource System (HMIRS). In most cases, there will be more than one SDS or Product Information Sheet (PIS) in the HMIRS for an NSN identified commodity. For this reason, it is important that the items be delivered with complete and accurate identifying information. Since the SDS or PIS number assigned by HMIRS and the number that is assigned by the supplier have no complementary identifying number or marking on the item to be received, the process must depend upon a well-trained and qualified receiving workforce. The accuracy of this process may depend totally upon the judgement of the receiving personnel. Often, choices for the precise SDS or PIS that relates to the item can be difficult to choose. Careful scrutiny of the item data may take several hours or days to ensure a perfect match between the item and its SDS or PIS. Until this step is accurately and confidently completed, the facility and workers are at risk of unknown dangers associated with these items. To ensure a near flawless receipt process for hazardous materials, future systems must take into consideration the development of new emerging technologies [i.e., Automatic Identification Technology (AIT) using the Global Trade Item Number (GTIN) or other equivalent commercial developments with national and international application] and apply them as prudently and rapidly as possible.

3. Receiving Inspection. (Customer Returns). All cylinders received as customer returns will be handled, separated, and stored in the same manner as filled cylinders (described in Enclosure 7). Personnel must always recognize the potential of varying amounts of residual gas, including full pressure in a cylinder received as "EMPTY."

a. Empty Cylinders. Add customer-returned cylinders identified as "EMPTY" to the records and report to DLA Aviation or DLA Troop Support as Federal Supply Code (FSC) 8120 cylinders. Use SF 364 to report the receipt of empty customer returns identified as FSC 6830 or 6505 on DD Form 1348-1, DOD Single Line Item Release/Receipt Document, by the shipping activity. This report will show the FSC 6830 or 6505 NSN cited on the DD Form 1348-1 in Block 9 and the correct FSC 8120 with which the cylinder should be identified in Block 12. Even though the cylinders are considered empty for accounting purposes, they must be labeled and tagged for shipment as required by Reference (g). If the cylinder is empty according to the DOT definition of an empty cylinder (cleaned and purged of all poisonous or flammable contents, less than 25 psig nonflammable, nonhazardous material); the cylinder shall be identified as an “EMPTY”, and the previous label (s) removed or destroyed (including the "EMPTY" label). Cylinders containing poisonous or flammable residue, or if the pressure is greater than 25 psig, the cylinder will be identified in the same manner as a full cylinder.

b. Full Cylinders. Customer-returned cylinders identified as "FULL" must be picked up on the records and reported to DLA Aviation or DLA Troop Support as FSC 6830 or 6505. The

return of full cylinders is not normally approved because the contents of the cylinder cannot be verified (DLAR 7000.4, Reporting, and Return of Excess Material to the DLA Distribution System); however, extenuating circumstances will at times need return of such cylinders. Cylinders received as full shall be completely inspected to ensure the shipping description and the cylinder contents agree. Inspection needs for this inspection are outlined in paragraph 4-3.

c. Receiving Inspection. (Redistribution). Inspection details for this receipt are the same as those outlined in paragraph 3.

4. Periodic Inspection. Cylinder contents evaluation about either quality or quantity is not needed, unless asked by the managing activity. Inspect all empty cylinders in Condition Code A every 6 months to decide their serviceability status about the requalification date and physical condition. Change the Condition Codes as required. If the contents must be emptied to perform necessary maintenance, the contents of the cylinder will be handled and disposed of as outlined in Enclosure 9. Report all cylinders reclassified to show the change in Condition Codes. Applicable inspection details are showed within the following paragraphs:

Inspection Element	Enclosure
a. Cylinder Identification	6 (1)(a)
b. Physical Condition (Internal Inspection Not Required)	6 (1)(e)
c. Permanent Markings	6 (1)(f)
d. Exterior Finish	6 (1)(g)
e. Requalification Inspection and Test	6 (1)(h)
f. Cleanliness	6 (1)(l)
g. Labels and Tags	6 (1)(m)
h. Condition Code	6 (1)(n)

5. Shipping Inspection. Empty cylinders in Condition Code A must not be shipped from Defense Depots to CONUS activities if their requalification date is due within 3 months. Empty cylinders whose requalification date is due within 2 years or less must not be shipped to overseas activities. Reclassify cylinders that are due for retest within 3 months to Condition Code D or F (see Enclosure 11) and report to DLA Aviation or DLA Troop Support.

a. Full cylinders that are in satisfactory physical condition are considered serviceable for local and CONUS use regardless of their last requalification date.

b. Full cylinders for which the requalification date is overdue or due within 2 years must not be shipped to overseas customers. Ship these cylinders only to CONUS activities or assigned Condition Code D or F. If the contents must be emptied to perform necessary maintenance, the contents of the cylinder will be handled and disposed of as outlined in Enclosure 9.

c. Empty propane cylinders, except for new or contractually reconditioned cylinders being transported via military airlift, require special preparation before delivery to the CONUS

shipping point. Empty all such cylinders of their contents IAW Enclosure 9. Remove the valves, rinse the cylinders (first with denatured ethyl alcohol and then with water), dry with oil-free compressed air or nitrogen, and re-valve. A tag or label with the note "PREPARED FOR AIR SHIPMENT UNDER AFJMAN 24- 204_IP/TM 38-250/NAVSUP PUB 505/MCO P4030.19G/DLAM 4145.3" (Reference (m)) will be attached to each cylinder.

d. In-storage maintenance, as defined in Enclosure 8, must be performed on Condition Code A cylinders before shipment when the need is detected because of pre-shipment inspection.

e. Full and empty cylinders that are labeled Condition Code A must be inspected thoroughly as they are removed out of stock in preparation for shipment. Applicable inspection details are shown within the following paragraphs:

Inspection Element	Paragraph
1. Cylinder Identification	6 (1)(a)
2. Cylinder Count	6 (1)(b)
3. Outside Finish	6 (1)(c)
4. Requalification Inspection and Test	6 (1)(h)
5. Valves or Plugs	6 (1)(i)
6. Valve Protection Caps	6 (1)(k)
7. Cleanliness	6 (1)(l)
8. Labels and Tags	6 (1)(m)
9. Condition Codes	6 (1)(n)

f. Full and empty cylinders classified as Condition Code D or F being shipped for refill or reconditioning must be inspected thoroughly as they are taken out of stock before shipment. Applicable inspection details are shown within the following paragraphs:

Inspection Element	Paragraph
a. Cylinder Identification	6 (1)(a)
b. Cylinder Count	6 (1)(b)
c. Valve Protection Caps	6 (1)(k)
d. Labels and Tags	6 (1)(m)
e. Condition Codes	6 (1)(n)

g. The terms of Reference (m) apply when the shipment is military aircraft.

ENCLOSURE 7

SAFE USE, STORAGE, AND HANDLING

1. Filling of Cylinders. Compressed gas cylinders must only be filled by the owner or with the owner's consent. The property keeper and the assigned contracting officer for the procurement of compressed gases in Government-owned cylinders take this responsibility. The contents of a cylinder must be identified by the proper chemical name and the cylinder must be properly color coded and stenciled IAW Reference (h), latest edition. All cylinders used for transportation and storage of compressed gases must comply with the applicable DOD and DOT rules and specifications (see Enclosure 6 (1).)

a. Maximum Filling Capacities. Cylinder filling capacities must be as approved and regulated by Reference (g), Part 173, and the data permanently stamped into the head or shoulder of the cylinder. Cylinders for gases in a liquefied state at 70°F must be charged by weight based on the filling density (percentage) of the product and the water weight capacity of the cylinders.

The weight of the product is found by multiplying the products fill density as found in Reference (g), Part 173, by the weight of the water the cylinder will hold. Cylinders for gases in a gaseous state at 70°F must be charged by pressure to a calculated pressure based on the charging temperature and the service pressure of the cylinders. The filling pressure shall be

decided by adding or subtracting a set up value (about 5 psig) to or from the service pressure of the cylinders for each degree the filling temperature is above or below 70°F. The filling pressure must be convertible to the service pressure of the cylinders at 70°F.

b. Transferring Gases. Compressed gases must not be transferred from one cylinder to another except by approved personnel using specifically designed equipment and the manufacturer's working instructions.

c. Incompatibility. Compressed gas cylinders must not contain incompatible gases capable of combining chemically with each other or with the cylinder material to endanger its serviceability.

d. Cylinder Service. The gas service of a compressed gas cylinder must not be changed unless approved by the applicable Military service engineering activity, DLA Aviation or DLA Energy.

2. **MAINTENANCE** Compressed gas cylinders and their item parts and accessories must be kept only by approved personnel and appointed activities as outlined in section 6. All maintenance and cylinder reconditioning shall be done IAW Reference (f) and must comply with the requirements of Reference (g).

3. **CYLINDER USAGE** The following guidelines are provided to assure safe usage of each cylinder and its contents:

a. Verify the contents of a cylinder by checking: The attached label, the cylinder markings, and the valve and its outlet connection before connecting it for use. Return the cylinder to the

source of supply when the contents of a cylinder cannot be identified. Do not solely depend on the cylinders color code to identify its contents.

b. Always keep the removable valve protection cap, provided to protect the cylinder valve, on the cylinder, except when the cylinder is in use dispensing its contents.

c. Always keep the valve outlet cap or plug provided on the valve outlet except, when the cylinder is in use as stated above.

d. Do not use compressed gas cylinders for any purpose other than to contain the named gas product IAW this Regulation or documents cited here.

e. Always keep the cylinder valve closed (charged or empty), except when the cylinder is in use. The term "in use" means when, gas is flowing from the cylinder, the cylinder gas is keeping pressure in a supply line, or the cylinder is standing by, during and between operations using the gas.

f. Do not place cylinders where they might become a part of an electrical circuit. When the cylinders are used with electric welding, the cylinders shall not be grounded. These precautions are to prevent burning by an electric welding arc.

g. Compressed gas cylinders must not be subjected to a temperature above 125ºF (51.7ºC). A flame must never be allowed to touch with any part of a compressed gas cylinder. If ice or snow collects on a cylinder, thaw with water at a temperature not exceeding 125ºF (51.7ºC).

h. Cylinders must not be subjected to artificially created, low temperatures. Many steels undergo significantly decreased impact resistance and ductility at low temperatures. Some non-cryogenic liquefied gases have relatively low vapor pressures at low surrounding temperatures and may need the use of check valves to prevent backflow into the cylinder.

i. Respiratory protection necessary to ensure the minimal acceptable needs as outlined in:

(1) Reference (p).

(2) Reference (n).

(3) Reference (o) must be used when confronting or handling a leaking cylinder. Proper personal protective equipment for the type of gas must be immediately available and worn when a leak is found or suspected. If the cylinder contains flammable gas, keep it away from all sources of ignition. Remove the leaking cylinder outdoors to a well-ventilated location or place under an exhaust ventilating system suitable for the product. If the gas is hazardous (e.g., flammable, poisonous, corrosive), a proper sign must be placed at the cylinder warning of the dangerous properties. If emergency help or advice about handling a leaking cylinder or other emergencies involving cylinders is needed, the gas supplier should be the first information or help source contacted. If the supplier is unknown or not accessible, contact an information source such as:

a. The U.S. Coast Guard National Response Center at 800-424-8802/ (202) 267-2675.

b. The Chemical Transportation Emergency Center (CHEMTREC) at 800-424 - 9300 or (703) 527-3887 in CONUS and Canada, Puerto Rico, and the Virgin Islands; from overseas, Alaska, and Hawaii, call (+1) (703) 527-3887 collect for advice or help.

j. If a leak develops in the valve packing around the stem, the cylinder valve should be closed and the valve gland or packing nut tightened as suitable. If the leak continues when the valve is reopened, the valve must be reclosed, and a tag attached stating the cylinder is unserviceable. Proper action should then be taken to have the cylinder returned to the fill contractor for proper repair or advice for correct disposition of the cylinder.

k. When in doubt about the routine proper handling of a compressed gas cylinder or its contents; the manufacturer or supplier of the gas must be consulted.

l. A positive pressure of 15 to 24 psig must be kept in all cylinders tagged or labeled empty to prevent the cylinder from becoming contaminated during idle storage or shipment. Before returning an empty cylinder, the valve must be closed and a proper fitting cylinder valve protection cap, if the cylinder is designed for one, must be installed. Valve outlet caps or plugs, if provided, must be installed in a gas tight condition. The empty cylinders must be labeled and tagged IAW Enclosure 6 (3) (a) and subparagraph m, below, of this enclosure.

m. Serviceable, reconditioned, cylinders "cleaned and purged" of hazardous residue in preparation for storage or shipment must be charged with a positive pressure of an inert gas (e.g., nitrogen), or dry, oil-free air not to exceed 24 psig (39 psia) at 70ºF. (Under no circumstances shall shop air be introduced into a "cleaned and purged" serviceable cylinder.) The cylinders must be properly tagged or labeled with DD Form 1574, Serviceable Tag- Materiel, or DD Form 1574-1, Serviceable Label-Materiel. The tag or label must be marked or over-stamped with "Does Not Contain a Hazardous Gas." A DOT "EMPTY" label is not required because the cylinder contains a pressure that is less than 25 psig (40 psia) and it does not contain a dangerous residue.

n. Non-refillable cylinders, such as DOT Specification 39 cylinders, must not be refilled with any material after the original contents have been depleted. The cylinders must be emptied of all pressure (0 PSIG), punctured with a sharp object, and then if possible, flattened.

o. The use of oxygen and fuel gas cylinders, including storage and handling by the user, for welding, cutting, brazing and other allied processes, must comply with the requirements of AWS Standard Z49.1, latest edition, Safety in Welding and Cutting.

4. CONNECTING CYLINDERS AND WITHDRAWING CONTENTS

a. Compressed gases must be handled and used only by properly trained people.

b. The user responsible for handling the cylinder and connecting it for use must check the identity of the gas by reading the label or other markings on the cylinder before using. If the contents are not properly and completely identified, the cylinder must be returned to the supplier without being used. The cylinder color code must not solely be depended on for content identification. It is there to represent the type of hazard the releasing gas would create.

c. Keep the removable valve protection and valve outlet caps and plugs in place until connecting the cylinder for use.

d. Secure all cylinders while in use to prevent them from being pulled or knocked over.

e. Examine the outlet of the valve for any dirt or other contamination before attaching any service device such as a regulator or fill or service manifold pigtail. The outlet may be cleared of dust and dirt by slightly opening the valve for an instantaneous burst of pressure. Always point the valve outlet away from yourself and others. CAUTION: DO NOT CLEAR VALVE OUTLET BY OPENING THE VALVE ON CYLINDERS CONTAINING CORROSIVE, TOXIC, OR POISONOUS GASES.

f. A suitable pressure regulating device, not a needle valve or similar pressure reducing device without a regulating mechanism, must be used where gas is admitted to a system of lower pressure rating than the supply pressure, and where, due to the gas capacity of the supply source, the system rating may be exceeded. This is a need regardless of the possible presence of a pressure relief device.

g. A suitable pressure relief device must be used to protect a down-stream system that has a pressure rating and flow capacity of less than the supply source. A pressure relief device must always be used in a cryogenic system where the expanding liquid can be trapped between two valves or other flow control devices.

h. Threaded connections that do not match must not be forced. Threads on regulator connections or other auxiliary equipment must match those on the cylinder valve outlet. Detailed information may be found in Enclosure 5.3 and Enclosure 6.1.i.

i. Service manifolds used to feed a service system from several cylinders must be of acceptable design and equipped with the necessary regulating devices to assure safe use with the appointed compressed gas, working temperatures, pressures, and the required flow capacity.

j. Regulators, gauges, hoses, and other appliances provided for use with a gas, or group of gases, must not be used on cylinders containing gases having different, possibly incompatible, chemical properties unless information received from the supplier or other authoritarian source shows this can be done safely. As an example, only pressure regulating devices approved for use with oxygen must be used in oxygen service.

k. Cylinder valves must be opened slowly. Valve outlets must be pointed away from all

personnel and sources of ignition. Wrenches or other torque devices must not be used to work valves with hand wheels. Valve hand wheels must not be hammered when trying to open or close the valve. For valves hard to open or close, or frozen because of corrosion, the cylinder must be tagged and taken to have the valve replaced by an approved activity. During use, all cylinder valves except acetylene will be opened fully and then closed one-half turn, ensuring the valve is free for rapid operation should the need arise. Acetylene cylinder valves must not be opened more than one and one-half turns.

l. Compressed gases must not be used to dust off clothing. The gas may collect in the clothing and create a serious fire hazard later. The burst of pressure may create sudden damage to the eyes or other parts of the body.

m. A positive pressure of at least 15 psig must be left in all compressed gas cylinders except those that are emptied and purged, to prevent contamination before its next use. With this positive pressure and the valve tightly closed the cylinder will not breathe in the surrounding atmospheric air and its contaminants. The valves on acetylene cylinders must be tightly closed to prevent the loss (evaporation) of the acetone solvent.

n. Suitable traps or check valves must be used in systems where a cylinder may be contaminated by the feedback of process materials.

o. Connections to piping regulators and other appliances must be kept tight to prevent leakage. Where hose is used, it must be kept in good condition. If a leak is found at a connection, the pressure must be released prior to an attempt to tighten or repair the leak.

p. Before a regulator is removed from a cylinder, the cylinder valve must be closed and the regulator and all down-stream equipment drained of all pressure.

q. Acetylene cylinders (DOT 8 or 8AL) must be used in the valve-up vertical position only (45 deg. or less of vertical). If for some reason, the cylinders need to be stored or transported in the horizontal position they must be allowed to stand vertically for at least 2 hours prior to their use. This will prevent drawing off acetone solvent with the acetylene when withdrawing the product.

5. **MOVING CYLINDERS.** The following guidelines will be observed in moving cylinders from one location to another:

a. Cylinders must not be rolled, dragged, or slid. Where practical, the user must use a suitable hand truck, fork truck, roll platform, or similar device with cylinders secured for transportation. One cylinder at a time may be tilted and rolled to and from a filling or dispensing manifold and, to and from a staging area within the filling plant or using facility.

b. Cylinders must not be dropped or permitted to strike violently against each other or other surfaces.

c. Cylinder valve protection caps must not be used for lifting cylinders except for hand

trucks that grip the cap for lifting the cylinder onto the hand truck. The flange that holds the cap on a high-pressure cylinder is only peened in place and may not hold the whole weight of the cylinder. In those cases, the cylinder must be lifted no higher than 6 inches for no longer, than it takes to properly position the cylinder on the hand truck. This is not to be interpreted as prohibiting cylinders with caps from being suspended during manufacturing operations or when tilting containers to an upright position.

d. Magnets must not be used for lifting cylinders.

e. Ropes, chains, or slings must not be used to suspend cylinders unless provisions at time of manufacture have been made on the cylinder for appropriate lifting attachments such as lugs or handles.

f. Where appropriate lifting attachments have not been provided on the cylinders, suitable cradles or platforms to hold the cylinders must be used for lifting and moving.

6. **STORING CYLINDERS**. The following are general requirements for the safe storage of compressed gases:

a. The storage facility or storage area must provide compressed gas cylinders and their contents with protection against physical damage, fire hazards, adverse environmental conditions, and tampering by unauthorized personnel. The storage facility or area must also provide enough isolation of the compressed gases to enable safety and emergency response personnel and equipment to control the situation if a leak were to develop or the cylinders were threatened by a fire in the immediate area. Physically separate incompatible gases and materials. Protect cylinders from objects that will produce a harmful cut or abrasion in the surface of the metal. Do not store near potential ignition sources. The storage area may be a separate special storage room, building, shed, or secure (fenced) improved outdoor storage area that provides physical protection for the cylinders. The requirements for each type of storage are provided herein or in the applicable NFPA standards and codes. OSHA requirements for storage are contained in Reference (l).

b. Prominently tag or label cylinders for storage containing a compressed gas to identify the proper hazard classification as required by Reference (g), Reference (j), and Enclosure 4 of this Regulation. The cylinders must also be color-coded and stenciled with the approved chemical name or proper shipping name of the contained gas IAW the most current issue of Reference (h).

c. Compressed gases must be segregated by their hazard class or division into three primary groups: Flammable gas (2.1), Non-flammable gas (2.2), and Poison gas (2.3). (See para. 172.400 of Reference (g).

If an additional secondary transportation hazard is present in conjunction with the primary classification, such as poison gas and flammable gas or nonflammable gas and oxidizer, the secondary transportation hazard must be considered to determine the compatibility of the gas with other gases and the need for further segregation and separation within the primary group.

The three primary transportation hazard classifications must be subdivided as necessary as follows:

(1) Group I TRANSPORTATION HAZARD CLASS OR DIVISION (2.1) (FLAMMABLE)

(a) Flammable Gas

(b) Flammable Gas, Corrosive

(2) Group II TRANSPORTATION HAZARD CLASS OR DIVISION (2.2) (NONFLAMMABLE)

(a) Nonflammable Gas

(b) Nonflammable Gas, Oxidizer

(c) Nonflammable Gas, Corrosive

(3) Group III TRANSPORTATION HAZARD CLASS OR DIVISION (2.3) (POISON)

(a) Poison Gas

(b) Poison Gas, Flammable Gas

(c) Poison Gas, Oxidizer

(d) Poison Gas, Corrosive

(e) Poison Gas, Corrosive, Oxidizer

(f) Poison Gas, Oxidizer, Corrosive

7. TYPES OF STORAGE

a. Storage in Buildings and Rooms with Other Commodities: This type of storage is defined as the storage of limited quantities of compressed gases in cylinders in the same room or bay of a building but physically separated by a named minimum distance from incompatible compressed gases, flammable liquids, or incompatible materials. See the proper NFPA National Fire Codes for each flammable or oxidizing gas to be stored to set up the maximum allowable volume or quantity limit for one location and the minimum separation distance. If a National Fire Code has not been written for a flammable or oxidizing gas (e.g.) chlorine, storage information will be got from the supplier or DLA Aviation-FAJ. Generally applicable to cylinders and small-liquefied gas tanks, separation of at least 20 feet (6 meters) is considered suitable for incompatible gases and materials. An alternative separation is to provide a noncombustible barrier with a fire resistance rating of at least 2 hours, built 5 feet in height for cylinders standing on the floor,

or of a height equal to the height of a stack of cylinders that are palletized and stacked more than one tier high. A minimum distance of 1 foot must be kept between the barrier and cylinders in storage.

b. Storage in Separate Rooms without Other Commodities: This type of storage is defined as the storage of compressed gases contained in cylinders in the same building but physically isolated in a separate room from incompatible materials and gases, flammable liquids, or materials. The design needs for the separate room must comply with NFPA Standard 58, Storage, and Handling of Liquefied Petroleum Gases, including: Explosion venting, Ventilation, and Heating.

c. Storage in Separate Buildings without Other Commodities:

(1) This type of storage is defined as the storage of compatible compressed gases contained in cylinders in a separate building or structure located a named safe distance from all other structures and equipment except those housing operations related directly to producing the stored gases.

(2) Design and build buildings of materials that will provide enough fire protection for the compressed gases to be stored and protect the cylinders from the elements, tampering, and physical damage.

(3) Design separate buildings used for the storage of flammable or poison gases to the requirements found in NFPA Standard 58. They must be located at least 50 feet from nearby important buildings and equipment. If, due to space limitations, the storage buildings must be located less than 50 feet from nearby buildings that are built of combustible materials or have unprotected openings, the storage building must also have the exposed wall built of materials having a fire resistance of at least 2 hours. (See NFPA Standard 220, Standard on Types of Building Construction.) The ventilating, heating, and electrical needs must meet the needs cited in Enclosure 7.8.b, 7.8.c, 7.8.d.

(4) Buildings used to store nonflammable compressed gases either separately or with other occupancy may be of standard general-purpose warehouse construction as described in NFPA Standard 231, Indoor General Storage, and NFPA Standard 220, Types of Building Construction. Buildings must be built above ground and have a concrete floor. The ventilation requirements must be as stated in Enclosure 7.8.b. Nonflammable gases displace oxygen in the air in the immediate area and do not create a fire hazard. The fire protection system must be designed to protect the building, if warranted.

(5) Build separate buildings used to store oxidizing gases; e.g. (oxygen) flammable (NFPA Standard 231) or noncombustible (NFPA Standard 220) material or a combination of both. The storage building must be located at least 20 feet from noncombustible buildings and 50 feet from combustible buildings or combustible outside open storage. Provide automatic sprinkler protection for flammable buildings containing gaseous oxidizer storage and for noncombustible materials within 50 feet of separated storage of gaseous oxidizers. The sprinkler system must be IAW NFPA Standard 13, Installation of Sprinkler Systems. The ventilating,

heating, and electrical requirements must meet the requirements cited in Enclosure 7.8.b, 7.8.c, and 7.8.d.

d. Outside Open Improved Storage Area:

(1) Outside open improved storage areas as defined herein are designated, improved, and secured areas that protect cylinders from physical and environmental damage and tampering from unauthorized personnel.

(2) Store the cylinders above ground on a raised concrete slab or by other means that prevents their contact with the ground. Cover the area with a fixed noncombustible canopy that will provide protection from inclement weather and the direct rays of the sun.

(3) Location of the storage areas must be crosswind or downwind of any industrial or residential buildings. In the event of a cylinder leak, this will carry the gas away from the congested area; in case of fire in the main building, a crosswind would carry the flame and heat away from the storage area.

(4) The type and quantity of gases to be stored determines the distance between the storage areas and occupied or important buildings and equipment.

(5) Keep storage areas free of all weeds, and of all flammable and incompatible materials.

8. **GENERAL STORAGE REQUIREMENTS:**

a. Stow Items by the HCC and SDS Number. When the receiving process is complete, all the necessary technical data associated with the item should be satisfactorily populated in the supporting system. At this time, the system can provide a stow action based on the HCC and SDS Number that is assigned to it in the HMIRS. This step too is “critical” to the proper storage segregation/separation of compressed gases in storage.

b. Maintain Storage Segregation by HCC & SDS Number. A precise storage location is provided for each item in accordance with the storage segregation and separation requirements established by law and programmed in the protocol of the supporting operating systems. The process ensures compliance with storage compatibility standards and improves the effectiveness of emergency response personnel when responding to dangerous releases or damages. The stowage of hazardous items by the SDS number avoids the danger of incompatible materials being placed in the same storage location at the same time. All items are maintained in these segregated locations consistent with the depot storage standards and shelf-life requirements. Facility surveys and physical inventories are performed periodically in accordance with standard warehousing practices. Items that are found damaged or deteriorating in storage will be responded to immediately and processed by specialists. Any release must be reported and responded to in a manner consistent with the license procedures and processes associated with this type of occurrence. General-purpose warehouse workers normally are not qualified for processing damaged and leaking cylinders. Special testing may be required or directed by the

managing Inventory Control Point (ICP). Items that cannot be recovered back to ready-for-issue may be properly prepared for turn in to the DLA Disposition Office for disposition processing.

c. Full and empty cylinders must be stored in separate locations, in a manner that will allow cylinders with the oldest hydrostatic test date to be removed first with minimal handling of other cylinders. Cylinders must be further segregated as necessary by Condition Code classification. Full cylinders must be properly identified with the current FSC 6830, 6505, or 9135 NSNs representing the cylinder and their contents. Empty cylinders must be properly identified with the correct FSC 8120 NSN that represents the empty cylinder. See Enclosure 6.1. a, for methods of identifying cylinders.

d. Separate storage rooms or enclosures and separate cylinder storage buildings must be well ventilated and dry. Provide ventilation openings to the outside at both the ceiling and or roof (highest point) and within 6 inches of the floor. Vents must be at least 5 feet from any opening to the enclosure or building and must be of the non-closing type. When mechanical ventilation is used, air circulation must be at the rate of at least 1 cubic foot per minute per square foot of floor area. When natural ventilation is used, outlet and inlet openings must be provided, each having a total free area of at least 1 square inch for each square foot of floor space. Temperatures within storage buildings or enclosures shall not be allowed to exceed 125oF (54.4oC) at the maximum height of the cylinders either standing on the floor or palletized and stacked.

NOTE: When there is a conflict between DOD storage requirements and the storage requirements of the host nation, the more stringent requirements must apply.

e. Heating of separate storage rooms, enclosures, and separate (detached) buildings, if essential, must be by steam, hot water, or other indirect means. Any heating system or heating unit using an open flame must be prohibited.

f. Conform electrical equipment for separate storage rooms, enclosures, and separate (detached) buildings to the provisions of NFPA Standard 70, National Electric Code, Article 501 for Class 1 division, 2 locations.

g. Limit outside, open improved, storage with no protection from the direct rays of the sun, where the surface of a cylinder could exceed 125oF, to use with empty cylinders or full cylinders containing only non-liquefied compressed gases. Protect cylinders containing liquefied gases or acetylene stored outdoors from the direct rays of the sun with a fixed canopy (preferably noncombustible) capable of withstanding all local environmental conditions. This is essential to prevent rupture of the cylinders or, at a minimum, to prevent the actuation of the pressure-relief device. Cylinders may become liquid full at temperatures of 125oF or greater and create a hydraulic pressure that will exceed the pressure rating of the pressure-relief devices or, when relief devices are not authorized or used, that will exceed the rupture pressure of the cylinder.

h. Protect all cylinders, regardless of their location, from continuous dampness. Do not store near salt and other corrosive chemicals or fumes. Resulting rust or corrosive action will deteriorate the cylinders and their accessories to a condition that will create a safety hazard or

cause the cylinders to become unusable. Although this condition occurs more commonly at the foot ring of acetylene, chlorine, or other low-pressure cylinders, it will also cause the threads of the valve protection cap to become corroded, making the cap difficult or impossible to be removed or installed.

i. Palletize compressed gas cylinders at DLA or DOD facilities, where it is desired to have them palletized, must be palletized in either the vertical or the horizontal position IAW MIL-STD-147, Palletized Unit Loads, or as otherwise directed using heavy duty four way pallets manufactured to the requirements of NN-P-71.

(1) All compressed gas cylinders in storage waiting use or shipment must be secured by either palletizing them or storing them standing in a valve end upright position, nested tightly together, in an approved storage area where they are unlikely to be knocked over.

(2) Palletize, box, crate, or secure to a fixed stanchion or fixture, cylinders that are inherently unstable in the vertical position.

(3) Palletize, box, crate, or secure to a fixed stanchion or fixture, cylinders located in an authorized storage area that permits pedestrian or vehicular traffic.

(4) Bind together in groups of three or more to reduce their capability of being knocked over, cylinders that cannot otherwise be secured.

(5) Store and secure cylinders equipped with valves but without either provisions for a valve protection cap or a protective collar in a position that will protect the valve. If they are stored horizontally, protection will be provided to prevent anything from meeting the valves. If they are stored vertically, they will be secured from tipping over and hitting the valve against something. If the cylinders are small (i.e., Medical D and E size), they must be crated in crates that are deep enough to protect the valve from abuse or they must be stacked horizontally in the crates in a position that no weight will be on the valves. Acetylene cylinders, no matter what size, must always be stored or shipped in a vertical position.

(6) Always store and ship cylinders equipped with valves and with provisions for valve protection caps, with the valve protection cap securely in place. Cylinders with a plug-in place of a valve need not have a valve protection cap installed.

(7) Palletize in a valve up vertical position cylinders containing acetylene, all the liquefied compressed gases, hydrogen, and all high-pressure cylinders smaller than 7 inches in dia. by 43 inches tall. Such cylinders that are transported individually or un-palletized must be placed in a valve-up vertical position and securely bound in place.

(8) Palletize all other high-pressure cylinders of non-liquefied compressed gases in the horizontal position using 4 inches by 4 inches by 40-inch separator boards and banding straps. The boards must be notched to provide nesting places for four cylinders per lay with 4 or 5 layers (16 or 20 cylinders) per pallet. The banding straps must be at least 3/4 inch in width rated for the weight of the full pallet. The bottom and top separator boards need only to be notched on one

side. The bottom separator notched on the top and the top separator notched on the bottom. The top separator board must be placed across the top of the full pallet and banded in place to provide a full resting place for a full pallet when stacking full pallets two or three high.

(9) Always store and transport cryogenic liquid cylinders (DOT 4L) in the position for which they are designed to operate, normally in the valve up vertical position.

j. Cylinders must not be stored near elevators, gangways, or unprotected platform edges, or in locations where heavy moving or flying objects or equipment may strike or fall on them. Do not locate them near building exits, stairways, or air intake returns for heating or ventilating systems, or in areas normally used or intended for the safe exit of people.

9. **SAFE USE, STORAGE, AND HANDLING REQUIREMENTS BY SERVICE CLASSIFICATION**:

a. Flammable Gases

(1) General

(a) Adequate portable fire extinguishers (carbon dioxide or dry chemical) must be available for fire emergencies at storage installations.

(b) "No smoking" signs must be posted around the storage area of buildings and at the entrance to special storage rooms.

(c) A flame must not be used for detection of flammable gas leaks. Combustible gas indicators, soapy water, or other suitable solutions must be used.

(d) Provisions must be made to protect flammable gases against hazardous exposure to and from adjoining buildings, equipment, property, and concentrations of people.

(e) Flammable compressed gases (other than cryogenic) for which specific storage procedures are not provided herein or in an NFPA document must be stored IAW their physical properties or as recommended by the manufacturer or knowledgeable authority. Flammable compressed gases in a liquefied state must be provided storage in accordance with the requirements of NFPA Standard 58. Flammable compressed gases in a non-liquefied state shall be provided storage IAW the requirements of NFPA Standard 50A, Gaseous Hydrogen Systems at Consumer Sites.

(2) Acetylene

(a) Storage of acetylene at the work site, in buildings with other occupancy, in separate storage rooms or storage compartments, and in separate buildings must be accomplished IAW the procedures and facility design requirements of NFPA Standard 51, Standard for the Design and Installation of Oxygen Fuel Gas Systems for Welding, Cutting, and Allied Processes,

and of NFPA Standard 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.

(b) Acetylene cylinders that have been palletized for storage at a Defense Depot or other high gas capacity facility must only be stored vertically and one tier high. This will prevent the possibility of spreading flames from one cylinder to another by the flame from the pressure relief devices in the top and bottom heads of the cylinders. Flames from a fully charged cylinder can reach as far as 15 feet from the relief device from which it is exhausting. Storing the cylinders one tier high will also enable direct contact of the spray from a sprinkler system to each cylinder for cooling in case of a fire in the immediate area. Cooling will prevent or delay the actuation of the pressure-relief devices that, if actuated, would feed more fuel to the fire. Storage of cylinders one tier high will also lessen the possibility of a cylinder detonating on impact from an accidental fall.

(c) The maximum acceptable quantity of acetylene in cylinders, except those in actual use or attached ready for use, must be limited to a total gas capacity of 2,500 cubic feet to be located in one area at the work site or in the main areas of buildings with other occupancy in compliance with NFPA Standard 51. Quantities in excess of those permitted must be stored in separate special rooms, separate special buildings, or acceptable improved outdoor storage locations where acetylene may be stored in unlimited quantities. The total gas capacity in one storage area may be increased to 5,000 cubic feet in cylinder storage areas protected by an automatic sprinkler system and water supply designed IAW NFPA Standard 13. The storage of acetylene with other fuel gases must be in strict compliance with NFPA Standards 51and 51B, and with Title 29 CFR, Section 1910.102, reference (j).

(3) Liquefied Petroleum Gases:

(a) Storage of LPG (e.g., propane, propylene, butane, and butylene) contained in cylinders for use with oxygen in welding or cutting operations must follow NFPA Standards 51 and 51B.

(b) Storage of LPG in cylinders at a location or facility not referenced in subparagraph 5-10A3a, above, must follow NFPA Standard 58.

(c) Storing LPG cylinders only one tier high provides more efficient fire protection; however, if space is limited and the canopy or building is constructed of noncombustible materials, palletized cylinders may be stored two tiers high.

(4) Hydrogen:

(a) Storage of gaseous hydrogen in cylinders at the consumer site or at a designated storage installation must be IAW the procedures and facility design requirements of NFPA Standard 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites.

(b) Adequate ventilation must be provided in the storage area. Floor level inlet and outlet openings in exterior walls or the roof must have a minimum area of 1 square foot for

each 1,000 cubic feet of storage volume and explosion venting must be designed to relieve a maximum internal pressure of 25 pounds per square foot in compliance with NFPA Standard 50A.

(c) Hydrogen cylinders must be stored only one tier high; this will enable direct contact of the spray from the sprinkler system to each cylinder for cooling in case of a fire within the immediate area. Cooling will prevent or delay the activation of the pressure-relief device, which when activated will feed more fuel to the fire.

b. Nonflammable Gases:

(1) Oxidizing Gases (Oxygen).

(a) The storage area must be kept free of all flammable gases and liquids and other combustible materials (oxygen vigorously supports combustion).

(b) Ventilation in the storage area must be enough to prevent the concentration of oxygen in the air from exceeding 23 percent. Ventilation requirements must be as prescribed in Enclosure 7.8.b.

(c) Oxygen cylinders, their valves, and all accessories (e.g., regulators, hoses and protection caps) must be kept free of oil, grease, or other hydrocarbon products and must not be handled with oily hands, oily gloves, or greasy equipment.

(d) Storage of gaseous oxygen in cylinders for use with a fuel gas in a welding or cutting operation must follow NFPA Standard 51. Storage of gaseous oxygen for other applications must follow NFPA Standard 43C, Storage of Gaseous Oxidizing Materials, and NFPA Standard 50, Bulk Oxygen Systems at Consumer Sites. Emphasis must be placed on the segregation, separation, and quantity limitations of each type of storage.

(2) Inert Gases (Nonflammable).

(a) Inert gases such as argon, helium, neon, and nitrogen are simple asphyxiants that can displace the oxygen in the air, causing rapid suffocation due to oxygen deficiency. Respiratory protection, as cited in Enclosure 7.3.i, must be worn by at least two persons working together in an atmosphere where the oxygen concentration is less than 19 percent by volume.

(b) Buildings or housing structures for the storage of inert nonflammable compressed gases must be constructed in accordance with Enclosure 7.7.c.4.

(c) Inert gases may be stored in the area used to separate different types of fuel gases or fuel and oxidizing gases located at the consumption site or in the industrial buildings.

(d) Inert gases may be stored in unlimited quantities at the storage site, in storage, rooms, in separate buildings, and in outside storage areas, provided adequate ventilation, and or personal protective equipment is available and properly used.

c. Corrosive Gases:

(1) Corrosive gases such as ammonia, chlorine, methylamine, and sulfur dioxide are corrosive on contact with tissue and mucous membranes and with metals. Not all these gases are used or stored by DOD activities, but are identified by type to assist anyone finding these gases in use or storage.

(2) Personal protective equipment must be worn to avoid contact with acid or alkaline gases. Face shields, rubber (or other suitable chemically resistant material) gloves, and aprons must be worn with long-sleeved shirts and long trousers. Open shoes and sneakers are prohibited. Reference the appropriate SDS for safety information.

(3) Personnel handling or using acid and alkaline gases must have available for immediate use in emergencies respirators or self-contained breathing apparatus as prescribed in Enclosure 7.3.i. Only use respirators under conditions where the concentration of the acid or alkaline gas will not exceed the rating of the respirator, and the oxygen content of the atmosphere is not less than 19 percent by volume. Equipment must be immediately available to personnel in the storage or work area and kept out of the area most likely to be contaminated.

(4) Areas in which acid or alkaline gases are filled, used, or stored must be equipped with an approved emergency shower and eyewash fountain. Drenching with copious amounts of water is an accepted first-aid procedure when corrosive gases encounter skin or eyes.

(5) Outside storage of acid or alkaline gases, at other than the using site, must be IAW Enclosure 7.7.d. Inside storage must be in a separate noncombustible building without other occupancy IAW Enclosure 7.7.c or in a separate room without other occupancy IAW enclosure 7.7.b and of noncombustible construction with a fire resistance rating of at least 2 hours. Storage facilities must also have at least two exits, with doors that open outward. Closed structures must be equipped with a ventilating system that will provide a 1- to 4-minute air exchange. For gases that are heavier than air, the intake of exhaust fans, if used, shall be located near floor level.

d. Poison Gases:

(1) Poison gases such as carbonyl fluoride, chlorine, chlorine trifluoride, diborane, fluorine, germane, hydrogen cyanide, hydrogen selenide, nickel carbonyl (liquid), nitric oxide, nitrogen dioxide, ozone, phosgene, phosphine, and stibine are poisonous gases that are dangerous to life when very small amounts are mixed with air. They are marked with either a skull and crossbones poison or a poison gas label and may have a flammable or nonflammable label.

(2) Personnel handling and using poison gases must have respirators or self-contained breathing apparatus for the gas in storage or use, as prescribed in Enclosure 7.3.i, available for immediate use in emergencies. Only use respirators where concentrations of the poison gas will not exceed the rating of the respirator and the oxygen content of the atmosphere is not less than 19 percent by volume. Equipment must be immediately available to personnel in the storage or work area and kept out of the area most likely to be contaminated.

(3) Only fill and use poison gas cylinders in forced ventilation areas or, preferably, in hoods with forced ventilation, or outdoors. Poison gases will not be emitted into the environment in a concentration in excess of the reportable quantity (RQ) as regulated by Reference (i), Section 302.6.

(4) Personnel working in the immediate area where these gases are handled must be instructed as to the poisonous nature of the gases and methods of protection against harmful exposure and first-aid treatment in case of exposure. Personnel must not be exposed to concentrations of poison gases in excess of the time weighted threshold limit values (TLV) as established by OSHA.

(5) Outside storage of highly toxic poison gases at other than the using site must be IAW Enclosure 7.7.d. Inside storage must be in a separate noncombustible building without other occupancy IAW Enclosure 7.7.c or in a separate room without other occupancy IAW Enclosure 7.7.b and of noncombustible construction with a fire resistance rating of at least 2 hours. Storage facilities must also be equipped with at least two exits with doors that open outward. Closed structures must be equipped with a ventilating system that will provide a 1 to 4-minute air exchange.

(6) For gases that are heavier than air, the intake of exhaust fans, if used, must be located near floor level.

e. Cryogenic Liquefied Gases:

(1) Cryogenic liquids are compressed gases that have been refrigerated into a liquid state at relatively low pressures and extremely low temperatures of -130°F (-90°C) at atmospheric Pressure or colder (oxygen -297.33°F nitrogen -320.36°F, argon -302.55°F, hydrogen – 423.0°F, and helium -452.1°F). Because of their low temperatures, they are transported in tanks/trailers to minimize evaporation and venting of gas. Small quantities of some cryogenic liquids are also handled and stored in non-pressurized Dewar flasks (vacuum-insulated containers) for laboratory applications. The International Civil Aviation Organization (ICAO) when being transported by commercial aircraft regulates these containers.

(2) Cryogenic liquids and their cold vapors will cause frostbite injury upon contact with tissue. When handling CHLORCHLORyogenic liquids, suitable eye and face protection, such as a full-face shield, must be worn to protect against the spray or splash of the extremely cold liquid and gas. Hand protection, such as insulated gloves and other personal protective equipment, must be worn to prevent contact with the cold liquids, cold gases, and cold equipment or piping.

(3) Cryogenic containers must be stored and handled in well-ventilated areas to prevent excessive concentrations of the gas. Containers are equipped with a pressure-relief device that permits intentional venting of gas.

(4) Cryogenic cylinders designed for vertical use must be handled and stored in an upright position. The cylinders must not be dropped, tipped over, or rolled on their sides.

(5) Containers and equipment designed for a specific cryogenic liquid service must not be used for the storage of any other product unless such service is authorized by DOT and/or the cognizant Service engineering activity.

(6) Cryogenic containers must be provided with pressure-relief devices adequate to prevent excessive pressures within the containers.

(7) Liquid oxygen containers must be kept clean and free of grease, oil, and organic materials. Smoking and open flames are prohibited in areas where liquid oxygen is stored. Liquid oxygen systems at consumer sites shall comply with NFPA Standard 50.

(8) Smoking, open flames, and general-purpose electrical equipment is prohibited where liquid hydrogen is stored or used. Liquid hydrogen systems at consumer sites must comply with NFPA Standard 50B.

(9) Smoking, open flames, and general-purpose electrical equipment is prohibited where liquefied natural gas is stored or handled. Liquefied natural gas systems at utility plants consumer sites must comply with NFPA Standard 59A.

f. Procedures for Specific Cylinders. Certain gases and liquids in cylinders in the military System, because of their extremely hazardous nature or unique properties, require special storage and handling. In addition to the general storage and handling procedures cited herein, the following additional procedures must apply to the following materials:

(1) Chlorine.

(a) Chlorine cylinders must be stored IAW subparagraph B3, above.

(b) In the event of a spill, leak, or exposure to chlorine from cylinders (including to multi-unit (TMU) or ton containers, DOT specification 106A500X and 106A500) the following actions must be taken:

1. Personnel not equipped with self-contained breathing apparatus and full protective clothing must be excluded from the area until the leak has been stopped.

2. If the leak cannot be stopped by closing the cylinder or container valve, the local emergency response plan must be activated.

3. If a "Chlorine Emergency Kit" is available, and personnel with proper protective equipment is trained to use the kit; the cylinder or container must be capped. The "Chlorine Emergency Kits" and instruction manuals have been assigned the following NSNs:

NSN	ITEM
8120-01-007-0257	Chlorine Emergency Kit A (Cylinder) Manual Instruction, Kit A Manual Instruction, Kit B

4. If a "Chlorine Emergency Kit" is not available, or if personnel with proper protective equipment and knowledge of the use of the kit are not available, advice and/or assistance will be solicited from the Chlorine Emergency Plan (CHLOREP), which operates 24 hours a day with the following phone number: 800-424-9300/(703) 894-4140, CONUS, Canada, Puerto Rico, Virgin Islands, from overseas, Alaska, Hawaii (Call collect) (+1) (703)894-4140.

5. The CHLOREP has been established by the United States and Canadian chlorine producers and is managed by the Chlorine Institute and CHEMTREC. When activated by telephone in the event of a chlorine emergency, trained industry experts are immediately put in touch with the scene. These experts will evaluate the seriousness of the accident or emergency and will make recommendations and give advice. If the situation is beyond the capabilities of a CONUS activity, CHLOREP experts will physically respond to the accident or emergency scene with the equipment to resolve the problem.

6. In the event of a chlorine release in CONUS, U.S. Territories, or territorial waters, if the quantity released is 10 pounds or greater, the person having knowledge of the release will report the release to the U.S. Coast Guard National Response Center at 800-424-8802 or 202-267-2675. This report is necessitated by Reference (i), Section 302.6, Reference (g), Section 171.15, and Public Law 99-499 (Superfund Amendments and Reauthorization Act (SARA).

7. CAUTION! Although water spray or fog sometimes is used to assist in the control of chlorine gas clouds or fumes, water should never be applied directly to the leak and the container should never be immersed in water.

(2) Chlorine Trifluoride.

(a) Chlorine trifluoride is the most hazardous compressed gas, in cylinders, currently used by the Military Services. Personnel who handle the cylinders shall be trained to recognize the brown cylinder with a single green band. Cylinders authorized to contain chlorine trifluoride are DOT specification 3A, 3AA, 4BA, or 4BN and must not be equipped with a pressure relief device.

(b) Upon receipt, chlorine trifluoride cylinders must be isolated immediately in open improved storage, on bare ground or on a concrete pad, at least 50 feet from anything combustible. Cylinders must be secured in a vertically upright position until a competent authority certifies that the storage facility is adequate. Chlorine trifluoride cylinders must be stored in compliance with the requirements for both oxidizers (subparagraph B1, above) and poison gases (subparagraph C, above). A Storage Quality Control Report (DD Form 1225) will be submitted to DLA Aviation-FAJ IAW Enclosure 12.2.a.

(3) Ethylene Oxide (Gaseous Sterilant).

(a) Ethylene oxide should not normally be stocked by Defense Depots.

(b) Ethylene oxide and dichlorodifluoromethane mixtures are gas sterilant. Cylinders of gas sterilant may be received by Defense Depots as customer returns.

(c) When such a cylinder has been returned and has not been cleaned and purged, it must be assigned Condition Code F, stored, and maintained using the same precautions as if the cylinder was full. DLA Aviation must be advised of the receipt of the cylinder and which gaseous sterilant mixture it last contained (if known) as outlined in Enclosure 12.2.b.

g. Personal Protective Equipment. Personal protective equipment, as required by Reference (l), must be immediately available and suitable for each different type of gas stored at the same location. Respirators as cited in Enclosure 7.3.i must be available for each type of gas being stored and handled. Equipment needs will vary greatly depending on the types of gases stored and their health hazards. Personnel who handle cylinders must be trained in the proper selection and use of the various types of personal protective equipment.

h. Storage Controls:

(1) All cylinders (both full and empty) in Condition Code A must be controlled to ensure cylinders with the earliest (oldest) hydrostatic test date are issued first. This is based on the date of the last hydrostatic test IAW Enclosure 5.2.

(2) Procedures must be established locally to detect, reclassify, and report "Condition Code A" empty cylinders that must be downgraded to Condition Code D because of expiration of the hydrostatic test date as outlined in Enclosure 6.l.h.

(3) Storage procedures and controls outlined in Enclosure 7.8 and .9 for filled cylinders must apply to empty cylinders with a positive residual pressure.

ENCLOSURE 8

MAINTENANCE OF CYLINDERS

1. **GENERAL.** In-storage maintenance of cylinders must be limited to external cleaning, and replacement of valve dust caps or plugs, valve hand wheels, and valve protection caps when such actions are all that are required to classify a cylinder to a Condition Code of A or D.

2. **SAFETY PRECAUTIONS**

a. Cylinder Cleaning. Cylinders that have become chemically contaminated either internally or externally must be cleaned IAW ASTMI G93, Standard Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments.

b. Personal Protective Equipment. Neoprene gloves and eye protection such as splash goggles or face shield must always be used when working with cleaning solvents or agents.

c. Ventilation and Respiratory Considerations. Existing ventilation systems in areas approved for storing compressed gases covered by this Regulation must be adequate for keeping vapors at a safe concentration (less than 1000 parts per million of vapor in contaminated air). However, scrutinize every case to ensure following good safety practices. Special ventilation should be provided in work areas where high concentrations are likely to occur and in low places where heavy vapors may collect. It may be prudent to consider using appropriate respiratory protection as prescribed in Enclosure 7.3.i.

d. Leak Detection. Soap solutions, frequently used to detect leaks around valves, must not be used on the outlet connection of valves in aviator's breathing oxygen service. Never use an open flame to detect gas leaks. Leak detection instruments or commercial leak detector solutions compatible with oxygen must be used. If a leak is detected, clear the immediate area of all personnel. Determine what type of a gas is leaking, how bad, and is it safe to move the cylinder. If it is safe to move the cylinder, take all precautions for breathing purposes and move the cylinder down-wind of all industrial and residential areas. Determine by guidelines provided in section seven how the gas can be safely disposed of under the situation. Move the cylinder to a safe place and then call in help. An emergency response team should always be available (See Enclosure 9).

3. **ADDITIONAL SERVICES.** Maintenance beyond the scope of that indicated above for in-storage maintenance will be performed by commercial contractors or by depot activities as directed by DLA Aviation or DLA Energy for Aerospace Energy cylinders. Maintenance to be performed by commercial contracts, Defense Depot maintenance, and/or Military Service maintenance activities.

ENCLOSURE 9

DISPOSAL OF COMPRESSED GASES OR LIQUIDS IN CYLINDERS

1. GENERAL.

a. The information in this section is provided to assist anyone finding, through inspection or use, a cylinder that has developed a leak and is creating a safety hazard or it is necessary to remove the contents of a cylinder for its safe disposal through the local DLA Disposition Services office. Remember, above all, it is imperative to identify the compressed gas contents of the cylinder (s) in question properly.

EMERGENCY ASSISTANCE

b. Emergency advice or assistance is available from the gas supplier or manufacturer. If they are unknown or inaccessible, contact an information source such as the U.S. Coast Guard National Response Center at 800-424-8802 or 202-267-2675. An alternate information source is CHEMTREC at 800-424-9300 or (703)527-3887 in CONUS, Canada, Puerto Rico, and the Virgin Islands. From overseas, Alaska, and Hawaii, call CHEMTREC collect at (+1) (703)527-3887.

c. Disposal action within CONUS or U.S. Territories must be accomplished IAW the following regulations:

(1) Clean Air Act, Reference (i), Part 61.

(2) Clean Air Act, Reference (i), Part 82 (1990).

(3) Resource Conservation and Recovery Act (RCRA), Reference (i), Parts 260-265.

(4) State regulations.

(5) Department of Defense or Service/Agency regulations.

d. Disposal action taken in countries outside U.S. jurisdiction must be accomplished IAW the applicable Status of Forces Agreement or International Treaty, or as prescribed by appropriate authorities or regulations.

e. The release of the gaseous contents of serviceable or unserviceable compressed gas cylinders into the atmosphere is now tightly controlled by the Environmental Protection Agency. A major concern is the release of the refrigerant gases known as chlorofluoro-carbons (CFC), Hydrochlorofluorocarbons (HCFC), and fire-fighting agents known as HALONS. These materials contain or manufactured using Chlorine, which has been identified as destroying the OZONE layer of the atmosphere. Also, known as OZONE DEPLETING SUBSTANCES (ODS), have or will be phased out of production to meet the requirements of the International

Agreement known as the Montreal Protocol, which has been incorporated into the 1990 Amendment of the Clean Air Act, Part 82, CFR. These ODS products have been segregated into two definitive Classes of identification. The Class I products have been identified as the most destructive and are known as:

(1) A Chlorofluorocarbons.

(2) Chlorinated Solvents.

(3) Fire-fighting Halons of which all have been removed from production.

The Class II products, known as Hydrochlorofluorocarbons are less destructive and will be phased out of production by the year 2030. Section 608 of the Clean Air Act, (Refrigerant Recycling Rule) prohibits knowingly venting, releasing, and disposing of any Class I or Class II product to the environment (Effective 1 July 1992).

Recover and recycle or reclaimed these products. (See Enclosure 14 of this Regulation for the procedures on returning these products to the DOD reserve for reuse in approved essential applications). Find a complete listing of these products in Part 82, Reference (i). Products currently used by DOD that meet the criteria of a Class I ODS follow:

CHLOROFLUOROCARBONS

CFC-11	Trichlorofluoromethane
CFC-12	Dichlorodifluoromethane
CFC-114	Dichlorotetrafluoroethane
R-500	Azeotropic mixture of CFC-12 and HFC-152a
R-502	Azeotropic mixture of CFC-115 and HCFC-22

HALONS

Halon 1202	Dibromodifluromethane
Halon 1211	Bromochlorodifluoromethane
Halon 1301	Bromotrifluoromethane
Halon 2402	Dibromotetrafluoroethane

SOLVENTS

Methyl Chloroform	1,1,1 Trichloroethane
CFC-113	Trichlorotrifluoroethane

f. The procedures to dispose of compressed gas cylinders are in section 8 of this enclosure.

2. DISCHARGE OF GASES NOT REGULATED AS WASTES OR POLLUTANTS.

a. The following compressed gases have been identified as not being controlled as hazardous wastes or pollutants, and may be discharged into the atmosphere, provided the proper safety precautions are followed:

Air	Hexafluoroethane
Argon	Neon
Carbon Dioxide	Nitrogen
Carbon Dioxide and Oxygen Mixture	Nitrogen and Oxygen Mixture
Helium	Nitrous Oxide
Helium and Oxygen Mixture	Sulfur Hexafluoride (domestic)/Sulphur Hexafluoride (international)

SAFETY PRECAUTIONS

b. The following safety precautions and working procedures must be followed when venting (discharging) the contents of a compressed gas cylinder.

(1) Identify the cylinder contents as not regulated, wastes, or pollutants before considering any release of its contents into the atmosphere as a disposal method. Contact the supplier, basic producer, or proper authority for disposal advice for a gas or liquid not listed by name in this Regulation.

(2) Take care to assure the released energy does not cause the cylinder to rocket. Firmly always, secure the cylinder in an upright position with the relief outlet pointed away from personnel. Securely attach a needle valve to the relief connection of the cylinder valve to adequately control the discharge rate. If a needle valve is not available or cannot be adapted to the valve outlet, a brass sealing valve outlet cap or plug drilled with a 3/32-inch hole and placed wrench-tight on the valve outlet, will provide a safe release of gas. When releasing carbon dioxide from a cylinder provided with a siphon or dip tube, the exhaust will be in the form of a "snow" or "dry ice." These cylinders with a siphon or dip tube can be identified by an "S" on the side of the valve.

(3) Removal of cylinder contents by some method other than a properly working valve, take care to release the content slowly, so the released energy does not cause the cylinder to rocket. If a cylinder valve is damaged, preventing the discharge of the content in a normal manner, it may be possible to release the pressure from the cylinder by loosening the pressure relief device. This must be done only by a qualified person who is completely familiar with gas cylinder and the operation of its pressure relief device. It should not be attempted without first securing the cylinder in a well-ventilated area where the possible ejection of the relief device will cause no harm.

(4) The area chosen for releasing compressed gases not regulated as wastes or pollutants must be in an isolated location outdoors, where escaping gases will not present a hazard to personnel or property.

(5) At least two qualified people must be present while the cylinders contents are being released. Proper personal protective equipment as prescribed in Enclosure 7.3.i shall be worn.

(6) Favorable weather must prevail during release operations (e.g., slight breeze, no fog or rain, preferably a clear day). Cylinders must not be subjected to a temperature above 125°F as prescribed in enclosure 7 (3) (g).

(7) Cryogenic (Refrigerated) fluids, such as liquefied argon, helium, hydrogen, neon, nitrogen, or oxygen must be handled only by fully trained and experienced personnel equipped with the necessary safety equipment to protect them from the extreme cold temperatures of -297°F and below.

3. HAZARDOUS SUBSTANCES AND HAZARDOUS WASTES

a. Hazardous substances are those materials and their matching Reportable Quantities (RQ) listed or named as "hazardous substances" under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510. The listing is in Reference (i) and Reference (g).

(1) Any material that is subject to the Hazardous Waste Manifest Requirements of the U.S. Environmental Protection Agency as specified in Reference (i), Part 262, is a "hazardous waste."

(2) DOD activities treating, storing, disposing of, or transporting dangerous substances and dangerous wastes shall comply with applicable laws and controls.

(3) DOD activities in CONUS, U.S. Territories, or territorial waters that discover a release of a hazardous substance in a quantity equal to or greater than the RQ for the substance are needed to quickly report the release to the U.S. Coast Guard National Response Center at 800-424-8802 or 202-267-2675. This need results from passing Public Law 99-499 on October 17, 1986.

4. DISPOSAL OF HAZARDOUS GASES OR LIQUIDS IN CYLINDERS.

a. The proper and safe method of disposal of the dangerous contents of a compressed gas cylinder must be selected by recognizing and evaluating the potential hazard the escaping gas will create (will it be safe to release to the atmosphere or must it be neutralized). The type of waste product that will be generated in the disposal process must also be recognized and the proper handling must be considered. The intent of the disposal methods in this document are for use only by qualified personnel. These recommendations do not cover all possible disposal methods. Detailed information is available from a supplier or manufacturer of the compressed gas contained in the cylinder. Activities within CONUS or U.S. Territories must hold a valid

Waste Treatment, Storage, or Disposal Facility (WTSDF) permit issued by the U.S. Environmental Protection Agency, State, or Territory when treating, storing, or disposing of hazardous waste gases.

b. Disposal Methods.

CAUTION

Qualified personnel, knowledgeable and experienced in the practical applications of stoichiometric amounts of neutralizing agents for the following selected hazardous gases and liquids are to follow the recommendations listed.

(1) Acetylene. Use for intended purpose or burn down contents of cylinder using an approved welding kit or burning manifold. If not feasible; contact supplier for advice.

(2) Anhydrous Ammonia. Convert to ammonium nitrate by passing vapors into a nitric acid solution.

(3) Carbon Monoxide. The cylinder contents may be piped to an approved incinerator for burning. Experienced personnel may place the cylinder in a pit and burn the carbon monoxide in a controlled manner to produce carbon dioxide.

(4) Chlorine. Neutralize by passing vapors into 18 to 20 percent sodium hydroxide solution.

(5) Chlorine Trifluoride. Contact supplier or manufacturer of the gas or an approved professional disposal firm.

(6) Cyclopropane. The waste should be destroyed by piping into an approved Federal- or State-permitted TSDF incinerator by a licensed professional disposal firm.

(7) Dimethylamine. Neutralize by passing vapors into a nitric acid solution.

(8) Ethyl Chloride. Neutralize by passing vapors into sodium hydroxide solution.

(9) Ethylene Oxide, and Ethylene Oxide and Nonflammable Gas Mixtures. Amenable to disposal in permitted bacteriological waste treatment facilities under controlled conditions after proper acclimation of the system.

(10) Fluorocarbons and Chlorofluorocarbons (Flammable and Nonflammable). The refrigerant and fire-fighting materials identified as: R-11, R-12, R-114, R-500, R-502, R-503, Halon 1202, Halon 1211, Halon 1301, and Halon 2402 have been designated as Class 1 ODS and must be recovered and reclaimed for reuse in essential use applications. The DLA has been tasked with establishing and maintaining a DOD reserve for use in designated critical applications. Contact DLA Aviation-FAJ for procedures on ordering empty cylinders and turn in of the used recovered products. All ODS will eventually be phased out of manufacture and replaced.

(11) Hydrogen. May be vented or burned under controlled conditions by experienced personnel. If vented, shut off and secure all ignition sources in an isolated controlled access open area. Attach at least 15 feet of piping to the cylinder so that the gas is vented well above ground level. Post warning signs reading: "Warning Venting Flammable Gas" and guard area until the gas has vented. All safety precautions outlined in Enclosure 9.2.b shall apply.

(12) Hydrogen Chloride. Neutralize by passing vapors into a sodium hydroxide solution.

(13) Hydrogen Sulfide. Neutralize by passing vapors into a sodium hydroxide solution.

(14) MAPP. Use for intended purpose, if not feasible; contact supplier for advice (LINDE).

(15) Methyl Bromide. Neutralize by passing vapors into a sodium hydroxide solution.

(16) Methyl Chloride. Neutralize by passing vapors into a sodium hydroxide solution.

(17) Methoxyflurane. The waste should be destroyed by piping into an approved Federal or State permitted TSDF incinerator by a licensed professional disposal firm. If a permitted disposal firm is not readily available, guidance and advice should be requested from DLA Aviation-HTIS.

(18) Oxygen: May be vented in the same manner as hydrogen. The area chosen for discharge must be cleared of any combustible materials, including vegetation. Post signs reading: "Warning Venting Oxygen Stay Clear", "NO SMOKING WITHIN 50 FEET."

(19) Liquefied Petroleum Gases. Use for intended purposes. If not feasible, contact supplier for advice.

(20) Phosgene. Neutralize by passing vapors into a sodium hydroxide solution.

(21) Sulfur Dioxide. Neutralize by passing vapors into a sodium hydroxide solution.

c. Hazardous Wastes

CAUTION

When gases or liquids have been chemically changed into salts or other compounds, additional hazardous wastes may be created. Newly created compounds may require additional treatment or hazardous waste disposal at a permitted facility.

ENCLOSURE 10

DISPOSAL OF COMPRESSED GAS CYLINDERS

1. **GENERAL.** Disposal of compressed gases or liquids in cylinders is covered in enclosure 9 of this Regulation. Non-Government owned cylinders shall be returned to their rightful owners. If the owner cannot be determined, or if the owner has executed a release document officially abandoning the cylinder (s) on Government property, the cylinder (s) shall be processed IAW paragraph 4, below. Process the disposal of Government-owned cylinders through a DLA Disposition Services Office for any of the following reasons:

a. Cylinders that have been condemned from further service due to physical defects detected by a visual inspection performed by a competent inspector. (See Enclosure 6.l.e of this Regulation.)

b. Cylinders that have been condemned from further service due to metal fatigue as determined by a hydrostatic test performed by a DOT approved and registered retest facility.

c. Cylinders that were not manufactured by a DOT approved manufacturer or that were not manufactured in compliance with DOD or DOT approved specifications.

d. Cylinders that have been condemned from further service due to manufacturing defects or unauthorized modifications or changes in service. (See Enclosure 6.l.d of this Regulation.)

e. Cylinders that have been declared excess by the Inventory Control Point (ICP) (DLA Aviation-FAJ or DLA Energy-QEM) for all known or anticipated DOD requirements and has provided disposal guidance.

2. **DISPOSITION INSTRUCTIONS**

a. Disposition instructions do not have to be requested from the DLA inventory manager for cylinders on hand that have been condemned from further service by the U.S. Government as cited in paragraphs 1(a) through 1(d), above. Activities having custody of condemned cylinders must transfer them to a DLA Disposition Services office as prescribed in paragraphs 3 and 4, below.

b. All excess compressed gas cylinders shall be reported to the DLA Inventory Manager at DLA Aviation, DLA Troop Support, or DLA Energy Aerospace Energy for identification to valid NSN and to determine if the U S Government owns them. Dispose of such cylinders as directed by the DLA Inventory Manager.

c. DOT specification 39 cylinders (small propane, refrigerant, calibrating gases, etc.) are designed as single trip, non-refillable cylinders to be used one time for the initial storage and shipment of a compressed gas and then destroyed. These cylinders are designed of minimum strength materials and will not tolerate the repeated flexing of refills. Federal law forbids

transportation of such cylinders, if they have been re-filled, with a fine of up to $25,000 and a 5-year imprisonment (49 United States Code, 1809). To prevent reuse of such cylinders, they must be evacuated to the local Environmental Protection Agency standards, equalized to atmospheric pressure, and then destroyed. The method of destruction is not critical but render the cylinder incapable to contain any compressed gas under pressure. Render the cylinder useless as a container and dispose of as scrap metal.

3. **TRANSFER OF CYLINDERS TO DLA DISPOSITION SERVICES:** Government owned cylinders designated to be processed for disposal through a DLA Disposition Service Site must be tagged or labeled to indicate the MILSTRAP Supply Condition Code, the current contents of the cylinder, and, if applicable, the required DOT and EPA labels and markings.

DLA Disposition Sites WILL NOT ASSUME PHYSICAL CUSTODY OF COMPRESSED GAS CYLINDERS UNLESS THEY HAVE BEEN RENDERED TO SCRAP AS OUTLINED IN PARAGRAPH 3(e) BELOW. DLA Disposition Services property disposal processing of excess compressed gas cylinders must include acceptance of accountability, but not physical custody, for reutilization, donation screening and/or sales actions on behalf of the activity reporting the excess. Activities having physical custody of the compressed gas cylinders must store cylinders IAW enclosure 7 of this Regulation. Cylinders reported for disposal action will be classified as follows:

a. Serviceable (Nonhazardous, Not Regulated). New cylinders and used serviceable cylinders that contain only a residue of a nonhazardous compressed gas (e.g., nitrogen, argon, and helium at a pressure less than 25 psig) do not require hazardous materials labeling IAW Title 49 CFR. These cylinders must be designated as MILSTRAP Supply Condition Code A and must be tagged with a DD Form 1574, Serviceable Tag-Materiel, or labeled with a DD Form 1574-1, Serviceable Label-Materiel. The tag or label must be marked or over stamped with the statement "DOES NOT CONTAIN A HAZARDOUS GAS." Cylinders shall have their valves tightly closed. Cylinders designed for valve protection caps must have caps securely installed with full thread engagement. Cylinders not designed for valve protection caps must be boxed, crated, palletized, and strapped, as appropriate, to protect the cylinders from physical damage. All cylinder-identifying markings must be recorded and provided to the receiving DLA Disposition Services office for permanent recording on the transfer document at time of sale. See Enclosure 10.6.

b. Serviceable (DOT Regulated and Labeled). Used serviceable cylinders that contain a compressed gas at a pressure of 25 psig at 70ºF or greater or contain a residue (less than 25 psig) of a hazardous gas (e.g., flammable, toxic, reactive, poisonous, irritating or one of the Class I or II ODS) must be properly labeled as a hazardous material IAW Reference (g) and as an ODS as required by Part 82 of Reference (i). If facilities and an EPA licensed technician are available, all residue of a Class I or II ODS shall be recovered and returned to the DOD reserve. The cylinder must then be returned to the Inventory Control Point. These cylinders must be designated as MILSTRAP Supply Condition Code A and must be tagged with a DD Form 1574, Serviceable Tag-Materiel, or labeled with a DD Form 1574-1, Serviceable Label-Materiel. Cylinders must have their valves tightly closed and those designed for valve protection caps must have securely installed with full thread engagement. Cylinders not designed for valve protection

caps must be boxed, crated, palletized, and strapped, as appropriate, to protect the cylinders from physical damage. All cylinder-identifying markings must be recorded and provided to the receiving DLA Disposition Services Site for permanent recording on the transfer document at time of sale. See Enclosure 10 (6).

c. Unserviceable (Reparable, Nonhazardous). Used unserviceable (reparable) cylinders that contain only the residue of a nonhazardous compressed gas (e.g., nitrogen, argon, and helium at a pressure less than 25 psig) do not require hazardous material labeling IAW Title 49 CFR. The cylinders must be designated as MILSTRAP Supply Condition Codes D or F and must be tagged with a DD Form 1577-2, Unserviceable (Reparable) Tag-Materiel, or labeled with a DD Form 1577-3, Unserviceable (Reparable) Label-Materiel. The tag or label must be marked or over stamped with the statement "DOES NOT CONTAIN A HAZARDOUS GAS." Cylinders must have their valves tightly closed and those designed for valve protection caps must have them securely installed with full thread engagement. Cylinders not designed for valve protection caps must be boxed, crated, palletized, and strapped, as appropriate, to protect the cylinders from physical damage. All cylinder-identifying markings must be recorded and provided to the receiving DLA Disposition Office for permanent recording on the transfer document at time of sale. See Enclosure 10.6.

d. Unserviceable (Reparable, DOT Regulated and Labeled). Used unserviceable (repairable) cylinders that contain compressed gas at a pressure of 25 psig at 70°F or greater or the residue (less than 25 psig) of a hazardous gas (e.g., flammable, toxic, reactive, poisonous, irritating, or one of the Class I or II ODS) must be properly labeled as a hazardous material IAW Title 49 CFR and as an ODS as required by Part 82 of Reference (i). If facilities and an EPA licensed technician are available, all residue of a Class I or II gas must be recovered and returned to the DOD reserve. Return the cylinders to the Inventory Control Point. These cylinders must be designated as MILSTRAP Supply Condition Codes D or F and must be tagged with a DD Form 1577-2, Unserviceable (Reparable) Tag-Materiel, or labeled with a DD Form 1577-3, Unserviceable (Reparable) Label-Materiel. Cylinders must have their valves tightly closed and those designed for valve protection caps must have them securely installed with full thread engagement. Cylinders not designed for valve protection caps must be boxed, crated, palletized, and strapped, as appropriate, to protect the cylinders from physical damage. All cylinder-identifying markings must be recorded and provided to the receiving DLA Disposition Office for permanent recording on the transfer document at time of sale. See Enclosure 10.6.

e. Unserviceable (Condemned, Nonhazardous Scrap). Used unserviceable (condemned) cylinders that previously contained a nonhazardous compressed gas or cylinders previously containing a hazardous compressed gas that have been thoroughly purged must be emptied of pressure and the valve removed. Any cylinder that previously contained an ODS must have the contents recovered and returned to the DOD reserve (see Enclosure 14). A hole must be cut or drilled (large enough that it cannot be welded closed) in the cylinder to render it unable to hold a positive pressure. The words “CONDEMNED-SCRAP” must be metal stamped into the shoulder of the cylinder near the permanent markings. If it is not possible to cut (torch or drill) a hole in the cylinder, the inlet threads must be destroyed sufficiently to prevent installing a valve with a gas tight seal. These cylinders must be designated as MILSTRAP Supply Condition Codes AH@ or AS@ and must be tagged with a DD Form 1577, Unserviceable (Condemned)

Tag-Materiel or DD Form 1577-1, Unserviceable (Condemned) Label-Materiel must be attached. The Words "CONDEMNED-SCRAP" must be stamped or printed on the tag or label. DLA Disposition Offices will accept physical custody of the remains of the scrapped cylinder.

f. Unserviceable (Condemned, DOT, RCRA or Clean Air Act (CAA) Regulated). Used unserviceable (condemned) cylinders (not leaking) that contain a regulated gas or the residue of a regulated gas (e.g., flammable, toxic, reactive, poisonous, irritating or one of the Class I or II ODS) must be properly labeled as a hazardous material IAW Reference (g) and as an ODS as required by Part 82 of Reference (i). These cylinders must be assigned MILSTRAP Supply Condition Code H." A DD Form 1577, Unserviceable (Condemned) Tag-Materiel, or DD Form1577-1, Unserviceable (Condemned) Label-Materiel, must be attached. If the contents cannot be safely removed through normal use, the cylinders must be removed to a safe isolated location. Their contents must be safely removed by an approved method by qualified personnel or the cylinders must be removed from the premises. The DLA Disposition Office may assist in obtaining the services of a Federal, state, or local permitted contractor who can render the cylinder(s) and its contents non-hazardous. In the event a release of a hazardous material could result or is anticipated due to the condition of the cylinder, the Activity's Installation Spill Contingency Plan (ISCP), Spill Prevention, Control, and Countermeasures (SPCC) Plan, or Facility Contingency Plan (FCP) should be activated. If warranted, response action as appropriate will be taken to render the cylinder(s) harmless. (See Enclosure 9 of this Regulation for emergency assistance contacts.)

4. **SPECIAL PROVISIONS FOR THE DISPOSAL OF NON-GOVERNMENT OWNED CYLINDERS.** Compressed gas cylinders that are not owned by the U S Government or their ownership has not been determined will be handled and disposed of as follows:

a. If ownership can be determined, the facility, installation, base, or activity having physical Custody must notify the owner of the quantity and type of cylinder(s) held by the Government by certified or Registered Mail. The owners will be given 30 days from the date of receipt of notification to:

(1) Request the cylinder (s) be returned, shipped at their expense. The contents of the cylinder must be absolutely verified, and a Proper Shipping Description be assigned IAW Reference 1 (c).

(2) Arrange for the pickup of the cylinder (s) by common, contract, or private carrier, at the owner's expense. If the contents of the cylinder cannot be absolutely identified, request the owner to prepare the necessary shipping papers, labeling, marking, and placarding. It will be the responsibility of the owner or his agent.

(3) Notify the Government, as the owner of the cylinder (s), they are releasing the ownership of the cylinder (s) as abandoned, to the Government. The notification from the Government must include the proper documents, as prescribed in Reference (d), to allow the owner to perform this release of the cylinder (s), as abandoned, to the Government.

b. If the owner does not respond to the notification, or if the owner executes an abandoned

property release, the following action will be taken:

(1) The facility, installation, base, or activity having physical custody will determine if the cylinder(s) are full, partially full, or empty. The holder will determine the DOT Proper Shipping Description for each cylinder.

(2) If the cylinder(s) contains a hazardous material, the activity having custody will decide if the contents can be used safely in normal operations. If the material cannot be safely used, or if the cylinder(s) contains a hazardous waste or residue of a hazardous material, the activity having custody will arrange for the cleaning and purging of the cylinder(s) by an authorized or permitted Government or commercial treatment facility.

(3) When cleaned and purged of all hazardous materials the activity having possession of the cylinder (s) will process them through a DLA Disposition Office in the same manner as Government-owned cylinders in paragraph 3, above.

(4) Abandoned, non-Government-owned cylinders for which ownership can be determined will be accounted for by DLA Disposition Offices as required by Reference (d). DOD or DLA activities will not place non-Government-owned cylinders on stock records or in stock. "Record Purpose Only" accounting, or maintaining an informal record, is permissible.

c. When cylinders are found, and proper authorities confirm that ownership cannot be Determined or is unknown and positive identification of the contents cannot be absolutely verified, a serious, possibly life-threatening situation could exist. Take the following action under these circumstances:

(1) Cylinders found in what appears to be an unauthorized dumping on Government property, or cylinders of unknown origin may be discovered with missing labels or markings (e.g., dug up during excavation). The facility, installation, base, or activity finding these cylinders will determine if the ISCP, SPCC Plan, or FCP should be activated. Take response action as appropriate to render the cylinders harmless.

(2) When cylinders in apparently serviceable condition are found commingled with Government-owned cylinders, in storage or use in Government-owned facilities, the facility, installation, base, or activity must determine or arrange for the determination of the exact condition and contents of each cylinder.

(3) When cylinders are rendered harmless and/or the exact condition and contents are positively identified, the activity having custody will process the cylinders through a DLA Disposition Services Site in the same manner as Government-owned cylinders in paragraph 3, above.

(4) All cylinders that are being turned into a DLA Disposition Services Site for disposal action because of a base closure which fall into the category of containing an "UNKNOWN" gas will be processed through a disposal service contract. Such a contract or contracts can be provided by DLA Disposition Service with the service activity paying the costs.

5. **ASSISTANCE IN DETERMINING OWNERSHIP**: Upon request, assistance in identifying the ownership symbols found on the shoulders of cylinders will be provided by DLA Aviation-FAJ. A data base of about 10,000 ownership symbols was compiled by the DOT from the beginning of the registration program through 1969, is at our disposal to help identify the owner of a cylinder and possibly what type of a product was shipped in it. In addition to this data file, the Compressed Gas Association has picked up the registration program and is now compiling the registration symbols in a CGA Pamphlet C-16.1. This pamphlet will incorporate symbols assigned since 1969 up through the current revision of the pamphlet. This pamphlet does not contain all the currently used symbols, because not all the cylinder owners chose to pay the fee to have their symbol recorded in this pamphlet. Assistance will be provided by calling **DSN 695-3995** OR Comm (**804) 279-3995.**

6. **RECORDING OF CYLINDER IDENTIFICATION AT TIME OF ISSUE/SALE.** Cylinders (both Government owned and abandoned commercial) that are sold, donated, or otherwise leave Government custody must have the permanent ownership markings, the ICC/DOT Specification, the service pressure, the serial number, the manufacturer's symbol, the date of manufacture and the full name and address of the purchaser recorded on the transfer document. It shall not be necessary to remove the ownership markings at the time of transfer. The transfer document must be used for proof of ownership by both the purchaser and the Government later. One copy of the transfer document must remain on file at the Disposal Activity, and one copy must be given to the recipient of the cylinder. Any inquiry by an investigative agency to verify the sale or ownership of a specific cylinder (identified by serial number and manufacturer) must be directed to phone (804) 279-3756. The document must be dated and signed by a representative of the Disposal Agency.

DLA Industrial Gas Program (IGP) industrial gases/cylinders: Privatized and managed under the Industrial Gas Program (HAAS is the Contractor)

DLA Aviation's Industrial Gas Cylinder Returns and Excess Turn-Ins Program for CONUS (This program does NOT include Class 1 Ozone Depleting Substances (ODS)!!! – Continue to use established ODS Program procedures and Points of Contact) DLA Aviation provides a 24-hr Call Center for returns of empty Industrial Gas Cylinders from customers in CONUS. Cylinder pick-up is available for most CONUS locations saving the customer time and transportation expense.

NOTE: DLA depots are no longer able to accept returns, customer returns will be directed to a local facility managed by the contractor.

For Industrial Gas Cylinder Returns: Please call: 1-866-724-0932 or e-mail: cylreturn@haastcm.com to coordinate returns. When calling/requesting turn-in assistance, please provide the following information:

- Customer POC Information (DoDAAC/Phone Number/Email Address)
- Cylinder NSN
- Gas Type
- Quantity

• Ship from Location

You will receive either an e-mail or phone call with either pick-up information or shipping instructions for the cylinders based on your location.

DLA also has in place provisions for the return of excess cylinders as the result of unit activation or deactivation, deployment or redeployment and new equipment fielding where the customer may offer to return empty reusable cylinders to DLA.

For Excess Turn-ins: Ship your bulk turn-in of excess Industrial Gas Cylinders to the respective receiving facility below, based on your physical location:

• East Coast: Airgas National Welders, Goldsboro, NC RIC: SRY / DODAAC: UY0466

• West Coast: Airgas NCN Sacramento, CA RIC: SX5 / DODAAC: UY0473

Note: Customers shall ensure cylinders are properly labeled, marked, and palletized IAW DOT Commercial Standards. The NSN must be clearly identified on the shipment and all related shipping documents. At time of shipment, provide carrier and tracking information to Haas TCM, Inc., at email: cylreturns@haastcm.com

POC: For additional information go on-line at http://www.dscr.dla.mil/customerassistance.asp or call Gases and Cylinders Integrated Supply Team (IST) Lead, at (804) 279-4257 (DSN: 695) or Administrative Contracting Officer, at (804) 279-5477(DSN: 695).

All Other Cylinders that cannot be redirected to either of the two afore-mentioned entities: Disposition Services
Contact local Disposal office.
For assistance, please contact DLA J4-BC, DSN 771-4164.

Note: Customers must ensure cylinders are properly labeled, marked, and palletized IAW DOT Commercial Standards. The NSN must be clearly identified on the shipment and all related shipping documents. At time of shipment, provide carrier and tracking information to Haas TCM, Inc., at email: cylreturns@haastcm.com

POC: For additional information go on-line at http://www.dscr.dla.mil/customerassistance.asp or call Gases and Cylinders IST Lead, at (804) 279-4257 (DSN: 695) or Administrative Contracting Officer, at (804) 279-4563 (DSN: 695).

NOTE:

All ICC/DOT permanent markings, e.g., ICC/DOT Specification, service pressure, serial number, manufacturer symbol, date of manufacture, and the last hydrostatic test date, must not be disturbed and **SHALL BE FULLY LEGIBLE.** If the permanent markings (after removing all paint) are not legible/readable, the cylinders must be condemned and not be turned in to DLA Disposition Offices without first reducing them to scrap, meeting the requirements of paragraph 3(e) above.

***The owners of the cylinders need to plan to have their cylinders shipped to the proper disposal facility depending on the type of cylinder. If the cylinders are shipped to the incorrect disposal facility, DLA Distribution will request a material release order (MRO) to ship material, if off base to the proper disposal facility. Once identified that the material was improperly released as a disposal release order (DRO), DLA Distribution will be able to charge the owner after a (30) day period. ***

**ALL COSTS OF RETURNING ANY MISIDENTIFIED CYLINDERS WILL BE PAID BY THE GENERATING TURN-IN ACTIVITY. **

ENCLOSURE 11

CLASSIFICATION OF CYLINDERS IN SUPPLY CONDITION CODES

1. **GENERAL.** All cylinders shall be classified with a Supply Condition Code IAW Reference (e). The cylinders must be visually inspected upon receipt and a Supply Condition Code must be assigned. Supply Condition Codes shall also be changed as necessary upon re-inspection.

2. **CYLINDER CLASSIFICATION.** Assignment of Supply Condition Codes to cylinders must be limited to the criteria and codes cited as follows:

a. Supply Condition Code A.

(1) Cylinders suitable for issue without further repair or maintenance, or those that can be made suitable by normal in-storage maintenance, must be assigned Supply Condition Code A. This condition must be determined by performing the applicable inspection as outlined in Enclosure 6.

(2) Subject any empty cylinder received without positive residual pressure to the hammer test as outlined in CGA Pamphlet C-6. Any cylinder that will pass the hammer test will then be inverted and checked for condensed moisture. If the cylinder shows no sign of moisture when inverted, the rest of the condition inspection can be performed. Any signs of moisture or other contaminants, the cylinder will be placed in Supply Condition Code F.

(3) A further inspection of an acceptable visual inspection of the exterior surface of a cylinder is as follows:

(a) A cylinder being returned from a reconditioning facility, should have been inspected and resurfaced as outlined in paragraphs 5.2.2 and 5.3.6 of Reference (f).

(b) Recycled cylinders at the user's location may be assigned Supply Condition Code A if they have only paint wear and scratches from handling and will pass all surface corrosion inspections outlined in CGA Pamphlet C-6, C-6.1, C-6.2 or C-6.3. When an estimated 3 to 5 percent of the cylinder surface is showing bare metal, the cylinder must be at least spot painted to preserve its condition. When more than 10 percent of the cylinder surface shows bare metal, it will be totally stripped of paint and repainted IAW paragraph 5.2.2 of Reference (f).

(4) The droplight used for the inspection of flammable gas cylinders must be explosion-proof. As an alternative to a droplight, a mirror illuminated by an outside source of light may be used to reflect light into the cylinder.

(5) Cylinders found to be unsatisfactory on internal inspection must be tagged or marked as requiring internal cleaning and will be assigned Supply Condition Code F.

b. Supply Condition Code D.

(1) Supply Condition Code D must be assigned to empty cylinders when their hydrostatic test serviceable period has exceeded that period outlined in paragraph 3-3, and that require no other repairs or maintenance.

NOTE:
A full or partially filled cylinder whose hydrostatic/ultrasonic examination test serviceability period has expired may remain in service until the product is exhausted, then it cannot be refilled until a hydrostatic/ultrasonic retest is performed.

(2) The principal application of Supply Condition Code D: must be to report Supply Condition Code "A" cylinders in depot storage that must be downgraded to an unserviceable status only because of an expired hydrostatic test date. Newly received cylinders will rarely require assignment of Supply Condition Code "D."

c. Supply Condition Code F.

NOTE:
Supply Condition Codes D and F as described above are not to be considered "suspense" conditions. Cylinders assigned either of these Supply Condition Codes will be maintained as such until they are needed for refilling and then they will be scheduled for the necessary reconditioning and then refilled and put back into service.

d. Supply Condition Code H. Cylinders with any of the physical defects equal to or exceeding the recommendations found in CGA Pamphlet C-6, C-6.1, C-6.2, C-6.3 (see Enclosure 6.1.e or have failed retest shall be assigned Supply Condition Code H and transferred to DLA Disposition Office IAW Reference (d) and enclosure 8 of this Regulation. Such cylinders must not be referred to DLA Aviation for disposition instructions. Contact the DLA Energy Aerospace Cylinder Manager at cylinder.return@dla.mil for disposition instructions of DLA Energy Aerospace cylinders.

e. Supply Condition Codes J and K.

(1) Supply Condition Codes "J" and "K" must be used as noted below when a cylinder cannot be identified to a valid NSN, or when ownership, e.g., Government or non-Government-owned, is in question.

(2) If the NSN is valid and ownership is known, cylinders normally require only a visual inspection by depot personnel to establish the Supply Condition Code. This should be accomplished in the same time and manner as outlined in Reference (e) and Enclosure 11 of this Regulation.

(3) Supply Condition Code "J" must be used only to suspend cylinders that are found in depot stock that cannot be assigned a valid NSN or when ownership is in question. (See Enclosure 6.1.c.

(4) Supply Condition Code "K" must be used to report cylinders received as customer returns or as a result of redistribution with an incorrect NSN assigned to the cylinder(s) on the

shipping document.

f. Supply Condition Code L.

(1) New, filled, or reconditioned cylinders must be assigned Supply Condition Code “L” only when the discrepancy results from noncompliance with the terms of the contract or when it involves damage in transit.

(2) Frequently a contractor will return Government-furnished cylinders as unsuitable for rehabilitation or refilling. This should not be reported as a discrepancy against "NEW PROCUREMENT.” These cylinders must be assigned Supply Condition Code “H” and reported IAW DLAM 4140.2, Supply Operations Manual, Volume I, Distribution System Procedures, and subparagraph D, above. DD Form 250, Material Inspection and Receiving Report, and DD Form 1155, Order for Supplies or Services, must be used to account for the number of cylinders received.

(3) When Government-furnished valves are returned by a cylinder filling or servicing contractor as unsuitable for further use, they must be considered scrap and transferred to a DLA Disposition Office as such. DLA Aviation must not be notified of this action.

g. Supply Condition Code S. Supply Condition Code “S” must be used to describe cylinders that have no value except for the basic material content. This code is used only for Cylinders being turned in to DLA Disposition Offices IAW Reference (d) and Enclosure 10.

h. DOD Supply Condition Codes. Supply Condition Codes that are reported to DLA Aviation must conform to those contained in Reference (e). General Services Administration (GSA) and Military Service Supply Condition Codes must not be used in any of the reports in Enclosure 12.

ENCLOSURE 12

REPORTING RECEIPTS OR INVENTORY ADJUSTMENTS

1. **GENERAL: Report r**eceipt and inventory adjustment transactions on cylinders to DLA Aviation IAW Reference (e), and the specific provisions and or exceptions of this Regulation. Distribution depots must establish internal controls to ensure and verify transmittal of DD Form 1486, DOD Receipt Document, and DD Form 1487, DOD Materiel Adjustment Document, that result from disposition instructions provided by this Regulation.

2. **REPORTS:** The following reports shall be used under the circumstances indicated and must provide the specific information required. Failure to provide this information will result in the return of the report.

a. DD Form 1225, Storage Quality Control Report. DD Form 1225 must be used only to report on hand cylinders in FSC 6830 and 8120 that must be reclassified Condition Code "J" IAW Enclosure 11.2.e or when requested by DLA Aviation. Cylinders whose ownership is unknown will not be reported and the proper ownership must be determined as outlined in Enclosure 6.1.c.4. (Contractor-owned, -leased, or -loaned cylinders must be identified and returned to their rightful owners by the using Military Service activity and must not be reported to any DLA activity as excess cylinders.) The DD Form 1225 that is used to report cylinders in Condition Code J must contain the complete cylinder identification information as outlined in Enclosure 6.1.a. DD Form 1225 must not be forwarded when cylinders in-storage are reclassified as Condition Codes D, F, or H. This provision is an exception to DLAM 4140.2, Volume I. For Defense Depots, transmittal of DD Form 1348-1, and the DAC Card, is, therefore, essential to ensure adjustment of inventory records.

b. SF 364, Report of Discrepancy. SF 364 will be used to report discrepancies in cylinders received under the following conditions:

(1) Receipts from Military Service activities returning empty cylinders to the DLA Supply System as excess property, if the discrepancy exceeds a value of $100 and is the responsibility of the shipper as outlined in subparagraph b (2), below.

(2) Receipts from redistribution if the value of the discrepancy exceeds $100 and is the responsibility of the shipper (in the case of GSA, see subparagraph (c), below).

(3) Receipts from contractors or vendors that involve overage, shortage, or damage for which the contractor is apparently responsible.

(4) Receipts with any of the following discrepancies:

(a) Incorrect item identification.

(b) Incorrect or missing documentation.

(c) When cylinders appear to have been received in error, e.g., intended for another activity or shipped without proper authority.

(d) For any discrepancy not otherwise specifically noted herein, if it appears that the shipper is responsible.

(5) Customer returns are usually identified by the shipper as being in Condition Code A. An SF 364 must not be submitted when cylinders are reassigned to Condition Codes D or F upon receipt. However, cylinders received as customer returns that are reassigned to either Condition Code K or H must be reported as such.

(6) The DD Form 1225 that is used to report cylinders that, in Condition Code K, must contain the complete information as outlined in paragraph 4-2A.

c. DD Form 361, Transportation Discrepancy Report. DD Form 361 must be used IAW AR 55-38/DLAR 4500.15/NAVSUPINST 4610.33/AFR 75-18/MCO P4610.19, Reporting of Transportation Discrepancies in Shipment, to report all discrepancies in receipts that are the fault of the carrier.

ENCLOSURE 13

COMPRESSED GAS CYLINDER REQUALIFICATION FACILITIES

1. **GENERAL:** In the early 1980s, the Department of Transportation negotiated with the DOD and DLA to provide a means to inspect and certify overseas cylinders retest and reconditioning facilities to eliminate the need to have all cylinders returned to the United States for retesting and reconditioning IAW the United States CFR. The DOT determined it necessary to establish an independent agency, other than the owner or operator of the test facility (Military or Commercial), to perform the inspection and certification. The most qualified agency to perform the inspection and certification program was DLA with the Mission Assignment placed with the DLA Aviation under the management of DLA Aviation-FAJ. Such a program was established, and we now have over twenty registered facilities worldwide.

Requalification (inspection, hydrostatic testing, and physical reconditioning) of compressed gas cylinders must be performed by requalification facilities (hereafter referred to as "facility" or "facilities") that have been inspected and registered with DOT. The registration of a facility with the DOT must specifically identify the DOT specification cylinders (Types) for which the facility has been inspected, approved, and registered to re-qualify (Retest). Each facility performing the required requalification shall be fully capable to safely and accurately perform the required inspections, tests and reconditioning of the cylinders. The method of obtaining the facility registration shall be determined by the location of the requesting facility. The facilities that are located within the United States or its territories or possessions shall correspond directly with DOT to obtain the desired registration. It is the responsibility of the requesting CONUS activity to pay for the expense of the inspection visit. The activity will negotiate directly with the inspection agency for the cost of the inspection. The expense of the inspection trip to an overseas activity is currently being funded through a Mission Assignment from DOD to DLA.

2. **REGISTRATION OF FACILITIES:** Facilities located within the United States, its territories, or its possessions shall be registered with the DOT in the name of the requesting DOD activity or the commercial firm that will be performing the cylinder requalification. Facilities at an overseas location, either Military Service or commercial, shall be registered in the name of the requesting DOD activity. The designated office within that activity must be either the managing office of the Military Service facility or the managing office that is administering the contract requirements with the commercial firm performing the cylinder retesting and reconditioning. The request for registration and the completion of the application forms must be accomplished and signed by a management representative of the commercial firm and the DOD activity.

3. **REGISTRATION PROCEDURES:** The following procedures must be used in obtaining a DOT facility registration as prescribed by Reference (g), Sections 180.209:

a. Facilities within the United States, Its Territories, or Its Possessions.

(1) Military Service activities and commercial firms desiring registration of their facilities must submit a letter requesting such registration to the following office:

Associate Administrator for Hazardous Materials Safety PHMSA
U.S. Department of Transportation
Attention: PHH-30
1200 New Jersey Avenue, SE East Building, 2nd Floor
Washington, DC 20590-0001

(2) Upon receipt of the written request for registration, the Director, Associate Administrator for Hazardous materials Safety at PHMSA, will provide the applicant with a copy of the registration procedure, a list of approved independent inspection agencies, a list of minimum requirements, and an application form.

(3) From the list provided by the Director, Associate Administrator for Hazardous materials Safety at PHMSA, the applicant must select one of the independent inspection agencies, whose recommendation will be solicited for registration,
purposes, to perform an inspection of the facility.

(4) Upon completion of a satisfactory inspection, the independent inspection agency will provide the applicant with a letter of recommendation and the Director, Associate Administrator for Hazardous materials Safety at PHMSA, with an inspection report.

(5) The applicant must then submit the letter of recommendation and a completed application form to the Director, Associate Administrator for Hazardous materials Safety at PHMSA, for consideration.

(6) The Director, Associate Administrator for Hazardous materials Safety at PHMSA, will evaluate all the information relating to the requalification operation and, if it is determined to be acceptable, will provide the applicant with a letter of registration bearing a unique registration number.

(7) The registration will be valid for 5 years, subject to the requirements for equipment maintenance and any changes in the testing and reconditioning capabilities of the facility.

4. **MINIMUM REQUIREMENTS FOR EQUIPMENT AND PERSONNEL** The following list outlines the equipment, documentation, and reference material normally necessary to perform visual and hydrostatic tests required by Reference (g), Section 178. Facility personnel must be able to demonstrate their knowledge of Reference (g), and CGA Pamphlets C-6, C-6.1, C-6.2 and C-6.3. They must also be able to demonstrate the capability of operating the test equipment to perform the required tests to the degree of accuracy required by the regulations. If the proposed test equipment and supporting data and documents differ from those prescribed, the independent inspection agency (DLA Aviation-FAJ) should be advised of any such differences. The proposed alternate method by which the competence of the testing personnel, and or the accuracy of testing equipment must be demonstrated by the test facility but should be explained to the inspection official prior to the inspection of the facility. The following must be available onsite at the time of the inspection:

a. Regulations: A current copy of Reference (g), Parts 100 to 185, or a similar reprint. Copies of this Regulation can be obtained from:

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

b. Pamphlets: CGA Pamphlets: C-6, C-6.1, C-6.2, and C-6.3. These can be obtained from:

Compressed Gas Association, Inc.
14501 George Carter Way
Suite 103
Chantilly, VA 20151
Phone: 703-788-2700
Fax: 703-961-1831

c. Certificate of Calibration. A certificate of calibration representing the most resent calibration of both the operating test and master gauges as applicable through their operating ranges.

d. Calibrated Cylinder. A calibrated cylinder of similar size and expansion range as that of the U.S. Government-owned cylinders being tested and a chart of its expansion values.

e. Hydrostatic Test Equipment. Hydrostatic test equipment capable of performing the desired testing in a range of 25 to 75 percent of its designed maximum capability with an accuracy of 1 percent of any designated test pressure and resultant expansion value.

f. Visual Inspection Equipment. Equipment necessary for both internal and external visual inspections.

g. Record keeping Form. A sample of the facility's Record keeping form, which must display the same information illustrated in CGA Pamphlets C-6.

h. Required MIL-STDs. Copies of Reference (m) and Reference (h), and all documents referenced therein. Copies can be obtained from:

Standardization Documents Order Desk
700 Robbins Ave
Bldg. 4D
Philadelphia, PA 19111-5094
https://assist.daps.dla.mil//

i. Required Regulation. Copies of this Regulation and all documents referenced herein.

ENCLOSURE 14

MANAGING THE DEFENSE RESERVE OF OZONE DEPLETING SUBSTANCES

1. **MISSION ASSIGNMENT.**

a. The DLA was assigned the mission of managing the Defense Reserve of Ozone Depleting Substances to ensure that the supplies for mission critical applications are available. DLA will provide central management for the receipt, storage, and issuance through the DLA Aviation, which is the activity within DLA that manages these substances. DLA Distribution Richmond VA is the primary storage site for ODS.

b. It is imperative that your military service or defense agency turn in to the Reserve the following excess CFCs and Halons: CFCs - 11, 12, 500, 502, HCFC-22 and Halons – 1202, 1211, 1301, and 2402. The Reserve accepts both used and new CFCs and Halons in a relatively pure state (I.E. not as a component of other products). These chemicals may have been purchased under the Federal Supply Classes (FSC) of 6830 and 4210, or from a commercial source. CFC/Solvent-113 (Type I & II) and 1, 1, 1 Trichloroethane (FSCs 6850 and 6810) can also be turned in to the Reserve provided they have never been used and the containers in which the chemicals reside have never been opened or unsealed.

c. Parts 1, 2, and 3 of this section will provide procedures on how to turn-in excess ODS. Parts 4, 5, 6 and 7 will provide National Stock Numbers (NSNs) specifically assigned to identify ODS turned in to the Reserve and associated recovery cylinders. Part 8 provides the list of chemicals by name that form a part of the ODS Reserve.

d. For questions concerning requisitions and stock availability, contact DLA Aviation-VO, ODS Reserve, DSN 695-6451 or (804)-279-6451. Procedural concerns may be addressed to DLA Aviation-VO, ODS Reserve, DSN 695-5203 OR (804) 279-5203 or email: AVN.ODS Reserve@dla.mil.

Ozone Depleting Substances (ODS) Gases/Cylinders: ODS Reserve

Fire extinguishers containing ODS, e.g., Halons, CFCs, etc.: and any other cylinders containing ODS, e.g. Halons, CFCs, etc.

ODS Contacts:

Address:	**Defense Logistics Agency Aviation** Ozone depleting Substances Reserve-VO Building 19 8000 Jefferson Davis Highway Richmond, VA 23297-5100
Technical Support	**Commercial** (804) 279-5203 **DSN** 695-5203

Requisition Support	**Commercial** (804) 279-6451	**DSN** 695-6451
Turn-In Support	**Commercial** (804) 279-5004	**DSN** 695-5004
ODS Program Support	**Commercial (**804) 279-4525	**DSN** 695-4525
FAX:	**Commercial** (804) 279-4970	**DSN** 695-4970
Email:	**DLA Aviation.ODSReserve@dla.mil**	

Website: http://www.aviation.dla.mil/externalWeb/UserWeb/aviationengineering/OZONE/

Note: Please see the above website for detailed turn-in procedures.

PART 1

GENERAL ODS TURN-IN INFORMATION

2. **PROCEDURES**

a. No authorization or pre-notification to the ODS Program Office is required when turning in ODS to the Reserve. However, turn-in guidance can be obtained by contacting the ODS Reserve via email at: AVNODSReserve@dla.mil.

b. All types of ODS containers will be accepted in the Reserve to include cylinders, fire extinguishers, drums, spheres, and canisters. Government recovery cylinders are available free of charge for ODS turned in to the Reserve. Only these recovery cylinders should be used for recovering ODS from systems. They can be requisitioned by following normal MILSTRIP procedures. The government cylinders used for recovering CFC refrigerants are painted orange, and Halons red. Both have yellow tops and dual port valves (in some cases on the larger cylinders, two valves) to distinguish them from single port valve standard spec gas cylinders. For Navy shipboard applications only, dual port spec gas (virgin) CFC cylinders are available. These unique spec gas cylinders can also be used for recovering CFCs.

c. All ODS containers returned to the Reserve must be tagged/ labeled as follows:

(1) The shippers DOD Activity Address Code (DODAAC).

(2) The shipping activity's "in the clear" address with POC and phone number.

(3) The NSN of the cylinder(s) containing the recovered ODS (see Part 2).

(4) Type of ODS (I.E. Halon 1301 or CFC-12).

(5) The quantity of containers on the pallet or within the shipping crate.

(6) Packaged and labeled in compliance with DOT regulations.

NOTE

WHEN MULTIPLE CONTAINERS (CYLINDERS, DRUMS, SPHERES, CANISTERS, OR FIRE EXTINGUISHERS) WITH THE SAME NSN ARE SHIPPED PALLETIZED OR IN A BOX/CRATE, APPLY ONLY ONE TAG/LABEL TO THE SHIPMENT, NOT TO EACH ITEM.

d. Fire suppression system cylinders and canisters with electrical charges or initiators must be deactivated prior to shipment to the Reserve. Also, safety caps must be used to cover exposed actuation mechanisms and discharge ports on these special cylinders, otherwise dangerous safety situations could arise during the shipping, receiving, or storage process. Local fire protection equipment companies can provide safety services. Special handling procedures for Halon system cylinders are provided later in this part. If further guidance is needed; contact the ODS Reserve Program Office at DSN 695-5202 or (804) 279-5202.

e. Monetary credit will not be given for turned in ODS or cylinders. However, ownership credit will always be given to the service or agency for the pounds of ODS returned to the Reserve. ODS can be requisitioned from the Reserve by service-authorized activities.

f. Empty recovery, and spec gas cylinders must be turned in to the Reserve. Spec gas empty
cylinders (see Part 2 for applicable NSNs) should not be used for recovery purposes. Spec gas cylinders will be refurbished and refilled with product for future requisitions. There are exceptions to recovery of product into spec gas cylinders, but this applies to limited Navy Shipboard applications. Approval by the ODS Program Office is required to obtain these unique spec gas cylinders for shipboard applications.

g. CFC, Solvent-113 and 1.1.1 Trichloroethane when turned in must be in their original containers in which the seal has never been broken.

h. Burnt out or mixed reserve products can be turned in to the Reserve. Clearly identify the chemical by defining its components (i.e. R-12 & R-502)

i. The following items are not a part of the Reserve: Empty fire extinguishers (valves removes), Empty commercial containers, Aerosol cans with Reserve chemicals, Dry chemicals, HCFC refrigerants except for R-22, and R-134a and other HFC refrigerants.

NOTE

CONTACT YOUR LOCAL PROPERTY DISPOSAL OFFICE FOR GUIDANCE ON THE DISCARDING OF THESE ITEMS.

3. TRANSPORTATION GUIDANCE

j. When shipping ODS See the following documents as needed:

(1) The applicable sections of this document.

(2) Reference (q), Military Standard Marking for Shipment and Storage.

(3) Reference (g), Part 173, Requirements for the Shipment of Compressed Gas Cylinders.

k. If funds are not available within your activity to ship excess ODS to the Reserve, transportation cost assistance/TAC information can be provided by the Reserve. This cost assistance is strictly for transporting ODS and not for packing costs. For transportation cost assistance, fax the following data to: (804) 279-4970 or DSN 695-4970, or email to: AVNODSReverve@dla.mil:

(1) Type and quantity of ODS.

(2) Number of cylinders, pallets, total weight of shipment and cube.

(3) The shipping cost.

(4) Requesting facility and point of contact.

l. Turn-ins should be forwarded to the following address:

DLA Distribution Richmond Virginia
SW0400
ODS Cylinder Operations
Open Shed 6
Richmond, VA 23297-5900

Trucks must enter DLA Distribution from Chippenham Parkway entrance (Route 150) through Gate 13.

m. All carriers and activities must schedule delivery and obtain an appointment number from DLA Distribution Dispatch Office at DSN 695-3834/3835 or (804) 279-3834/3835 at least 48 hours in advance to delivery ODS to the ODS Reserve.

PART 2

COLLECTION SITE SPECIFIC PROCEDURES

Collection/consolidation site specific procedures are available from the ODS Reserve Program Office for Germersheim, Germany; Pearl Harbor, Hawaii; Yokosuka, Japan; and the European

Holding Facility, Zevenaae, Netherlands. Contact the Reserve at (804) 279-5202 for any of these procedures.

PART 3

SPECIAL ODS TURN-IN PROCEDURES FOR HALON 1301

4. PROCEDURE

a. Halon 1301 is typically incorporated into built-in fire suppression systems applications with the charged Halon cylinder connected to the system piping. Because the Halon is over pressurized with nitrogen to facilitate distribution, these system cylinders are usually disconnected from the system and used as the transportation cylinder to return the product to the Reserve as the systems are taken out of service. However, fire suppression system cylinders and canisters with electrical charges or initiators must be deactivated prior to shipment to the Defense Reserve. Special care should be taken when deactivating and disassembling the systems. The valves on these cylinders are designed in a manner that upon activation they are changed instantly from closed position to fully open position and will dispense the Halon in under 10 seconds. The combination of these sensitive valves and the high pressure within the cylinders require compliance with good safety practices

b. Instructions for dismantling a Halon Fire Suppression System are provided as follows:

(1) The first step is to deactivate the actuation system, which is usually electrical or pneumatic. However, disconnection from the electrical or pneumatic source is not enough from a safety standpoint. In the case of pneumatic systems, there is often still a small pin exposed that must be covered with a safety cap before handling. Just the slightest touch on this pin could cause full activation of the valve. In the case of electrically activated valves, simple disconnection of the electrical leads to solenoid valves is acceptable. However, if the electrical connection is to an explosive initiator, it is very important to remove the initiator. This is a very important safety practice, because static electricity can cause the explosive to detonate. These actions should be done before any other dismantling is initiated.

(2) The next step is to disconnect any discharge piping from the discharge port. Immediately upon disconnection of the piping, install an anti-recoil device (discharge port safety cap). Safety caps should be used to cover exposed actuation mechanisms and discharge ports on these special cylinders, otherwise dangerous safety situations could arise during the shipping, receiving, or storage process. Application of manufacturers designed and supplied caps are the proper safety practice. In some cases, the threads are not the same as pipe threads and may not hold under the pressure of release. However, if pipe caps, plugs or plates are substituted for manufacturers' caps, at least four opposing holes must be drilled in the anti-recoil cap, plug or plate to disperse any release of the Halon if the valve inadvertently activates. Anti-recoil device safety caps/plugs/plates must always be in place before handling the cylinders.

(3) Adherence with the above safety practices is paramount before removing any cylinder from the mounting position. Once the safety devices are in place, cylinders can be moved with relative safety. However, these are high-pressure compressed gas cylinders and require all the safe handling practices of any other gas cylinder. Also, protective safety wear is required for personnel deactivating cylinders.

PART 4

NSNs FOR EMPTY RECOVERY CYLINDERS

COMMODITY	EMPTY RECOVERY SIZE: (LB)	CYLINDER NSN
HALONS		
Halon 1202	160	8120-01-356-1781
Halon 1202	2000	8120-01-447-3636
Halon 1211	200	8120-01-356-1248
Halon 1211	1500	8120-01-396-2624
Halon 1211	2400	8120-01-399-3050
Halon 1301	117	*8120-01-371-0533
Halon 1301	122	8120-01-356-5963
Halon 1301	1000	8120-01-356-5962
Halon 1301	2400	8120-01-399-2504
Halon 2402	122	8120-01-469-2550
Halon 2402	1000	8120-01-469-2774
REFRIGERANTS		
R-11	59	8120-01-356-5960
R-11	170	8120-01-356-9756
R-11	1400	8120-01-355-9763
R-12	45	8120-01-355-4017
R-12	145	8120-01-355-4018
R-12	800	8120-01-456-1706
R-12	1190	8120-01-355-4019
R-22	44	8120-01-357-9140
R-22	128	8120-01-357-9139
R-22	1050	8120-01-357-9141
R-114	57	8120-01-356-1245
R-114	165	8120-01-356-1246
R-114	165	8120-01-377-2300
R-114	1360	8120-01-356-1247
R-124	24	8120-01-457-7063
R-134a	43	8120-01-394-2653
R-134a	125	8120-01-394-2656

NSNs FOR EMPTY RECOVERY CYLINDERS (cont.)

COMMODITY	EMPTY RECOVERY SIZE: (LB)	CYLINDER NSN
R-134a	800	8120-01-484-2646
R-401A	34	8120-01-457-4757
R-401B	34	8120-01-457-7025
R-402A	34	8120-01-457-7033
R-402B	34	8120-01-457-7038
R-404A	34	8120-01-457-7052
R-500	43	8120-01-357-6774
R-500	127	8120-01-357-7656
R-500	1045	8120-01-357-7657
R-502	44	8120-01-337-6770
R-502	128	8120-01-357-6771
R-502	1050	8120-01-357-6769

*Denotes a High-pressure cylinder of 600 psig plus.

PART 5

NSNs FOR EMPTY SPEC GAS (VIRGIN) PRODUCT CYLINDERS (FOR TURN-INS ONLY)

COMMODITY	CAPACITY (POUNDS SIZE)	CYLINDER NSN
HALONS		
Halon 1202	2000	8120-01-371-0532
Halon 1211	200	8120-00-337-2899
Halon 1211	1500	8120-01-396-2165
Halon 1301	137 & 150	8120-00-531-8193
Halon 1301	1123 & 1240	8120-01-356-5961
REFRIGERANTS		
R-11	59	8120-01-355-9760
R-11	170	8120-01-355-9761
R-11	1400	8120-01-531-2122
R-12	45	8120-01-337-1816
R-12	145	8120-01-337-6242
R-12	1190	8120-01-355-4016

NSNs FOR EMPTY SPEC GAS (VIRGIN) PRODUCT CYLINDERS (cont.) (FOR TURN-INS ONLY)

R-114	57	8120-01-354-9400
R-114	165 (10x49)	8120-00-063-3983

R-114	165 (12x36)	8120-01-337-6236
R-114	1360	8120-01-356-1244
R-500	43	8120-01-357-6773
R-500	127	8120-01-357-6772
R-500	1045	8120-01-357-9137
R-502	44	8120-01-357-7655
R-502	128	8120-01-337-6239
R-502	1050	8120-01-357-6907

Part 6

NSNs FOR TURN-INS OF ODS

COMMODITY	EXTINGUISHER OR CYLINDER CAPACITY (SIZE)	NSN FOR TURN-IN
HALON IN CYLINDERS OR EXTINGUISHERS		
Halon 1202	160	6830-01-356-1780
Halon 1202	2000	6830-01-447-3632
Halon 1211	1-5	6830-01-376-8013
Halon 1211	6-10	6830-01-376-8014
Halon 1211	11-20	6830-01-376-8015
Halon 1211	21-60	6830-01-376-8016
Halon 1211	126-200	6830-01-356-1209
Halon 1211	341-1500	6830-01-356-1211
Halon 1301	1-5	6830-01-376-8394
Halon 1301	6-10	6830-01-376-8395
Halon 1301	11-20	6830-01-376-8396
Halon 1301	21-70	6830-01-376-8397
Halon 1301	71-100	6830-01-376-8398
Halon 1301	101-117	6830-01-371-0501
Halon 1301	118-125	6830-01-376-8399
Halon 1301	126-150	6830-01-356-9752
Halon 1301	151-200	6830-01-376-8400
Halon 1301	201-260	6830-01-376-8401
Halon 1301	261-350	6830-01-376-8402
Halon 1301	351-530	6830-01-376-8403
Halon 1301	531-600	6830-01-376-8404
Halon 1301	601-1240	6830-01-356-5958

Halon 2402	122	6380-01-469-9138
Halon 2402	1000	6830-01-469-9135
REFRIGERANTS		
R-11	59	6830-01-355-9754
R-11	100	6830-01-368-4847
R-11	170	6830-01-355-9756
R-11	1400	6830-01-355-9758
R-12	45	6830-01-355-4013
R-12	145	6830-01-355-6648
R-12	1190	6830-01-355-4015
R-114	57	6830-01-356-1203
R-114	165	6830-01-356-1205
R-114	165(10”x49”)	6830-01-377-1807
R-114	1350	6830-01-356-1207
R-500	43	6830-01-357-7650
R-500	127	6830-01-358-5123
R-500	1045	6830-01-357-7654
R-502	44	6830-01-357-6726
R-502	128	6830-01-357-6727
R-502	1050	6830-01-357-6905
R-22	44	6830-01-357-9131
R-22	128	6830-01-357-9129
R-22	1050	6830-01-357-9133

PART 7

NSNs FOR TURN-IN OF CFC SOLVENTS IN DRUMS/CANS

COMMODITY	CAPACITY	NSN FOR TURN-IN
CFC/Solvent 113	6 oz.	6850-01-424-8532
	1 pint	6850-01-424-8533
	1 quart	6850-01-424-8540
	1 gal / 11 lbs.	6850-01-424-8531
	100 lb.	6850-01-424-8535
	200 lb.	6850-01-424-8536
	5 gal / 60 lb.	6850-01-424-8534
1,1,1 Trichloroethane	6 oz.	6850-01-424-8538
	1 pint	6850-01-424-9662
	1 quart	6850-01-424-9665
	1 gal / 12 lb.	6850-01-424-8539

55 gal / 640 lb. 6850-01-424-9673

PART 8

OZONE DEPLETING SUBSTANCES IN THE RESERVE

CLASS I

CFCs	CHEMICAL NAME	SYMBOL
CFC-11	Trichlorofluoromethane	CFCl3
CFC-12	Dichlorodifluoromethane	CF2Cl2
CFC-114	Dichlorotetrafluoroethane	C2F4Cl2
R-500*	(See note below)	CF2Cl2/C2F2
R-502**	(See note below)	CF2Cl/C2F5Cl
HALONS		
Halon 1202	Dibromodifluoromethane	CF2Br2
Halon 1211	Bromochlorodifluoromethane	CF2ClBr
Halon 1301	Bromotrifluoromethane	CF3Br
Halon 2402	Dibromotetrafluoroethane	C2F4Br2
SOLVENTS		
Methyl Chloroform	1,1,1 Trichloroethane	CH3CCl3
CFC-113	Trichlorotrifluoroethane	C2F3Cl3

CLASS II

HCFC-22	Monochlorodifluoromethane	CHF2CI

* Azeotropic mixture of CFC-12 and HFC-152a (1,1 Difluoroethane)
** Azeotropic mixture of CFC-115 and HCFC-22

MEDICAL GASES AND GAS CYLINDERS UNDER MANAGEMENT

OF
DEFENSE PERSONNEL SUPPORT CENTER

SECTION 1

1. Gases for medical use are shipped in the same type of steel cylinders as other compressed gases and use similar valves and valve protection caps. Medical cylinders can be distinguished by the letters "MED" stamped into the shoulder of the cylinder and or the word "MEDICAL" or "USP" stenciled on the cylinder after the name of the gas on two diametrically opposite locations parallel to the longitudinal axis of the cylinder. The procedures in enclosure 1 of the document apply to medical gases and constitute the procedures of the proper color coding, storage, handling, inspection, maintenance, and shipment of medical gases. Requirements for reports to DLA Aviation as indicated in enclosure 1 of this document will apply also for medical gases and cylinders, with these reports being forwarded to DLA Troop Support. Some supplementary instructions for medical gases are desirable, and they are outlined in this enclosure. All cylinders, both empty and filled, managed by DLA Troop Support shall meet pressure and all other requirements of the applicable specifications. The medical gases and cylinders centrally managed by DLA Troop Support are:

a. Full cylinders:

NSN	GAS	GAL	SIZE
6505-00-130-1940	Nitrous Oxide, USP	2,000	M
6505-00-130-1920	Nitrous Oxide, USP	250	D
6505-00-132-5225	Oxygen, USP	800	M
6505-00-132-5181	Oxygen, USP	95	D
6505-00-132-5199	Oxygen, USP	1,650	H

b. Refillable medical gas cylinders are DOT Specification 3AA2015 purchased to Fed Spec RR-C-901, Amend #1 thereto and RR-C-901/3.

c. Non-reusable (non-refillable) containers (NRC) are disposable emergency oxygen Cylinders managed by DLA Troop Support. The full cylinder NSN is 6505- 00-965-2439, Oxygen, USP, with Tube and Face Mask. It contains 24 gallon of gaseous oxygen and is a DOT-39 NRC 1000/1250 cylinder.

2. **PROCEDURES.**

a. **Storage and Handling**

(1) Medical gases must be evaluated and considered for their chemical characteristics and stored and handled in a similar manner as the industrial gases outlined in enclosure 1 of this document.

(2) The principal types of medical gases are:

(a) Carbon Dioxide

(b) Carbon Dioxide and oxygen mixture

(c) Cyclopropane (no longer in general use)

(d) Ethylene oxide and nonflammable gas mixtures

(e) Helium and oxygen mixture

(f) Methoxyflurane Nitrogen

(g) Nitrogen and oxygen mixture

(h) Nitrous oxide

(i) Oxygen

(3) The hazards of the medical gases are outlined in enclosure 1 of this document.

(4) The maintenance of the purity of medical gases is the utmost importance. There are serious hazards involved in transferring compressed gases from one cylinder to another; therefore, Do NOT transfer medical gases from one cylinder to another.

b. **Inspection - Filled Cylinders.**

(1) Inspection of filled medical gas cylinders consists of a receiving inspection, storage Inspection, and an inspection at time of shipment. Inspection for refilled medical gas cylinders (after refurbishing) will be accomplished at the supplier's facility. Filled Cylinders that are ready for issue and use will bear the tag as required by the DLA Troop Support contract to indicate that the cylinders are full. In addition, oxygen-filled cylinders will bear DD Form 1191, Warning Tag for Medical Oxygen Equipment.

(2) Inspect all oxygen received at a medical facility for patient use to ensure that it has a letter of certification from the supplier stating that the oxygen meets the requirements of the United States Pharmacopoeia (USP) and Food and Drug Administration (FDA).

3. **SHELF LIFE.** Medical gases managed by DLA Troop Support no longer are designated as Type I (non-extendable) shelf-life items with a designated expiration date. The FDA waived this requirement for all DOD medical gases in 1987. The full and empty cylinder retesting and reconditioning requirements must be as outlined in Enclosure 5 (2). The cylinder has an indefinite life span and with proper care and hydrostatic testing the cylinder will last 50 to 60 years.

SECTION 2

INSTRUCTIONS FOR AIR FORCE USERS

1. Air Force activities should See AFI 41-209, Medical Logistics Support, for specific guidance concerning purchase, receipt, storage, and issue of medical gases.

2. Oxygen for patient use must comply with the provisions of the National Fire Protection Association (NFPA) 99, Standard for Health Care Facilities. It covers the storage and handling of gases, and the protection of the medical facility.

3. Select pamphlets published by the CGA should be used as references by medical facilities. CGA Pamphlet P-1, "Safe Handling of Compressed Gases in Containers", Pamphlet P-2, "Characteristics and Safe Handling of Medical Gases", and Pamphlet P-2.7, "Guide for the Safe Storage, Handling & Use of Portable Liquid Oxygen Systems in Health Care Facilities" are applicable.

GLOSSARY

PART I. ABBREVIATIONS AND ACRONYMS

AFI	Air Force Instruction
AFJI	Air Force Joint Instruction
AFJMAN	Air Force Joint Manual
AR	Army Regulation
ASD L&MR	Assistant Secretary of Defense for Logistics and Material Readiness
AFOSH	Air Force Occupational Safety and Health
ASTMI	American Society for Testing Materials International (formerly ASTM)
AWS	American Welding Society
CAGE	Commercial and Government Entity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CID	Commercial Item Description
CFC	Chloroflurocarbons
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CONUS	Continental United States
DLA	Defense Logistics Agency
DLAI	Defense Logistics Agency Issuance
DLAR	Defense Logistics Agency Regulation
DOD	Department of Defense
DoDAAC	Department of Defense Activity Address Code
DOT	Department of Transportation
DPSC	Defense Personnel Support Center
ESOH	Environment, Safety and Occupational Health
FAR	Federal Acquisition Regulation
FED STD	Federal Standard
FCP	Facility Contingency Plan
FLIS	Federal Logistics Information System
FSC	Federal Stock Class
GAL/gal	Gallon
GSA	General Services Administration
HAZCOM	Hazardous Communication
HAZMAT	Hazardous Material
HCC	Hazardous Characteristic Code

HCFC	Hydrochloroflurocarbons
HMIRS	Hazardous Materials Information Resource System
HMR	Hazardous Material Regulation
HMTC	Hazardous Material Technical Center
HTIS	
IAW	in accordance with
ICC	Interstate Commerce Commission
ICP	Inventory Control Point
INC	Item Name Code
ISCP	Installation Spill Contingency Plan
Lb./lb.	Pound
LEL	Lower Explosive Limit
MCO	Marine Corps Order
MIL-DTL	Military Detail
MILSPEC	Military Specification
MILSTRAP	Military Standard Transaction Reporting and Accounting Procedures
MRO	Material Release Order
NASA	National Aeronautics and Space Administration
NAVOSH	Navy Occupational Safety and Health
NAVSUPINST	Naval Supply Instruction
NFPA	National Fire Protection Association
NSN	National Stock Number
OHMT	Office of Hazardous Materials Transportation
OPNAVINST	*Office of the Chief of Naval Operations Instruction*
PN	Part Number
POC	point of contact
Psia	pounds per square inch absolute
Psig	pounds per square inch gauge
QAR	Quality Assurance Representative
SDS	Safety Data Sheet
SF	Standard Form
SPCC	Spill Prevention, Control, and Countermeasures
SQCR	Storage Quality Control Report
USD AT&L	Under Secretary of Defense for Acquisition, Technology, and Logistics
USA	United States Army
UEL	Upper Explosive Limit
USAF	United States Air Force

USMC	United States Marine Corps
USN	United States Navy
WTSDF	Waste Treatment, Storage, or Disposition Facility

PART II: DEFINITIONS

Department of Defense Supply System: The DOD Supply System is a comprehensive level of organized supply (including wholesale and retail supply) linking the producer to the DOD user through an elaborate system of materiel management actions (including provisioning, cataloging, requirements determination, acquisition, distribution, maintenance, and disposal) for both principal items (items in which a central inventory control is required) and secondary items (consumable and repairable items) of supply.

Hazardous Characteristics Code (HCC). A two-digit alphanumeric code that is used to provide a means of categorizing hazardous materials (HAZMAT). Enclosure 1 of Reference (e) of the enclosure provides the official definition for each HCC.

Hazardous Material. Is any chemical, bare item, or article controlled by:

a. Title 10, Chapter I, Part 40, Section 40.4, Nuclear Regulatory Commission (NRC).

b. Reference (l), Subtitle B, Chapter XVII, Part 1910, Subpart A, Section 1910.6, Occupational Safety and health Administration (OSHA).

c. Reference (i), Chapter I, Part 2, Subpart B, Section 2.306, Environmental Protection Agency (EPA).

d. Reference (g), Chapter I, Part 171, Section 171.8, Department of Transportation (DOT).

e. International Maritime Organization (IMO); International Air Transport Association (IATA), International Civil Aviation Organization (ICAO).

f. Reference (m), "Preparing Hazardous Materials for Military Air Shipment."

Compressed Gas. The term "compressed gas" is described as follows:

a. Any material or mixture having, in the container, an absolute pressure exceeding 40 pounds per square inch (40 psia) (25 pounds per square inch gauge (25 psig)) at 70°F.

b. Regardless of the pressure at 70°F, having an absolute pressure exceeding 104 psia (89 psig) at 130°F.

c. Any flammable liquid material having a vapor pressure exceeding 40 psia (25 psig at 100°F as determined by American Society for Testing Materials International (ASTMI) D-323, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method), latest edition.

Cylinder. A compressed gas cylinder is a pressure vessel designed for the storage and transportation of a compressed gas at pressures higher than 40 psia (25 psig), with a tubular shape and circular cross section. This does not include a portable tank, a multi-unit tank car tank, a cargo tank, or a tank car (Reference (g), Section 171.8).

a. Compressed Gas. Class 2, Divisions 2.1, 2.2, and 2.3 (CFR 49-173.115)

(1) *Division 2.1 (Flammable Gas).* A *flammable gas* (Division 2.1) means any material which is a gas at 20°C (68°F) or less and 101.3 kPa (14.7psia) of pressure (a material which has a boiling point of 20°C (68°F) or less at 101.3 kPa (14.7 psia)) which:

(a) Is ignitable at 101.3 kPa (14.7 psia) when in a mixture of 13 percent or less by volume with air, or

(b) Has a flammable range at 101.3 kPa (14.7 psia) with air of at least 12 percent regardless of the lower limit. Except for aerosols, the limits specified in paragraphs (a)(1) and (a)(2) of this section shall be determined at 101.3 kPa (14.7 psia) of pressure and a temperature of 20oC (68oF) IAW the ASTMI E681, Standard Test Method for Concentration Limits of Flammability of Chemicals or other equivalent method approved by the Associate Administrator. The flammability of aerosols is determined by the tests specified in paragraph (l) of this section.

(2) *Division 2.2 (non-flammable, nonpoisonous compressed gas-including compressed gas, liquefied gas, pressurized cryogenic gas, compressed gas in solution, asphyxiant gas and oxidizing gas).* A nonflammable, nonpoisonous compressed gas (Division 2.2) means any material (or mixture) which:

(a) Exerts in the packaging a gauge pressure of 200 kPa (29.0 psig/43.8 psia) or greater at 20°C (68°F), is a liquefied gas or is a cryogenic liquid, and

(b) Does not meet the definition of Division 2.1 or 2.3.

(3) *Division 2.3 (Gas poisonous by inhalation)* A *gas poisonous by inhalation* (Division 2.3) means a material which is a gas at 20°C (68°F) or less at a pressure of 101.3 kPa (14.7 psia) (a material which has a boiling point of 20° C (68°F) or less at 101.3 kPa (14.7 psia)) And which:

n. Is known to be toxic to humans as to pose a hazard to health during transportation.

o. In the absence of adequate data on human toxity, is presumed to be toxic to humans because when tested on laboratory animals it has an LC_{50}value of not more than 5000mL/m^3 (see §173.116(a) of this subpart for assignment of Hazard Zones A, B, C, or D).

LC_{50}values for mixtures may be determined using the formula in §173.133(b) (1) (i) or CGA P-20 (IBR, see §171.7 of Reference (g).

4. Compressed Gas in Solution. The term “compressed gas in solution" identifies a non-liquefied compressed gas that is dissolved in a solvent. In this case, we are speaking of acetylene, which is dissolved into acetone.

5. Cryogenic Liquid. A cryogenic liquid means a refrigerated liquefied gas having a boiling point colder that –90°C (-130°F) at 101.3 kPa (14.7 psia). It must be super cooled (refrigerated) for it to condense into the liquid state. It is therefore sometimes referred to as a refrigerated liquid. A material meeting this definition is subject to the requirements of Reference (g). An example of this type of material is partially described as "oxygen, refrigerated liquid" (cryogenic liquid) in Reference (g). Gases meeting these characteristics would be gases such as oxygen, nitrogen, argon, helium, and hydrogen.

6. Liquefied Compressed Gas. The term "liquefied compressed gas" means a gas, which in a packaging under the charged pressure is partially liquid at a temperature of 20°C (68°F). Gases meeting these characteristics would be the Liquefied Petroleum Gases (Butane and Propane), all the refrigerant gases, ammonia, chlorine, and the firefighting halons 1202, 1211, and 1301.

a. High *pressure liquefied gas* which is a gas with critical temperature between -50°C (-58°F) and +65°C (149°F), and

b. *Low-pressure gas* which is a gas with a critical temperature above +65°C (149°F).

7. Non-liquefied Compressed Gas. The term "non-liquefied compressed gas" means a gas, other than in solution, when in a packaging, under the charged pressure is entirely gaseous at a temperature of 20°C (68°F). These are sometimes referred to as the permanent gases. They will also (when super cooled or refrigerated) meet the characteristics of a cryogenic liquid or a refrigerated gas. Gases meeting these characteristics would be oxygen, nitrogen, argon, helium, and hydrogen.

a. Cylinder. A pressure vessel designed for pressures higher than 40 psia and having a circular cross section. It does not include a portable tank, multi-unit tank car tank, cargo tank, or tank car. (Reference (g), Section 171.8).

(1) Empty Cylinder. A cylinder may be considered empty by the user at any time when the remaining contents (usually pressure) in the cylinder is below an acceptable level for the designated application however under all circumstances the following regulatory requirements apply:

(a) Any cylinder containing the residue of a DOT regulated hazardous material (HAZMAT) must be offered for transportation and transported in the same manner as when it contained a greater quantity of that HAZMAT. This includes classification, marking, labeling, identification, shipping papers etc.

(b) A cylinder is not subject to the requirements of the hazardous materials regulations if it:

1. Is unused.

2. Is sufficiently cleaned of residue and purged of vapors to remove any potential hazard.

3. Contains only the residue of a non-flammable gas with no subsidiary hazard at an absolute pressure less than 280 kPa (40.6 psia) at 20°C (68°F) and any material in the cylinder does not meet the definition for a hazardous substance, hazardous waste or a marine pollutant.

(c) Empty New Procurement - Except for DOT 8 or 8AL cylinders, cylinders received as a result of procurement action should be pressurized with not less than 5 psi of nitrogen and should be tagged "PRESERVED WITH NITROGEN GAS." A DOT "Empty" label is not required.

(d) Acetylene New Procurement - DOT 8 or 8AL cylinders received because of procurement action will have a flammable solvent in its porous core. These cylinders are not required to be labeled "Flammable" or "Empty" by the U.S. DOT.

(2) Cleaned and Purged Cylinder. Any cylinder cleaned and purged of all hazardous residue IAW with Reference (g), Paragraph 173.29, and charged with a positive pressure of an inert gas (e.g., nitrogen), or dry, oil-free air, not to exceed 24 psig (39 psia) at 70°F and properly tagged "cleaned and purged." Under no circumstances shall standard oil tolerant shop air (air that has been compressed with an oil lubricated compressor without adequate filtration and cleaning be used to purge and pressurize a "cleaned and purged" cylinder).

b. Flammable Range (Reference (g) para-173.115). The term *flammable range* means the difference between the minimum and maximum volume percentages of the material in air that forms a flammable mixture.

c. Explosive Range, the term "explosive range" shall be used to describe the values of the volume percentage of the material in air between the minimum Lower Explosive Limit (LEL), and the maximum, Upper Explosive Limit (UEL), which can be detonated.

d. Inert. Inert defines the type of a compressed gas that is not flammable, corrosive, oxidizable, or poisonous and is essentially chemically inactive. Gases such as helium, neon, argon, and nitrogen are considered inert.

e. Mixture. Mixture defines a material that is composed of more than one compound or element. (Reference (g), paragraph 171.8)

f. Oil Free. For applications that cannot tolerate hydrocarbon contamination, the term "oil free" shall be used to identify use restrictions when applied to air, helium, and nitrogen.

Applications that cannot tolerate hydrocarbon contamination include the purging of oxygen systems or components, delicate instruments, human respiration systems and equipment, heavy artillery recoil mechanisms, etc. Such gases shall not be used on or with any system in which feedback of oil or other hydrocarbon contaminants into the cylinder is possible. This term has replaced the term "water pumped," which originally indicated that the gas was charged into the cylinder with the use of a water-and-soap lubricated compressor. This type of compression, no longer in general use, has been replaced with systems using a diaphragm-type compressor or a system by which the gas is pumped as a cryogenic liquid, then passed through a vaporizer to convert it into a gas as it is charged into cylinders. The need to identify the type of compression has thus changed to a need to identify the type of application. It has been found that hydrocarbon contamination can migrate back into a cylinder from a system with which it is used by pressure feedback. It is, therefore, necessary to continue the distinct separate applications of inert gases with systems that demand a hydrocarbon free gas and systems that can tolerate, or that do contain, hydrocarbon products such as oil or hydraulic fluids. The purpose in making a distinction between these two applications was to enhance user safety. Consequently, different cylinder valve outlet connections are now employed, and adaptors are not authorized for non-compatible applications.

g. Oil Tolerant. The term, "oil tolerant," when applied to air, helium, and nitrogen, indicates that the gas can be used in applications that can tolerate or contain a hydrocarbon material such as oil or similar fluids. Such applications would be for purging or pressurizing hydraulic or pneumatic systems, leak testing of refrigerant systems, pressurizing aircraft struts, and general use by maintenance and automotive shops, etc. This term has replaced the term "oil pumped," which originally designated that the gas was charged into the cylinder with the use of an oil-lubricated compressor. This type of compression system is still available and is still used for some gases; however, some gas systems are using a diaphragm compressor, and still others, such as nitrogen systems, are now charging nitrogen into cylinders by pumping the gas as a cryogenic liquid and then passing it through a vaporizer to convert it to a gas as it is charged into cylinders. Even though the gas is now charged from an "oil free" source from the cryogenic fluid, it has been found that the cylinders can become contaminated with feedback from a system using hydrocarbon products such as oil or other hydraulic fluids. It was, therefore, necessary to continue the separate and distinct application of certain inert gases (air, helium, nitrogen). The term "oil tolerant" is now used to designate the type of applications with which the gases shall be used. The separation of this type of application has been further enhanced using a specific cylinder valve outlet connection. Inert gases identified as oil tolerant must not be used to purge or pressurize oxygen or air for human respiration systems. They shall only be used with systems that do or can tolerate hydrocarbon contamination. Contamination of an oxygen system with an oil-tolerant gas could result in a fire or explosion with loss of life or of a complete weapons system.

h. Oxidizer. The term oxidizer defines a compressed gas that readily yields oxygen to stimulate the combustion of organic matter and when contained in a cylinder, the cylinder will be so labeled in accordance with Reference (g) Section 173.127.

i. Pressure-Relief Device. This is a device that is employed to prevent the rupture of a charged compressed gas cylinder under abnormal conditions (over filling, over pressurization,

engulfed in a fire etc.). The device can be designed to be activated by either pressure or temperature and will relieve all or partial pressure sufficiently to prevent the rupture of the cylinder. Such a device must be subjected to a fire test as required by Section 180.209 of Reference (g). Pressure relief devices are prohibited on cylinders charged with a poison gas or liquid and fluorine.

j. PSI or psi. PSI or psi is the abbreviation for pounds per square inch when defining pressure.

k. PSIA or psia. PSIA or psia is the abbreviation for pounds per square inch absolute. This is gage pressure plus the atmospheric pressure of 14.7 psi.

l. PSIG or psig. PSIG or psig is the abbreviation for pounds per square inch gauge. The pressure indicated on the pressure gauge which represents the pressure above atmospheric. This is the pressure read on a pressure gage where A0" is the absence of pressure or vacuum.

m. Residue. Residue is the material (compressed gas) remaining in a cylinder after its contents have been exhausted to the maximum extent practicable and before the cylinder is either refilled or cleaned of hazardous material and purged to remove any hazardous vapors. (Reference (g), Section 171.8)

n. Service Pressure. The term "service pressure" (sometimes referred to as working pressure) is defined as the authorized (designed) fill pressure of the compressed gas cylinder. This will be a numeric value immediately following the DOT specification stamped into the shoulder, head ring, or foot ring of the cylinder. For example, for cylinders marked "DOT 3AA2265," the service pressure is 2265 psig. This is the predetermined pressure to which the cylinder is authorized to be charged at a stabilized temperature of 70° F.

o. Temperature Limits. The temperature of 130°F is cited in Reference (g) as the upper temperature limit to be used for calculating when a cylinder will become liquid full, and in the definition of a compressed gas. This temperature has been determined to be the maximum temperature normally encountered during the transportation and storage of compressed gases. For the purposes of this Regulation, 130°F is cited in text when it relates directly to a citation in Reference (g). To provide an extra margin of safety, temperature limits cited in other parts of this Regulation have been lowered to 125°F for DOD and DLA activities.

p. USP. USP means Pharmacopoeia of the United States. This is a document published by the medical profession that contains a list of drugs and medicines and describes their reparation, properties, uses, etc.