

Attachment 6

CLASS 2-COMPRESSED GASES

A6.1. General Requirements. For military members, failure to obey the mandatory provisions from paragraphs A6.2. through A6.25. and any provisions of mandatory subparagraph(s) hereunder is a violation of Article 92, Uniform Code of Military Justice (UCMJ). Civilian employees who fail to obey the provisions from paragraph A6.2. through A6.25. and any provisions of mandatory subparagraph(s) hereunder are subject to administrative disciplinary action without regard to otherwise applicable criminal or civil sanctions. Personnel shall not deviate from provisions provided and comply with cylinder selection and packaging paragraph requirements. **(T-0)**. Not all packaging paragraphs are inclusive and packaging selection is based on the type of flammable, nonflammable or toxic gas category as stated in each packaging paragraph or compressed gas Table. This attachment contains information concerning the packaging and general handling instructions for Class 2.1 (flammable gas), Class 2.2 (nonflammable, nontoxic compressed gas), and Class 2.3 (toxic gas). See Attachment 3 for additional information concerning Class 2 material.

A6.2. Aerosols. Prepare aerosols meeting the definition of “Consumer Commodity” as authorized under paragraph A13.3. Package aerosol products identified under the proper shipping name “Aerosols” as follows:

A6.2.1. Aerosols Containing Non-Toxic Substances. For an aerosol containing non-toxic substances, pack in inner non-refillable non-metal receptacles not exceeding 120 mL (4 fluid-ounce) capacity each, or in inner non-refillable metal or plastic receptacles not exceeding 1 L (34 fluid-ounces) provided all of the following conditions are met:

A6.2.1.1. Pressure in the aerosol container must not exceed 1245 kPa at 55 degrees C (180 psig at 130 degrees F) and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55 degrees C (130 degrees F). **(T-0)**.

A6.2.1.2. If the pressure exceeds 970 kPa at 55 degrees C (140 psig at 130 degrees F) but does not exceed 1105 kPa at 55 degrees C (160 psig at 130 degrees F) use a DOT 2P, or ICAO/IATA IP7, IP7A, or IP7B inner metal receptacle. If the pressure exceeds 1105 kPa at 55 degrees C (160 psig at 130 degrees F) but does not exceed 1245 kPa at 55 degrees C (180 psig at 130 degrees F) use a DOT 2Q, or ICAO/IATA IP7A, or IP7B inner metal receptacle.

A6.2.1.3. Liquid content of the material and the gas must not completely fill the receptacle at 55 degrees C (130 degrees F). **(T-0)**.

A6.2.1.4. Each aerosol exceeding 120 mL (4 fluid ounce) capacity must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the content at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects. **(T-0)**.

A6.2.1.5. Protect the valves by a cap or other suitable means.

- A6.2.1.6. Tightly pack aerosols in a strong outer packaging capable of meeting packaging performance test outlined in A19.3.4. UN specification (UN marked) packaging is not required. The complete package must not exceed 30 kg (66 lbs) gross weight. **(T-0)**.
- A6.2.2. Other Aerosols. For other aerosols (including those containing toxic substances), pack in inner non-refillable non-metal receptacles not exceeding 120 mL (4 fluid ounce) capacity each, or in inner non-refillable metal receptacles not exceeding 1 L (34 fluid ounces) provided all of the following conditions are met:
- A6.2.2.1. Pressure in the aerosol container must not exceed 1500 kPa at 55 degrees C (217 psig at 130 degrees F) and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55 degrees C (130 degrees F). **(T-0)**.
- A6.2.2.2. If the pressure exceeds 970 kPa at 55 degrees C (140 psig at 130 degrees F) but does not exceed 1105 kPa at 55 degrees C (160 psig at 130 degrees F) use a DOT 2P, or ICAO/IATA IP7, IP7A, or IP7B inner metal receptacle. If the pressure exceeds 1105 kPa at 55 degrees C (160 psig at 130 degrees F) but does not exceed 1245 kPa at 55 degrees C (180 psig at 130 degrees F) use a DOT 2Q, or ICAO/IATA IP7A, or IP7B inner metal receptacle. If the pressure exceeds 1245 kPa at 55 degrees C (180 psig at 130 degrees F) but does not exceed 1500 kPa at 55 degrees C (217 psig at 130 degrees F) use an ICAO/IATA IP7B inner metal receptacle.
- A6.2.2.3. Liquid content of the material and the gas must not completely fill the receptacle at 55 degrees C (130 degrees F). **(T-0)**.
- A6.2.2.4. Each aerosol exceeding 120 mL (4 fluid ounce) capacity must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects. **(T-0)**.
- A6.2.2.5. Protect the valves by a cap or other suitable means.
- A6.2.2.6. Tightly pack aerosols in an outer fiberboard (4G), wooden (4C1, 4C2), plywood (4D), reconstituted (4F), or plastic (4H1, 4H2) box meeting PG II requirements.
- A6.2.3. For an aerosol charged with a non-toxic solution containing a biological product or medical preparation that could be deteriorated by heat and compressed gases (except Class 6.1, PG III material that are poisonous or nonflammable) pack in inner non-refillable metal receptacles provided all of the following conditions are met:
- A6.2.3.1. Inner receptacles not exceeding 575 mL (20 fluid ounces) each.
- A6.2.3.2. Pressure in the receptacle must not exceed 970 kPa at 55 degrees C (140 psig at 130 degrees F). **(T-0)**.
- A6.2.3.3. The liquid content of the product and gas must not completely fill the receptacle at 55 degrees C. **(T-0)**.
- A6.2.3.4. One aerosol out of each lot of 500 or less, filled for shipment, must be heated until the pressure in the container is equivalent to the equilibrium pressure of the contents at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects. **(T-0)**.

A6.2.3.5. Protect the valves by a cap or other suitable means.

A6.2.3.6. Package inner receptacles in a strong outer packaging. The outer packaging must be capable of meeting the limited quantity performance standards outlined in A19.3.4. UN specification (UN marked) packaging is not required. **(T-0)**.

A6.2.3.7. The complete package must not exceed 30 kg (66 lbs) gross weight. **(T-0)**.

A6.2.4. For an aerosol containing a biological product or medical preparation that could be deteriorated by heat and is nonflammable, pack in inner non-refillable metal receptacles provided all of the following conditions are met:

A6.2.4.1. The first five subparagraph requirements of A6.2.3. related to the aerosol receptacles apply.

A6.2.4.2. Tightly pack aerosol containers in an outer fiberboard (4G), wooden (4C1, 4C2), plywood (4D), reconstituted (4F), or plastic (4H1, 4H2) box meeting PG II requirements.

A6.3. Small Receptacles Containing Compressed Gas. Package Small receptacles of compressed gases, other than aerosols or Consumer Commodities, as identified in this paragraph, as follows. Unless otherwise specified, UN specification (UN marked) packaging is not required. Each package must not exceed 30 kg (66 lbs) gross weight. **(T-0)**. For unregulated compressed gases, comply with general handling requirements in A3.3.2.

A6.3.1. Use containers, except lighter refills, of not more than 120 mL (4 fluid ounces, 7.22 cubic inches or less) capacity each. Package inner receptacles in strong outer packaging.

A6.3.2. Use metal containers filled with nonhazardous material not over 90 percent capacity at 21 degrees C (70 degrees F) then charged with a nonflammable, nonliquefied gas. Test each container to three times the gas pressure at 21 degrees C (70 degrees F). When refilled, the container may be transported when retested to three times the gas pressure at 21 degrees C (70 degrees F) provided one of the following conditions are met:

A6.3.2.1. Container is not over 1 L (1 quart) capacity and charged to not more than 1172 kPa at 21 degrees C (170 psig at 70 degrees F).

A6.3.2.2. Container is not over 114L (30 gallon) capacity and charged to not more than 517 kPa at 21 degrees C (75 psig at 70 degrees F).

A6.3.3. Package electronic tubes of not more than 489 mL (30 cubic inch) volume charged with gas to a pressure of not more than 241 kPa (35 psig). Package in strong outer packaging.

A6.3.4. Use inside metal containers of a capacity not over 570.7 mL (35 cubic inches, 19.3 fluid ounces), charged with nonflammable, nonpoisonous or noncorrosive liquefied compressed gas designed for audible fire alarm systems. Pressure in the container must not exceed 482.6 kPa at 21 degrees C (70 psig at 70 degrees F). **(T-0)**. The completely assembled non-refillable container must be designed and fabricated with a burst pressure of not less than four times its charged pressure at 55 degrees C (130 degrees F.) **(T-0)**. Each refillable inside container must be designed and fabricated with a burst pressure of not less than four times its charged pressure at 55 degrees C (130 degrees F). **(T-0)**. The liquid portion of the gas must not completely fill the container at 55 degrees C (130 degrees F). **(T-0)**.

A6.3.5. Non-pressurized gas samples must be transported when its pressure corresponding to ambient atmospheric pressure in the container is not more than 105 kPa (15.22 psia) absolute. **(T-0).** For Toxic or Toxic and Flammable non-pressurized gases pack in a hermetically sealed glass or metal inner packagings of not more than 1 L (0.3 gallons) and overpacked in strong outer packaging. For flammable non-pressurized gases pack in hermetically sealed glass or metal inner packagings of not more than 5L (1.3 gallons) and overpacked in strong outer packaging.

A6.3.6. A cylinder that is a component part of a passenger restraint system and is installed in a motor vehicle, charged with nonliquefied, nonflammable compressed gas and having no more than two actuating cartridges per valve, is exempt from the requirements of this manual with the following **exceptions**:

A6.3.6.1. Cylinder must comply with one of the cylinder specifications in 49 CFR Part 178, and be authorized for use in A6.6. for the gas it contains. **(T-0).**

A6.3.6.2. Cylinder must comply with the filling requirements of A3.3.2.6. **(T-0).**

A6.3.7. A cylinder that is part of a tire inflation system in a motor vehicle, charged with a nonliquefied, nonflammable compressed gas, and is excepted from the requirements of this manual except the following:

A6.3.7.1. Cylinder must comply with one of the cylinder specifications in 49 CFR Part 178, and be authorized for use in Table A6.1. for the gas it contains. **(T-0).**

A6.3.7.2. Cylinder must comply with the filling requirements of A3.3.2.6. **(T-0).**

A6.3.7.3. Each cylinder must be securely installed in the trunk of the motor vehicle, and the valve must be protected against accidental discharge. **(T-0).**

A6.4. Liquefied Compressed Gases. Package liquefied compressed gases as follows:

A6.4.1. Ship liquefied compressed gases, including nontoxic and nonflammable mixtures, in accordance with the filling, pressure, and DOT cylinder specification requirements of Table A6.1. If the compressed gas is not specifically identified in Table A6.1., ship (except gas in solution) in DOT 3, 3A, 3AA, 3AL, 3B, 3BN, 3E, 4B, 4BA, 4B240ET, 4BW, 4E, or 39 cylinders. Ensure compliance with general handling requirements in A3.1.7.2. Do not charge and ship DOT 4E or 39 cylinders with a mixture containing a pyrophoric liquid, carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin, or toxic material, (Class 6.1 or 2.3) unless authorized in a specific packaging paragraph. Use of existing cylinders, DOT 3, 3D, 4, 4A, 9, 25, 26, 38, 40, and 41 is authorized, but new construction of these cylinders is not authorized.

A6.4.2. DOT 3AL Cylinders. DOT 3AL cylinders must not be used for any material with a primary or subsidiary hazard of Class 8. **(T-0).**

A6.4.3. Mixtures With Class 2.3. Ship a mixture containing any Class 2.3 material or irritating material, in such proportion that the mixture would be classed as toxic, in containers authorized for these poisonous materials.

A6.4.4. Ship carbon dioxide and oxygen mixture, compressed; liquefied gas, oxidizing, N.O.S.; or nitrous oxide in DOT-3A, 3AA, 3AL, 3E, 3HT, 39 cylinders, UN pressure receptacles

ISO 9809-1, ISO 9802-2, ISO 9809-3 and ISO 7866 cylinders in rigid outer packaging in accordance with 49 CFR Paragraph 173.304(f).

A6.4.5. Carbon Dioxide, Refrigerated Liquid or Nitrous Oxide, Refrigerated Liquid. Ship in DOT 4AL cylinders in accordance with 49 CFR Subparagraph 173.304a(e).

A6.4.6. Refrigerant Gases. Ship refrigerant gases that are nonpoisonous and nonflammable in cylinders prescribed in A6.4.1. or as follows: Pack in DOT 2P and 2Q containers in strong wooden or fiberboard boxes designed to protect valves from damage or accidental functioning under conditions incident to transportation. Pressure in the container must not exceed 599 kPa at 21 degrees C (87 psia at 70 degrees F). **(T-0)**. Heat each completed metal container filled for shipment until contents reach a minimum temperature of 54 degrees C (130 degrees F), without evidence of leakage, distortion, or other defects. Mark each outside package "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS".

A6.4.7. Engine Starting Fluid. Engine-starting fluids containing compressed gas (or gases) that are flammable in cylinders prescribed in A6.4.1. or as follows:

A6.4.7.1. Inside nonrefillable metal containers not over 500 mL (32 cubic inch) capacity. Pressure in the container must not exceed 999 kPa at 54 degrees C (145 psia at 130 degrees F). **(T-0)**.

A6.4.7.2. If the pressure exceeds 999 kPa at 54 degrees C (145 psia at 130 degrees F) use a DOT 2P container.

A6.4.7.3. Any metal container must be capable of withstanding a pressure of 1 1/2 times the pressure of the content at 54 degrees C (130 degrees F) without bursting. **(T-0)**.

A6.4.7.4. The liquid content of the material and gas must not completely fill the container at 54 degrees C (130 degrees F). **(T-0)**. Heat each container filled for shipment until the contents reach a minimum temperature of 54 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects.

A6.4.7.5. Pack inside nonrefillable metal containers in a strong tight outer packaging. Mark each outside package "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS".

A6.4.8. Foreign Cylinders. Foreign cylinders meeting the requirements of A3.3.2.10.

A6.4.9. UN Specification cylinders meeting the requirements of 49 CFR Section 173.304b and marked with "USA" as country of approval.

A6.5. Nonliquefied Compressed Gases. Package nonliquefied compressed gases as follows:

- A6.5.1. Ship nonliquefied, compressed gases in accordance with the filling, pressure, and DOT cylinder specification requirements of Table A6.1. If the compressed gas is not specifically identified in Table A6.1., ship in DOT 3, 3A, 3AA, 3AL, 3B, 3E, 4B, 4BA, or 4BW. Use of existing cylinders, DOT 3, 3C, 3D, 4, 4A, 4C, 25, 26, 33, and 38 is authorized, but new construction of these cylinders is not authorized.
- A6.5.2. DOT-3HT Cylinders. DOT-3HT cylinders for use in aircraft only, having a maximum service life of 24 years, are only authorized for nonflammable gases. They must be equipped with a frangible disc safety relief device, without fusible metal backing, with a rated bursting pressure not over 90 percent of the minimum required test pressure of the cylinder with which the device is used. **(T-0)**. Pack cylinders in strong outer packagings.
- A6.5.3. DOT 39 Cylinder. Use DOT 39 cylinder for compressed gasses. When used for flammable gases, the internal volume must not exceed 1.23 L (75 cubic inches). **(T-0)**. Use aluminum cylinders for oxygen only under the following conditions:
- A6.5.3.1. Cylinder threads must be straight threads (except for UN Cylinders). **(T-0)**.
- A6.5.3.2. Valves must be made of brass or stainless steel. **(T-0)**.
- A6.5.3.3. Each cylinder must be cleaned to comply with the requirements of DLAI 4145.25 or MIL-STD-1411, *Inspection and Maintenance of Compressed Gas Cylinders*. **(T-0)**.
- A6.5.3.4. The pressure in each cylinder must not exceed 20,684 kPa (3000 psig) at 21 degrees C (70 degrees F). **(T-0)**.
- A6.5.4. DOT 3AL Cylinder. Ship flammable gases in 3AL cylinders on cargo aircraft only. When used in oxygen service, the cylinders must comply with 49 CFR Subparagraph 173.302a(a)(5). **(T-0)**.
- A6.5.5. DOT 3AX, 3AAX, 3T Cylinders. Use cylinders, DOT 3AX, 3AAX, or 3T for Division 2.1 and 2.2 materials and for carbon monoxide. DOT 3T cylinders are not authorized for hydrogen. When used in methane service, the methane must be a nonliquefied gas with a minimum purity of 98.0 percent methane and which is commercially free of corroding components. **(T-0)**.
- A6.5.6. UN Specification cylinders as authorized in 49 CFR Section 173.302b.
- A6.5.7. Foreign Cylinders. Foreign cylinders meeting the requirements of A3.3.2.10.
- A6.5.8. Compressed Oxygen and Oxidizing Gases. Ship compressed oxygen and oxidizing gases in DOT specification 3A, 3AA, 3AL, 3E, 3HT, 39 cylinders, 4E (filled to less than 200 psig at 21 °C (70 °F), and UN pressure receptacles ISO 9809-1, ISO 9809-2, ISO 9809-3 and ISO 7866 cylinders. Cylinders must be equipped with a pressure relief device in accordance with 49 CFR Paragraph 173.301(f) and, DOT specification cylinders or for the UN pressure receptacles prior to initial use. **(T-0)**. The rated burst pressure of a rupture disc for DOT 3A, 3AA, 3AL, 3E, and 39 cylinders, and UN pressure receptacles ISO 9809-1, ISO 9809-2, ISO 9809-3 and ISO 7866 cylinders must be 100% of the cylinder minimum test pressure with a tolerance of plus zero to minus 10%. **(T-0)**. The rated burst pressure of a rupture disc for a DOT 3HT cylinder must be 90% of the cylinder minimum test pressure with a tolerance of plus zero to minus 10%. **(T-0)**. A cylinder containing compressed oxygen, compressed

oxidizing gases, or nitrogen trifluoride must be packaged in a rigid outer packaging that conforms to the requirements of either 49 CFR Part 178, Subparts L and M, at the Packing Group I or II performance level; or the performance criteria in Air Transport Association (ATA) Specification No. 300 for a Category I Shipping Container. **(T-0)**. In addition, is capable of meeting the following additional requirements:

A6.5.8.1. Pass the Flame Penetration Resistance Test specified in 49 CFR Part 178, Appendix E.

A6.5.8.2. Pass the Thermal Resistance Test specified in 49 CFR Part 178, Appendix D.

A6.5.8.3. Prior to each shipment, passes a visual inspection that verifies that all features of the packaging are in good condition, including all latches, hinges, seams, and other features, and that the packaging is free from perforations, cracks, dents, or other abrasions that may negatively affect the flame penetration resistance and thermal resistance characteristics of the packaging.

A6.5.9. Carbon Monoxide. Ship carbon monoxide in a DOT-3A, 3AX, 3AA, 3AAX, 3AL, 3, 3E, or 3T cylinder having a minimum service pressure of 12,411 kPa (1800 psig). The pressure in the cylinder must not exceed 6895 kPa at 21 degrees C (1000 psig at 70 degrees F), except that if the gas is dry and sulfur free, charge the cylinder to no more than five-sixths of the cylinder service pressure or 13,790 kPa (2000 psig), whichever is the least. **(T-0)**. Fill DOT 3AL cylinders to no more than its marked service pressure.

A6.5.10. Fluorine. For fluorine gas use only DOT 3A1000, 3AA1000, or 3BN400 cylinders without a safety relief device and equipped with valve protection caps. Do not charge cylinders over 2758 kPa at 21 degrees C (400 psig at 70 degrees F) and ensure contents do not exceed 2.7 kg (6 pounds) of gas.

A6.5.11. Liquid Argon, Oxygen, and Nitrogen Samples. Ship liquid argon, oxygen, or nitrogen samples under pressure, in Cosmodyne Gas Samplers, Models CS 4.4 and CS 2.0 or in TTU-131/E Sampler (MIL-S-27626). Package as required for the specific model used. Take samples in the liquid state but vaporize before shipment.

A6.5.12. Diborane and Diborane Mixtures. For Diborane and Diborane mixtures, use only a DOT 3AL or 3AA cylinders having a minimum service pressure of 12,411 kPa (1800 psig). Ensure the maximum filling density of the diborane does not exceed 7 percent. Ensure diborane mixed with compatible compressed gas does not have a pressure exceeding the service pressure of the cylinder if complete decomposition of the diborane occurs.

A6.5.13. Recoil Mechanisms/Artillery Gun Mounts. Pack recoil mechanisms or artillery gun mounts containing nitrogen charged to a maximum pressure of 15,858 kPa at 21 degrees C (2300 psig at 70 degrees F) in strong outer wooden containers. Ship recoil mechanisms or artillery gun mounts containing nitrogen unpackaged when securely attached to the weapon system.

A6.5.14. Satellites, Spacecraft, and Other Articles Charged with Nitrogen or Dry Air. These items may be transported inside a protective shipping container with a nitrogen or air purge during flight. The compressed gas must be in authorized cylinders and protected from damage during transport. **(T-0)**. The system must be equipped with a safety valve, enabling

the nitrogen flow to be immediately shut off in the event of a problem while on the aircraft. **(T-0)**. Transport authorized on C-5, and C-17 aircraft only. The following limitations apply:

A6.5.14.1. Nitrogen may be purged into the shipping container at a rate not to exceed five (5) cubic feet per hour.

A6.5.14.2. Nitrogen may be purged into the shipping container at a rate not to exceed twenty (20) cubic feet per hour during transport. A technical escort must, using a portable oxygen monitor, continuously check the atmosphere inside the aircraft during flight. **(T-0)**. If the percentage of oxygen drops to 19.5% per volume, the escort must notify the aircraft commander immediately and the nitrogen purge immediately discontinued. **(T-0)**. All personnel will use supplemental oxygen until the percentage of oxygen exceeds 19.5% per volume. **(T-0)**. Provide maximum airflow rate in the cargo compartment during flight. Cargo doors must remain open during ground operations to provide adequate ventilation. **(T-0)**.

A6.5.14.3. Dry air may be purged into the shipping container at a rate not to exceed 70 cubic feet per hour.

A6.5.14.4. Meet all other requirements of this manual.

A6.5.14.5. See Attachment 17 for additional certification requirements.

Table A6.1. Cylinder Requirements for Compressed Gases.

Table A6.1 Name of Gas	Maximum Permitted Filling Density in Percent (See A3.3.2.6)	Cylinders Marked as Shown Below, Or of The Same Type With Higher Service Pressure
Anhydrous ammonia	54	DOT-3A480, DOT-3AA480, DOT-3A480X, DOT-4AA480, DOT-3, DOT-3E1800, DOT-3AL480
Bromotrifluoromethane (R-13B1 or H-1301)	124	DOT-3A400, DOT-3AA400, DOT-3B400, DOT-4AA480, DOT-4B400, DOT-4BA400, DOT-4BW400, DOT-3E1800, DOT-39, DOT-3AL400
Carbon dioxide (see notes 3 and 4)	68	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT-3, DOT-3E1800, DOT-3T1800, DOT-3HT2000, DOT-39, DOT-3AL1800,
Carbon dioxide refrigerated liquid		DOT-4L
Chlorine (see note 1)	125	DOT-3A480, DOT-3AA480, DOT-3, DOT-3BN480, DOT-3E1800

Table A6.1 Name of Gas	Maximum Permitted Filling Density in Percent (See A3.3.2.6)	Cylinders Marked as Shown Below, Or of The Same Type With Higher Service Pressure
Chlorodifluoroethane (R142b) or 1-Chloro-1, 1-Difluoroethane (see note 4)	100	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-3E1800, DOT-39, DOT-3AL150,
Chlorodifluoromethane (R22) (see note 4)	105	DOT-3A240, DOT-3AA240, DOT-3B240, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4B240ET, DOT-4E240, DOT-39, DOT-3E1800, DOT-3ALA240,
Chloropentafluoroethane (R-115)	110	DOT-3A225, DOT-3AA225, DOT-3B225, DOT-4A225, DOT-4BA225, DOT-4B225, DOT-4BW225, DOT-3E1800, DOT-39, DOT-3AL225,
Chlorotrifluoromethane (R-13) (see note 4)	100	DOT-3A1800, DOT-3AA1800, DOT-3, DOT-3E1800, DOT-39, DOT-3AL1800
Cyclopropane (see note 4)	55	DOT-3A225, DOT-3A480X, DOT-3AA225, DOT-3B225, DOT-4AA480, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET, DOT-3, DOT-3E1800, DOT-39, DOT-3AL225
Dichlorodifluoromethane (R-12) (see note 4)	119	DOT-3A225, DOT-3AA225, DOT-3B225, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET, DOT-4E225, DOT-39, DOT-3E1800, DOT-3AL225

Table A6.1 Name of Gas	Maximum Permitted Filling Density in Percent (See A3.3.2.6)	Cylinders Marked as Shown Below, Or of The Same Type With Higher Service Pressure
Dichlorodifluoromethane and difluoroethane mixture (constant boiling mixture) (R-500) (see note 4)	Not liquid full at 55 degrees C (131 degrees F)	DOT-3A240, DOT-3AA240, DOT-3B240, DOT-3E1800, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4E240, DOT-39
Difluoroethane (R-152a) (see note 4)	79	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-3E1800, DOT-3AL150
1,1-Difluoroethylene (R-1132A)	73	DOT-3A2200, DOT-3AA2200, DOT-3AX2200, DOT-3AAX2200, DOT-3T2200, DOT-39
Dimethylamine, anhydrous	59	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, ICC-3E1800
Ethane (see note 4)	35.8	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT-3, DOT 3E1800, DOT-3T1800, DOT-39, DOT-3AL1800
Ethane (see note 4)	36.8	DOT-3A2000, DOT-3AX2000, DOT-3AA2000, DOT-3AAX2000, DOT-3T2000, DOT-39, DOT-3AL2000
Ethylene (see note 4)	31.0	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT -3, DOT-3E1800, DOT-3T1800, DOT-39, DOT-3AL1800

Table A6.1 Name of Gas	Maximum Permitted Filling Density in Percent (See A3.3.2.6)	Cylinders Marked as Shown Below, Or of The Same Type With Higher Service Pressure
Ethylene (see note 4)	32.5	DOT-3A2000, DOT-3AX2000, DOT-3AA2000, DOT-3AAX2000, DOT-3T2000, DOT-39, DOT-3AL2000
Ethylene (see notes 4)	35.5	DOT-3A2400, DOT-3AX2400, DOT-3AA2400, DOT-3AAX2400, DOT-3T2400, DOT-39, DOT-3AL2400
Hydrogen chloride, anhydrous	65	DOT-3A1800, DOT-3AA1800, DOT-3AX1800, DOT-3AAX1800, DOT-3, DOT-3T1800, DOT-3E1800
Hydrogen sulfide (see notes 5 and 6)	62.5	DOT-3A, DOT-3AA, DOT-3B, DOT-4A, DOT-4B, DOT-4BA, DOT-4BW, DOT-3E1800, DOT-3AL
Insecticide, gases liquefied (see note 4 and 8)	Not liquid full at 55 degrees C (131 degrees F)	DOT-3A300, DOT-3AA300, DOT-3B300, DOT-4B300, DOT-4BA300, DOT-4BW300, DOT-3E1800
Liquefied nonflammable gases, other than classified flammable, corrosive, toxic & mixtures or solution thereof filled with nitrogen, carbon dioxide or air (see notes 3 and 4)	Not liquid full at 55 degrees C (131 degrees F)	DOT specification cylinders identified in A6.4.1. and DOT-3HT, DOT-4D, DOT-4DA, DOT-4DS

Table A6.1 Name of Gas	Maximum Permitted Filling Density in Percent (See A3.3.2.6)	Cylinders Marked as Shown Below, Or of The Same Type With Higher Service Pressure
Methylacetylene-propadiene, mixtures, stabilized (see note 2)	Not liquid full at 55 degrees C (131 degrees F)	DOT-4B240, without brazed seams, DOT-4BA240, without brazed seams, DOT-3A240, DOT-3AA240, DOT-3B240, DOT-3E1800, DOT-4BW240, DOT-4E240, DOT-4B240ET, DOT-3AL240
Methyl chloride	84	DOT-3, DOT-3A225, DOT-3AA225, DOT-3B225, DOT-3E1800, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET, Cylinders complying with DOT-3A150, 3B150, and 4B150 manufactured before 7 December 1936 are also authorized.
Methyl mercaptan	80	DOT-3A240, DOT-3AA240, DOT-3B240, DOT-4B240, DOT-4B240ET, DOT-3E1800, DOT-4BA240, DOT-4BW240
Nitrosyl Chloride	110	DOT-3BN400 only
Nitrous Oxide (see notes 3, 4, and 7)	68	DOT-3A1800, DOT-3AA1800, DOT-3AX1800, DOT-3AAX1800, DOT-3, DOT-3E1800, DOT-3T1800, DOT-3HT2000, DOT-39, DOT-3AL1800
Refrigerant gas, N.O.S. or Dispersant gas, N.O.S. (see notes 4 and 9)	Not liquid full at 55 degrees C (131 degrees F)	DOT-3A240, DOT-3AA240, DOT-3AL240, DOT-3B240, DOT-3E1800, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4E240, DOT-39

Table A6.1 Name of Gas	Maximum Permitted Filling Density in Percent (See A3.3.2.6)	Cylinders Marked as Shown Below, Or of The Same Type With Higher Service Pressure
Sulfur dioxide (see note 4)	125	DOT-3, DOT-3A225, DOT-3AA225, DOT-3AL225, DOT-3B225, DOT-3E1800, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET, DOT-39
Sulfur hexafluoride	120	DOT-3A1000, DOT-3AA1000, DOT-3AAX2400, DOT-3, DOT-3AL1000, DOT-3E1800, DOT-3T1800
Sulfuryl fluoride	106	DOT-3A480, DOT-3AA480, DOT-3E1800, DOT-4B480, DOT-4BA480, DOT-4BW480
Tetrafluoroethylene, stabilized	90	DOT-3A1200, DOT-3AA1200, DOT-3E1800
Trifluorochloroethylene, stabilized	115	DOT-3A300, DOT-3AA300, DOT-3B300, DOT-3E1800, DOT-4B300, DOT-4BA300, DOT-4BW300
Trimethylamine, anhydrous	57	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-3E1800
Vinyl chloride (see note 2)	84	DOT-4B150 without brazed seams, DOT-4BA225 without brazed seams, DOT-4BW225, DOT-3A150, DOT-3AA150, DOT-3AL150, DOT-3E1800
Vinyl fluoride, stabilized	62	DOT-3A1800, DOT-3AA1800, DOT-3E1800, DOT-3AL1800

Table A6.1 Name of Gas	Maximum Permitted Filling Density in Percent (See A3.3.2.6)	Cylinders Marked as Shown Below, Or of The Same Type With Higher Service Pressure
Vinyl methyl ether (see note 2)	68	DOT-4B150 without brazed seams, DOT-4BA225 without brazed seams, DOT-4BW225, DOT-3A150, DOT-3AA150, DOT-3B1800, DOT 3E1800
<p>Notes:</p> <ol style="list-style-type: none"> 1. Cylinders purchased after 1 October 1944 for the transportation of chlorine must contain no aperture other than that provided in the neck of the cylinder for attachment of a valve equipped with an approved safety device. Cylinders purchased after November 1, 1935 and charged with chlorine must not contain over 150 pounds of gas. (T-0). 2. All parts of valve and safety devices in contact with contents of cylinders must be of a metal or other material, suitably treated if necessary, which will not cause formation of any acetylides. (T-0). 3. DOT-3HT cylinders are authorized for use in aircraft only for a maximum service life of 24 years. They must be equipped with a frangible disc safety relief device, without fusible metal backing, and with a rated bursting pressure not over 9 percent of the minimum required test pressure of the cylinder with which the device is used. Ship only nonflammable gases in these cylinders and pack in strong outer packagings. 4. Refer to A3.3.2.7. for additional packaging requirements, if applicable. 5. Use of a DOT specification cylinder with a service pressure of 480 psi is not authorized. 6. Ensure each valve outlet is sealed by a threaded cap or a threaded solid plug. 7. Ensure DOT-3AL cylinders are equipped with brass or stainless steel valves and cleaned in compliance with Federal Specification RR-C-901c. 8. See A6.4.1. and A6.4.6. (Only DOT 2P is authorized). 9. See A6.4.6. 		

A6.6. Liquefied Petroleum Gas (see A3.3.2. for additional cylinder and filling requirements).
Package liquefied petroleum gas as follows:

- A6.6.1. Use DOT 3, 3A, 3AA, 3AL, 3B, 3E, 4B, 4BA, 4B240ET, 4BW, 4E, or 39, cylinders. Ensure the internal volume of DOT 39 cylinders is not over 1.23 L (75 cubic inches). Comply with the requirements of Table A6.1. for the gases named.
- A6.6.2. DOT 2P or 2Q Containers. Use DOT 2P or 2Q containers, packed in strong wooden or fiberboard boxes designed to protect valves from damage or accidental functioning under normal transportation conditions. Each completed container filled for shipment must have been heated until contents reached a minimum temperature of 54 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects. **(T-0)**. DOT 2P or 2Q containers with a maximum capacity of 31.83 cubic inches are authorized under the following conditions:
- A6.6.2.1. Maximum filling pressure of 310.3 kPa (45 psig) at 21 degrees C (70 degrees F), and 724 kPa (105 psig) at 54 degrees C (130 degrees F) when equipped with safety devices which prevents rupture of the container and dangerous projection of a closing device when it is exposed to fire.

A6.6.2.2. Maximum filling pressure of 241 kPa (35 psig) at 21 degrees C (70 degrees F) and 689.5 kPa (100 psig) at 54 degrees C (130 degrees F).

A6.6.3. Foreign Cylinders. Foreign cylinders meeting the requirements of A3.3.2.10.

A6.6.4. UN Specification cylinders marked with "USA" as country of approval.

A6.7. Fire Extinguishers. Fire extinguishers authorized below may be shipped secured in holders as part of a vehicle/equipment according to A3.3.2.13. Pack fire extinguishers that are not fastened in a designed holder in strong outer containers. Ship fire extinguishers in DOT specification cylinders identified in paragraphs A6.7.1. and A6.7.2. Ship fire extinguishers in non-DOT specification cylinders as identified in paragraphs A6.7.3. and A6.7.4. Fire suppression bottles in DOT specification 3HT, 4D, 4DA, or 4DS, use description "Liquefied Gases, UN1058"; "Compressed Gas, N.O.S., UN1956"; or the hazard classification assigned by the manufacturer. See paragraph A6.4.1. and Table A6.1.

A6.7.1. DOT 3A, 3AA, 3AL, 3E, 4B, 4BA, 4B240ET, or 4BW Cylinders. Use these cylinders provided:

A6.7.1.1. Cylinders contain only fire extinguishing agents such as ammonium phosphate, sodium bicarbonate, potassium bicarbonate, potassium imido dicarboxamide and bromochlorodifluoromethane or bromotrifluoromethane, which is commercially free from corroding components.

A6.7.1.2. Cylinders are charged with a nonflammable, nontoxic, noncorrosive, dry gas, having a dew point at or below minus 46.7 degrees C (minus 52 degrees F) at 101 kPa (1 atmosphere), to not more than the service pressure of the cylinder.

A6.7.1.3. Cylinders have an external corrosion-resistant coating.

A6.7.1.4. Cylinders are retested in accordance with Title 49 CFR Paragraph 178.209(j).

A6.7.1.5. Fire extinguisher, DOT 4BW240, on a cart does not require additional packaging.

A6.7.2. DOT 2P or 2Q Containers. Use DOT 2P or 2Q inner nonrefillable metal containers provided:

A6.7.2.1. The liquid portion of the gas plus any additional liquid or solid does not completely fill the container at 55 degrees C (130 degrees F).

A6.7.2.2. The pressure in the container does not exceed 1250 kPa (181 psig) at 55 degrees C (130 degrees F). If the pressure exceeds 920 kPa (141 psig) at 55 degrees C (130 degrees F), but does not exceed 1100 kPa (160 psig) at 55 degrees C (130 degrees F), use a DOT 2P inner metal container. If the pressure exceeds 1100 kPa (160 psig) at 55 degrees C (130 degrees F) use a DOT 2Q inner metal container. The metal container must be capable of withstanding, without bursting, a pressure of one and one-half times the equilibrium pressure of the contents at 55 degrees C (130 degrees F). **(T-0).**

A6.7.2.3. Each completed inner container filled for shipment must have been heated until the pressure in the container is equivalent to the equilibrium pressure of the contents at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defect. **(T-0).**

A6.7.3. Fire Extinguishers with a Small Amount of Compressed Gas. Must not contain more than 1660 kPa at 21 degrees C (241 psig at 70 degrees F). **(T-0)**. Fire extinguishers marked "MEETS DOT REQUIREMENTS" are excepted from DOT cylinder specification requirements provided:

A6.7.3.1. They are shipped as inside containers. Use original manufacturer's packaging or suitable outer packaging to protect extinguisher during normal transportation.

A6.7.3.2. The contents are not flammable, toxic, or corrosive.

A6.7.3.3. Internal volume is not over 18 L (1,100 cubic inches). For fire extinguishers not over 900 mL (55 cubic inch) capacity, the liquid portion of the gas plus any additional liquid or solid must not completely fill the container at 55 degrees C (130 degrees F). **(T-0)**. Fire extinguishers over 900 mL (35 cubic inches) must not contain liquefied compressed gas. **(T-0)**.

A6.7.3.4. Fire extinguishers manufactured on and after 1 January 1976 must be designed and fabricated with a burst pressure not less than six times its charged pressure at 21 degrees C (70 degrees F). **(T-0)**.

A6.7.3.5. Fire extinguishers are tested to three times the charged pressure at 21 degrees C (70 degrees F), but not less than 825 kPa (120 psig) without failure before the initial shipment. For any subsequent shipments, they must meet retest requirements of 29 CFR Paragraph 1910.157(e). **(T-0)**.

A6.7.4. FEU-1/M Extinguisher. Transport extinguisher (FEU-1/M) 37.8 L (10 gallon) capacity on military aircraft without special packing and crating. Use caution during handling and transportation to avoid damage to valves.

A6.7.5. Foreign Fire Extinguishers. Foreign fire extinguishers meeting the requirements of A3.3.2.10.

A6.7.6. UN Specification cylinders marked with "USA" as country of approval.

A6.7.7. Large fire extinguishers include fire extinguishers mounted on wheels for manual handling; fire extinguishing equipment or machinery mounted on wheels or wheeled platforms or units transported similar to (small) trailers; and fire extinguishers composed of a non-rollable pressure drum and equipment, and handled, for example, by fork lift or crane when loaded or unloaded. Large fire extinguishers may be transported while unpackaged under the following conditions:

A6.7.7.1. The general and hazard class specific requirements of attachment 3 are met;

A6.7.7.2. The valves are protected in accordance with paragraph A3.3.2.3; and

A6.7.7.3. Other equipment mounted on the fire extinguisher is protected to prevent accidental activation.

A6.8. Refrigerating Machines, Air Conditioners, and Articles, Pressurized Hydraulic or Pneumatic packaged as follows:

A6.8.1. Refrigerating Machines, Air Conditioners, and Components. Factory-tested refrigerating machines, air conditioners, and components are exempted from specification

packaging, marking, and labeling except for the name of contents on the outer packaging, provided (see A3.3.2.9. for small quantities):

A6.8.1.1. Each pressure vessel is charged to not more than 2268 kg (5,000 pounds) of Group A1 refrigerant as classified in ANSI/ASHRAE Standard 15, or not more than 22.7 kg (50 pounds) of refrigerant other than Group A1.

A6.8.1.2. Machines containing two or more charged vessels may not contain more than 907 kg (2,000 pounds) of Group 1 refrigerant, or more than 45.4 kg (100 pounds) of refrigerant other than Group 1.

A6.8.1.3. Each pressure vessel is equipped with a safety relief device meeting the requirements of ANSI/ASHRAE Standard 15.

A6.8.1.4. Each pressure vessel is equipped with an individual shut-off valve at each opening except openings used for safety devices and with no other connection. Close shut-off valves during transportation.

A6.8.1.5. Pressure vessels are manufactured, inspected, and tested according to ANSI/ASHRAE Standard 15, or when over 152.4 mm (6 inches) internal diameter, according to American Society of Mechanical Engineers (ASME) Code.

A6.8.1.6. All parts subject to refrigerant pressure during shipment are tested under ANSI/ASHRAE Standard 15.

A6.8.1.7. The liquid portion of refrigerant, if any, does not completely fill any pressure vessel at 55 degrees C (130 degrees F).

A6.8.1.8. Filling densities prescribed in A3.3.2.6. are not exceeded.

A6.8.2. Articles, Pressurized Hydraulic or Pneumatic. The following apply to Articles, Pressurized, Hydraulic or Pneumatic (e.g., accumulators) containing nonliquefied, nonflammable gas, and nonflammable liquids or pneumatic accumulators containing nonliquefied, nonflammable gas, fabricated from materials that do not fragment upon rupture:

A6.8.2.1. Accumulators installed in motor vehicles, construction equipment, and assembled machinery, designed and fabricated with a burst pressure of not less than five times their charged pressure at 21 degrees C (70 degrees F) are exempt from the requirements of this manual.

A6.8.2.2. When charged to not more than 1380 kPa (200 psig) at 21 degrees C (70 degrees F), the following conditions apply:

A6.8.2.2.1. Each article must have a fluid space not exceeding 41L (2,500 cubic inches) under stored pressure. **(T-0).**

A6.8.2.2.2. Ship each article as an inside package. There are no specification requirements.

A6.8.2.2.3. Test each article, without evidence of failure or damage, to at least three times its charged pressure at 21 degrees C (70 degrees F) but not less than 120 psig (830 kPa) before initial shipment and before each refilling and reshipment.

A6.8.2.3. When charged over 1380 kPa (200 psig) at 21 degrees C (70 degrees F) the following conditions apply:

A6.8.2.3.1. Each article must have a fluid space not exceeding 41L (2,500 cubic inches) under stored pressure. **(T-0)**.

A6.8.2.3.2. Test each article, without evidence of failure or damage, to at least three times its charged pressure at 21 degrees C (70 degrees F) but not less than 120 psig (830 kPa) before initial shipment and before each refilling and reshipment.

A6.8.2.3.3. Design and fabricate each article with a burst pressure of not less than five times its charged pressure when shipped.

A6.9. Acetylene Gas must be packaged as follows:

A6.9.1. DOT 8 or 8AL Cylinders. Ship in DOT 8 or 8AL cylinders with the following provisions:

A6.9.1.1. Ensure the cylinders consist of metal shells filled with a porous material, and this material is charged with a suitable solvent as identified in 49 CFR Sections 178.59 or 178.60 as appropriate.

A6.9.1.2. Ensure cylinders comply with the provisions of 49 CFR Paragraphs 173.303(a) through (e).

A6.9.2. Foreign Cylinders. Foreign cylinders meeting the requirements of A3.3.2.6.

A6.9.3. In UN Specification cylinders meeting the requirements of 49 CFR Paragraph 173.303(f) and marked with "USA" as country of approval.

A6.10. Cigarette Lighters or Other Similar Devices Charged With Fuel packaged as follows:

Do not ship any package containing a cigarette lighter or other similar ignition device charged with fuel and equipped with an ignition element, or any self-lighting cigarette, unless the design of the device and its packaging has been approved according to 2.3. or by the DOT. The DOT approval process is identified in 49 CFR Section 173.308. Ship a cigarette lighter or other similar device charged with a flammable gas according to the following:

A6.10.1. No more than 10 grams (0.35 fluid ounces) of liquefied gas may be loaded into each device.

A6.10.2. The liquid portion of the gas may not be over 85 percent of the volumetric capacity of each chamber at 15 degrees C (59 degrees F).

A6.10.3. Each device including closures must be capable of withstanding, without leakage or rupture, an internal pressure of at least two times the vapor pressure of the fuel at 55 degrees C (130 degrees F). **(T-0)**.

A6.10.4. Place lighters in an inner packaging that is designed to prevent movement of the lighters and inadvertent ignition or leakage. The ignition device and gas control lever of each lighter must be designed, or securely sealed, taped, or otherwise fastened or packaged to protect against accidental functioning or leakage of the contents during transport. **(T-0)**. If

lighters are packed vertically in a plastic tray, use a plastic, fiberboard or paperboard partition to prevent friction between the ignition device and the inner packaging.

A6.10.5. Pack lighters and their inner packagings tightly and secure against movement in any rigid non-bulk UN specification outer packaging authorized in 49 CFR Part 178 at the Packing Group II performance level.

A6.10.6. Lighter refills may not contain an ignition element but must contain a release device. **(T-0).** Lighter refills may not exceed 4 fluid ounces capacity (7.22 cubic inches) or contain more than 65 grams of a Division 2.1 fuel. Pack lighter refills tightly and secure against movement in any rigid non-bulk UN specification outer packaging authorized in 49 CFR Part 178 at the Packing Group II performance level.

A6.11. Cryogenic Liquids packaged as follows:

A6.11.1. Handling Instructions. Store in cool, well-ventilated area away from fire hazards, direct rays of the sun, and organic or easily oxidizable materials such as grease and oil. Handle containers with extreme care. Avoid direct contact.

A6.11.2. Packaging Requirements. Ensure all containers are prepared in accordance with T.O. 37C2-8-1-127 and designed to hold low temperature liquefied gases and are strong enough to withstand all shocks and loading normally incident to air shipment and associated handling. Ship cryogenic liquids of argon, helium, neon, nitrogen, and oxygen according to filling density requirements in Figure A3.4. Ship hydrogen (minimum 95 percent parahydrogen) according to filling density requirements in Figure A3.5. Unless excepted in this paragraph, connect container to the aircraft's overboard vent system as required by A3.3.2.16.2. Protect container accessories against damage in handling.

A6.11.2.1. DOT 4L cylinders in a vertical position.

A6.11.2.2. Type TMU-27M, MIL-T-38170, or MA-1, trailer mounted, 189 L (50 gallon) capacity containers.

A6.11.2.3. C-1, 1892 L (500 gallons) capacity containers.

A6.11.2.4. Dewars, 25 L (6.6 gallon) capacity each. Not more than 6 per aircraft.

A6.11.2.5. Nonpressurized metal vacuum-type containers, dewars, 100 liter (26.42 gallon capacity) attached to nonskid base. Ship no more than one container per aircraft.

A6.11.2.6. NRU-5/E air-transportable 1514L (400 gallon tank) (MIL-T-38261).

A6.11.2.7. LS-160 container attached to shipping platform. Ship a maximum of one container per aircraft. Maximum 150 liters (39.63 gallons) nitrogen per container.

A6.11.2.8. TMU-70/M (MIL-A-85415) LOX servicing trailers equipped with absolute pressure relief valve.

A6.11.2.9. TMU-24E (MIL-T-27720), mounted on aircraft cargo pallet, 1514 L (400 gallons), liquid oxygen or liquid nitrogen storage and transfer tanks.

A6.11.2.10. LSHe-102, 109 L (28.79 gallon) capacity, attached to shipping skid equipped with an absolute pressure relief valve for air shipment. Authorized for liquid helium.

A6.11.2.11. LSHe-30, 30 L (7.92 gallon) capacity, packed in a specially designed shipping container (P/N 0305-0002) equipped with plastic foam pads. Ship no more than five containers per aircraft. Authorized for liquid helium and neon.

A6.11.2.12. LSNe-75, liquid neon container, with a maximum quantity of 75 L (19.81 gallon) attached to a shipping skid equipped with an absolute pressure relief valve.. Ship not more than two containers per aircraft.

A6.11.2.13. Liquid oxygen and liquid nitrogen in specification MIL-T-38170 containers vented to the outside of the aircraft. Monitor the container vent valve to make sure the pressure buildup within the container is not over 40 psig. Vent the container down to 5 psig whenever necessary during flight and close the valve when not venting.

A6.11.2.14. CRU-87/U, 10-liter, Portable Therapeutic Liquid Oxygen (PTLOX) Converters. Up to 25 PTLOX converters per aircraft may be shipped without overboard venting, except that C-21 aircraft is limited to 10 PTLOX converters without overboard venting.

A6.11.2.15. Foreign cylinders meeting the requirements of A3.3.2.10.

A6.11.2.16. UN Specification cylinders marked with "USA" as country of approval.

A6.11.2.17. CRU-50/A, 20-liter, Next-Generation Portable Therapeutic Liquid Oxygen (NPTLOX) Converters. Up to 25 Next-Generation Portable Therapeutic Liquid Oxygen (NPTLOX) converters per aircraft may be shipped without overboard venting aboard USAF transport aircraft.

A6.11.2.18. 500 Gallon liquid nitrogen (LIN)/liquid oxygen (LOX) Trailer, NSN 3655-01-601-2544RN and 3655-01-604-1578RN from partial to total capacity of LIN or LOX. Ensure container is connected to the aircraft's overboard vent system as required by paragraph A3.3.2.16.2. Up to three containers may be carried as long as they are properly connected to the vent system.

A6.12. Ethyl Chloride packaged as follows: Package ethyl chloride in any of the following single or combination nonbulk packagings which meet the PG I performance level. (Outage for all containers must be 7.5 percent or more at 21 degrees C (70 degrees F)). **(T-0)**.

A6.12.1. Package in boxes as follows:

Inner packaging	Outer packaging
Receptacles: glass, earthenware or metal Note: Not over 500 g (17.6 ounces) capacity each.	Boxes: ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), or reconstituted wood (4F), fiberboard (4G) Note: Gross weight of 4G may not exceed 30 kg (66 pounds).

A6.12.2. Package in drums as follows:

Inner packaging	Outer packaging
Inner packaging not required	Drum: steel (1A1) not over 100 L (26 gallon) capacity each

A6.12.3. DOT Cylinders. Any DOT specification cylinder prescribed for any compressed gas except acetylene. Cylinders made of aluminum alloy are not authorized.

A6.12.4. Package in capsules with a maximum net mass of 150 g (5.30 ounces) per capsule. The capsule must be free of faults liable to impair its strength. **(T-0)**. The leakproofness integrity of the closure must be maintained by a secondary means (e.g., cap, crown, seal, binding, etc.) capable of preventing any leakage of the closure while in transportation. **(T-0)**. Place capsules in a strong outer packaging suitable for the contents and must not exceed a gross mass of 75 kg (165 pounds). **(T-0)**.

A6.13. Ethylene Oxide packaged as follows: Silver mercury, or any of its alloys, or copper may not be used in any part of a packaging, valve, or other packaging appurtenance if that part, during normal conditions of transportation, may come in contact with ethylene oxide liquid or vapor. Copper alloys may be used only where gas mixtures do not contain free acetylene at any concentration that will form copper acetylene. All packaging and gaskets must be constructed of materials which are compatible with ethylene oxide and do not lower the auto-ignition temperature of ethylene oxide. **(T-0)**.

A6.13.1. Package in boxes as follows: Hermetically seal inner packagings and cushion in the outer packaging. After filling, determine each inner packaging to be leak-tight by placing the inner packaging in a hot water bath at a temperature, and for a period of time, sufficient to ensure that an internal pressure equal to the vapor pressure of ethylene oxide at 55 degrees C is achieved. Each completed package must meet PG I performance requirements. **(T-0)**.

Inner packaging	Outer packaging
Glass ampoules / vials Note: The capacity of each inner packaging may not exceed 100 g (3.5 ounces). or Metal receptacles Note: The capacity of each inner packaging may not exceed 340 g (12 ounces).	Boxes: wooden (4C1, 4C2, 4D, or 4F) or fiberboard (4G) Note: The total quantity in any outer packaging may not exceed 100 g (3.5 ounces), and the total quantity in any outer packaging containing only metal inner packagings may not exceed 2.5 kg (5.5 pounds).

A6.13.2. In DOT specification cylinders or UN pressure receptacles, as authorized for any compressed gas except acetylene. Pressurizing valves and insulation are required for cylinders over 4 L (1 gallon) capacity. Eductor tubes must be provided for cylinders over 19L (5 gallons) capacity. **(T-0)**. Cylinders must be seamless or welded steel (not brazed) with a nominal capacity of no more than 115 L (30 gallons) and must not be liquid full below 82 degrees C (180 degrees F). **(T-0)**. Before each refilling, test each cylinder for leakage at no less than 103.4 kPa (15 psig) pressure. In addition, equip each cylinder with a fusible type relief device with yield temperature of 69 °C to 77 °C (157 °F to 170 °F). The capacity of the relief device and the effectiveness of the insulation must be such that the charged cylinder will not explode when tested by the method described in CGA Pamphlet C-14 or other equivalent method. **(T-0)**.

A6.13.3. Steel (1A1) Drums. In steel (1A1) drums of no more than 231 L (61 gallons) and meeting Packing Group I performance standards. The drum must be lagged, of all welded construction with the inner shell having a minimum thickness of 1.7 mm (0.068 inches) and the outer shell must have a minimum thickness of 2.4 mm (0.095 inches). **(T-0)**. Drums must be capable of withstanding a hydrostatic test pressure of 690 kPa (100 psig). **(T-0)**. Lagging must be of sufficient thickness so that the drum, when filled with ethylene oxide and equipped with the required pressure relief device, will not rupture when exposed to fire. **(T-0)**. The drum must not be liquid full below 85 degrees C (185 degrees F). **(T-0)**. Before each refilling, each drum must be pressure tested for leakage at no less than 103 kPa (15 psig). **(T-0)**. Each drum must be equipped with a fusible-type relief device with a yield temperature of 69 to 77 degrees C (157 to 170 degrees F). **(T-0)**. The capacity of the relief device and the effectiveness of the insulation must be such that the filled drum is capable of passing, without rupture, the test method described in CGA Pamphlet C-14 or other equivalent method. **(T-0)**.

A6.14. Ethylamine (Monoethylamine, Aminoethane) packaged as follows:

A6.14.1. Use metal drums (1A1) which meet PG I performance level requirements.

A6.14.2. Use any DOT specification cylinder prescribed for any compressed gas except acetylene.

A6.15. Arsine; Cyanogen Chloride, Stabilized; Cyanogen, Liquefied; Germane; Liquefied Gas, Toxic; Phosgene; Phosphine packaged as follows. See paragraph 2.8. for additional information.

A6.15.1. Handling Instructions. These items are extremely dangerous. Approved chemical safety mask and clothing must be available when handling this material and worn when handling leaking packages. **(T-0)**.

A6.15.2. Packaging Requirements. Package in DOT specification 3A1800, 3AA1800, 3AL1800, 3D, 3E1800, and 33 cylinders. Specification 3A, 3AA, 3AL, 3D, and 33 cylinders not exceeding 57 kg (125 pounds) water capacity (nominal). Shipments of "Arsine" or "Phosphine" may not be packaged in a specification 3AL cylinder. Cylinders containing "phosgene" may not exceed a filling density of 125 percent (see A3.3.2.6.). The cylinder may not contain more than 68 kg (150 pounds) of phosgene. Also, test each filled cylinder for leakage before it is offered for transportation with absolutely no leakage. This test consists of immersing the cylinder and valve, without the protection cap attached, in a bath of water at a temperature of approximately 66 degrees C (150 degrees F) for at least 30 minutes. During which time, make frequent examinations to identify any escape of gas. After the test has been accomplished do not loosen the valve of the cylinder before the cylinder is offered for transportation, and do not be loosened during transportation.

A6.16. Bromoacetone; Methyl Bromide; Chloropicrin and Methyl Bromide, or Methyl Chloride Mixtures; Insecticide Gases, Toxic, N.O.S. packaged as follows. See paragraph 2.8. for additional information.

A6.16.1. Handling Instructions. These materials and mixtures are extremely dangerous poisons. Approved chemical safety mask and clothing must be available when handling this material, and worn when handling leaking packages. **(T-0)**.

A6.16.2. Packaging Requirements:

A6.16.2.1. Pack bromoacetone with inner glass receptacles or tubes in hermetically sealed metal receptacles in corrugated fiberboard cartons in the following boxes: steel (4A), aluminum (4B), other metal (4N) natural wood (4C1), natural wood with sift-proof walls (4C2), plywood (4D), or reconstituted wood (4F), Bottles must not contain over 500 g (17.6 ounces) of liquid each and must be cushioned in cans with at least 12.7 mm (.5 inches) of absorbent cushioning material. **(T-0)**. The total amount of liquid in the outer box may not exceed 11 kg (24 pounds). Packagings must conform to the PG I performance level. **(T-0)**.

A6.16.2.2. Pack bromoacetone, methyl bromide, chloropicrin and methyl bromide mixtures, chloropicrin and methyl chloride mixtures, and chloropicrin mixtures charged with a nonflammable, nonliquefied compressed gas in DOT specification 3A, 3AA, 3B, 3C, 3E, 4A, 4B, 4BA, 4BW, or 4C cylinders having not over 113 kg (250 pounds) water capacity (nominal). However, this capacity does not apply to shipments of methyl bromide.

A6.16.2.3. Package methyl bromide mixtures containing up to 2 percent chloropicrin in a fiberboard (4G) box with inside metal cans containing not over 0.454 kg (1 pound) each, or inside metal cans with a minimum wall thickness of 0.178 mm (0.007 inch) containing not over 0.7945 kg (1 3/4 pounds) each. The 0.454 kg (1 pound) can must be capable of withstanding an internal pressure of 896.6 kPa (130 psig) without leakage or permanent distortion. **(T-0)**. Vapor pressure of the contents must not exceed 896.6 kPa (130 psig) at 55 degrees C (130 degrees F). **(T-0)**. The 0.7945 kg (1 3/4 pound) can must be capable of withstanding an internal pressure of 965.6 kPa (140 psig) without leakage or permanent distortion. **(T-0)**. Vapor pressure of the contents must not exceed 965.6 kPa (140 psig) at 55 degrees C (130 degrees F). Cans must not be liquid full at 55 degrees C (130 degrees F). Cans must be constructed of tinplate or lined with suitable material and must have concave or pressure ends. **(T-0)**.

A6.17. Gas Identification Sets must be packaged as follows: Gas identification sets containing toxic material meeting the requirements of the PG I performance level.

A6.17.1. Pack in hermetically sealed glass inner receptacles not over 40 ml (1.4 fluid ounces). Place each glass inner receptacle in a sealed fiberboard receptacle cushioned with absorbent material. Not more than 12 fiberboard receptacles may be placed in a 4G fiberboard box. No more than four fiberboard boxes, well-cushioned, may be placed in a steel cylinder. The cylinder must have a wall thickness of at least 3.7 mm (0.146 inches) and must have a hermetically sealed steel closure. **(T-0)**.

A6.17.2. When the toxic material is absorbed in a medium such as activated charcoal or silica gel, pack gas identification sets as follows:

A6.17.2.1. If the liquid toxic material does not exceed 5 ml (0.2 fluid ounces) or the solid toxic material does not exceed 5 g (0.2 ounces), they may be packed in glass inner receptacles of not over 120 ml (4.1 fluid ounces) each. Pack each glass receptacle, cushioned with absorbent material in a hermetically sealed metal can. The metal can must have a wall thickness of not less than 0.30 mm (0.012 inch). **(T-0)**. Then pack metal cans in metal boxes (4A, 4B, or 4N), or wooden boxes (4C1, 4C2, 4D, or 4F) surrounded on

all sides by at least 25 mm (1 inch) of dry sawdust. Not more than 100 ml (3.4 fluid ounces) or 100 g (3.5 ounces) of toxic materials may be packed in one outer wooden box.

A6.17.2.2. If the liquid toxic material does not exceed 5 ml (0.2 fluid ounces) or the solid toxic material does not exceed 20 g (0.7 ounces), they may be packed in glass inner receptacles with screw-top closures of not less than 60 ml (2 fluid ounces) that are hermetically sealed. Twelve bottles containing toxic material not exceeding 100 ml (3.4 ounces) for liquids or 100 g (3.5 ounces) for solids may be placed in a plastic carrying case. Surround each glass receptacle with absorbent cushioning material and separate from each other with sponge rubber partitions. Place the plastic carrying case in a tightly fitted fiberboard box and then place in a tight fitting metal box (4A, 4B, or 4N), or wooden box (4C1, 4C2, 4D, or 4F).

A6.18. Hexaethyl Tetraphosphate and Compressed Gas Mixtures; Insecticide Gases, Toxic, N.O.S.; Parathion and Compressed Gas Mixture; Tetraethyl Dithiopyrophosphate and Gases, in Solution or Tetraethyl Dithiopyrophosphate and Gases, Mixtures (LC50 Less Than or Equal to 200 Parts Per Million (ppm)); Tetraethyl Dithiopyrophosphate and Gases, in Solution or Tetraethyl Dithiopyrophosphate and Gases, Mixtures (LC50 over 200 but not Greater Than 5000 ppm); Tetraethyl Pyrophosphate and Compressed Gas Mixture (LC50 Less Than or Equal to 200 ppm); Tetraethyl Pyrophosphate and Compressed Gas Mixture (LC50 Over 200 but not greater than 5000 ppm) packaged as follows: See paragraph 2.8. for additional information.

A6.18.1. Handling Instructions. These materials and mixtures are extremely dangerous poisons. Make approved chemical safety mask and clothing available when handling this material, and wear when handling leaking packages.

A6.18.2. Packaging Requirements.

A6.18.2.1. Hexaethyl tetraphosphate, parathion, tetraethyl dithiopyrophosphate, and tetraethyl pyrophosphate may be mixed with a nonflammable compressed gas. This mixture may not contain more than 20 percent by weight of an organic phosphate and be packaged in DOT specification 3A240, 3AA240, 3B240, 4A240, 4B240, 4BA240, or 4BW240 cylinders meeting the following requirements:

A6.18.2.1.1. Each cylinder may not be charged with more than 5 kg (11.0 pounds) of the mixture. The maximum filling density of the cylinder may not exceed 80 percent of its water capacity.

A6.18.2.1.2. Charge each cylinder in compliance with A3.3.2.6.

A6.18.2.1.3. No cylinder may be equipped with an education tube or a fusible plug.

A6.18.2.1.4. No cylinder may be equipped with any valve unless the valve is a type approved by the DOT.

A6.18.2.2. Package cylinders must in a fiberboard box (4G) in a way to protect each valve or other closing device from damage. Except as provided in A6.17.2.2, no more than four cylinders may be packed in a box. Each box with its closing device protection must be sufficiently strong to protect all parts of each inside cylinder from deformation or breakage if the completed package is dropped 1.8 m (5.9 feet) onto solid concrete impacting at the package's weakest point. (T-0).

A6.18.2.3. Cylinders may be packed in a strong wooden box (4C1, 4C2, 4D, or 4F) and packed in a way to protect each valve or other closing device from damage. No more than twelve cylinders may be packed in one outer wooden box. Each wooden box with its closing device protection must be sufficiently strong to protect all parts of each inside cylinder from deformation or breakage if the completed package is dropped 1.8 m (5.9 feet) onto solid concrete impacting at the package's weakest point. **(T-0)**.

A6.19. Packaging for Class 2.3 Materials, Poisonous by Inhalation (Hazard Zone A) is as follows:

A6.19.1. Handling Instructions. These items are extremely dangerous. Make approved chemical safety mask and clothing available when handling this material, and wear when handling leaking packages.

A6.19.2. Packaging Requirements. Package Class 2.3, PG I materials with an Inhalation Hazard Zone A as follows:

A6.19.2.1. In DOT cylinders as identified in 49 CFR Part 178 Subpart C, except that specification 8, 8AL, and 39 cylinders are not authorized. Cylinders must also meet the requirements of A3.3.2. **(T-0)**.

A6.19.2.2. Pack in an inner drum (1A1, 1B1, 1H1, 1N1, or 6HA1), then place in an outer drum (1A2 or 1H2). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches). The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The outer 1A2 and 1H2 drums must withstand a hydrostatic test pressure of 100 kPa (15 psi). The capacity of the inner drum must not exceed 220 L (58 gallons). The inner drum must also meet the following requirements:

A6.19.2.2.1. Satisfactorily withstand a hydrostatic pressure test (as outlined in 49 CFR Section 178.605) of 550 kPa (80 psig).

A6.19.2.2.2. Satisfactorily withstand a leakproofness test (as outlined in 49 CFR Section 178.604) using an internal air pressure at 55 degrees C (130 degrees F) of at least twice the vapor pressure of the material to be packaged.

A6.19.2.2.3. Have screw-type closures that are:

A6.19.2.2.3.1. Closed and tightened to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.

A6.19.2.2.3.2. Physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation.

A6.19.2.2.3.3. Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psi). **(T-0)**.

A6.19.2.2.4. Meet the following minimum thickness requirements:

A6.19.2.2.4.1. If the capacity of the inner drum is less than or equal to 120 L (32 gallons) the minimum thickness of the inner drum is: 1.3 mm (0.051 inches) for 1A1

and 1N1 drums, 3.9 mm (0.154 inches) for 1B1 drums, 3.16 mm (0.124 inches) for 1H1 drums, 1.58 mm (0.0622 inches) for the plastic inner container and 0.96 mm (0.0378) for the outer steel drum of a 6HA1 drum.

A6.19.2.2.4.2. If the capacity of the inner drum is greater than 120 L (32 gallons) the minimum thickness of the inner drum is: 1.7 mm (0.067 inches) for 1A1 and 1N1 drums, 4.7 mm (0.185 inches) for 1B1 drums, 3.16 mm (0.124 inches) for 1H1 drums, 1.58 mm (0.0622 inches) for the plastic inner container and 1.08 mm (0.0378) for the outer steel drum of a 6HA1 drum.

A6.19.2.2.5. Cushion the inner drum within the outer drum with a shock-mitigating, nonreactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum and the inner surface (side) of the outer drum, and at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum. **(T-0)**.

A6.19.2.3. Pack in an inner packaging system that consists of an impact-resistant receptacle of glass, earthenware, plastic, or metal securely cushioned with a nonreactive absorbent material. Pack the inner packaging system within a leak-tight packaging of metal or plastic, then pack in a steel drum (1A2), aluminum drum (1B2), metal drum (other than steel or aluminum (1N2)), plywood drum (1D), fiber drum (1G), plastic drum (1H2), wooden barrel (2C2), steel jerrican (3A2), plastic jerrican (3H2), steel box (4A), aluminum box (4B), natural wood box (4C1 or 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), expanded plastic box (4H1), or solid plastic box (4H2). The capacity of the inner receptacle may not exceed 4 L (1 gallon). An inner receptacle that has a closure, must have the closure held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation. **(T-0)**. Both the inner packaging system and the outer container must each meet the test requirements of the PG I performance level independently. **(T-0)**. The total amount of liquid that can be packed in the outer container must not exceed 16 L (4 gallons). **(T-0)**.

A6.20. Package Nitric Oxide as follows: See paragraph 2.8. for additional information.

A6.20.1. Handling Instructions. Nitric oxide is extremely dangerous and poisonous. Make approved chemical safety mask and clothing available when handling this material, and wear when handling leaking packages.

A6.20.2. Packaging Requirements. Pack nitric oxide in DOT 3A1800, 3AA1800, 3AL1800, or 3E1800 cylinders, charged to a pressure of not more than 5,170 kPa (750 psi) at 21 degrees C (70 degrees F). Ensure cylinders are equipped with a valve of stainless steel and a valve seat of material that is not deteriorated by contact with nitric oxide or nitrogen dioxide. Cylinders or valves may not be equipped with safety devices (pressure relief) of any type. Ensure valve outlets are sealed by a solid threaded cap or plug and an inert gasketing material. Clean cylinders as identified in 49 CFR Paragraph 173.337(b).

A6.20.2.1. Pack cylinders, DOT 3E1800, in strong wooden boxes to protect valves from injury or accidental functioning under conditions incident to transportation.

A6.21. Package Ethyl Methyl Ether in packaging meeting the requirements of the PG I performance level as follows:

A6.21.1. Package in drums, jerricans, or boxes as follows:

Inner packaging	Outer packaging
Receptacles: glass, earthenware, plastic, metal or glass ampoules	Drums: steel (1A1 or 1A2), aluminum (1B1 or 1B2), metal other than steel or aluminum (1N1 or 1N2), plywood (1D), fiber (1G), or plastic (1H1 or 1H2) <i>or</i> Jerricans: steel (3A1 or 3A2), aluminum (3B1 or 3B2), plastic (3H1 or 3H2) <i>or</i> Boxes: steel (4A1 or 4A2), aluminum (4B1 or 4B2), natural wood (4C1 or 4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), expanded plastic (4H1), solid plastic (4H2)

A6.21.2. Package in drums or jerricans as follows:

Inner packaging	Outer packaging
Not required	Drums: steel (1A1 or 1A2), aluminum (1B1 or 1B2), metal other than steel or aluminum (1N1 or 1N2) or plastic (1H1 or 1H2) <i>or</i> Jerricans: steel (3A1 or 3A2), aluminum (3B1 or 3B2), or plastic (3H1 or 3H2)

A6.21.3. Package in the following plastic inner receptacle composite packages:

Inner receptacle	Outer packaging
Plastic	Drums: steel, aluminum, fiber or plastic (6HA1, 6HB1, 6HG1, 6HH1) <i>or</i> Boxes: steel, aluminum, wooden, plywood, or fiberboard (6HA2, 6HB2, 6HC, 6HD2, 6HG2)

A6.21.4. Package in the following glass, porcelain, or stoneware inner receptacle composite packages:

Inner receptacle	Outer packaging
Glass, porcelain, or stoneware	Drums: steel, aluminum or fiber (6PA1, 6PB1, 6PG1) <i>or</i> Boxes: steel, aluminum, wooden, or fiberboard (6PA2, 6PB2, 6PC, 6PG2) <i>or</i> solid or expanded plastic packaging (6PH1 or 6PH2)

A6.21.5. DOT Cylinders. Any DOT specification cylinders as prescribed for any compressed gas, except 3HT cylinders and those for acetylene.

A6.22. Package Chemical Under Pressure N.O.S. as follows: Offer in cylinder filled for transportation in accordance with the requirements of DOT cylinders and UN pressure receptacles in Attachment 3 and paragraph A6.4. and A6.5. as applicable. Where multiple specifications apply to a cylinder, follow the most restrictive requirements.

A6.22.1 Filling limits. Fill cylinders so that at 50 °C (122 °F) the non-gaseous phase does not exceed 95% of their water capacity and they are not completely filled at 60 °C (140 °F). When filled, the internal pressure at 65 °C (149 °F) may not exceed the test pressure of the cylinder. Take the vapor pressures and volumetric expansion of all substances in the cylinders into account.

A6.22.2 Minimum service pressure. The minimum service pressure must be in accordance with the design specifications of 49 CFR Part 178 for the propellant. **(T-0)**. In any case the minimum test pressure must not be less than 291 psig (20 bar). **(T-0)**.

A6.22.3 Periodic inspection. The maximum requalification test period for cylinders transporting chemical under pressure N.O.S. is 5 years.

A6.23. Fuel Cell Cartridges.

A6.23.1. The weight of the fuel cells may not exceed 1 kg. Package fuel cell cartridges in drums, jerricans or boxes as follows:

Inner packaging	Outer packaging
Not required	Drums: removeable head steel (1A2), removeable head aluminum (1B2), plywood (1D), fiber (1G), plastic (1H2), removeable head other metal (1N2) <i>or</i> Jerricans: steel (3A2), aluminum (3B2), plastic (3H2) <i>or</i> Boxes: steel (4A), aluminum (4B), wood (4C1 or 4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), plastic (4H1 or 4H2), other metal (4N)

A6.24. Fuel Cell Cartridges Contained in Equipment.

A6.24.1. UN specification packaging is not required. Protect fuel cells installed in equipment against short circuit, and protect the entire system against inadvertent operation. Fuel cell systems may not charge batteries during transport.

A6.25. Fuel Cell Packed With Equipment.

A6.25.1. UN specification packaging is not required. Pack fuel cells with equipment in inner packagings or place them in the outer packaging with cushioning material or divider(s) in order to protect fuel cartridges from damage during transportation. The maximum number of fuel cell cartridges in the intermediate packaging may not be more than the number required to power the equipment plus two spares.

A6.26. Metal hydride storage systems.

A6.26.1. The following packing instruction is applicable to transportable UN Metal hydride storage systems (UN3468) with pressure receptacles not exceeding 150 liters (40 gallons) in water capacity and having a maximum developed pressure not exceeding 25 MPa. Metal hydride storage systems must be designed, constructed, initially inspected and tested in accordance with ISO 16111. **(T-0)**. Mark steel pressure receptacles or composite pressure receptacles with steel liners in accordance with 49 CFR Paragraph 173.301b(f) which specifies that a steel UN pressure receptacle bearing an “H” mark must be used for hydrogen bearing gases or other gases that may cause hydrogen embrittlement. **(T-0)**. Requalification intervals must be no more than every five years as specified in 49 CFR Section 180.207 in accordance with the requalification procedures prescribed in ISO 16111. **(T-0)**.

A6.27. Package Flammable gas powered engines and machinery as follows: The following general requirements apply:

A6.27.1. Compliance With Technical Orders. Use service technical manuals to prepare items for shipment.

A6.27.2. Engines which are drained and purged according to the responsible technical manual, and containing no other hazardous material, are nonhazardous for transportation. Comply with paragraph A3.1.16.4.

A6.27.3. Where an engine or machine could possibly be handled in other than an upright position, secure the engines or machinery in a strong, rigid outer packaging in an orientation to prevent accidental leakage and prevent any movement during transport which would change in orientation or cause them to be damaged.

A6.27.4. Liquefied petroleum gas or compressed gas powered engines or equipment must have the gaseous fuel completely emptied from any non-DOT specification pressurized vessel (fuel tank), lines, and regulator. **(T-0)**. Ensure tanks are securely closed. Purging is not required.

A6.27.5. Fuel cell powered engines or equipment. Secure and protect the fuel cell in a manner to prevent damage to the fuel cell. Describe equipment (other than vehicles, engines or mechanical equipment) such as consumer electronic devices containing fuel cells (fuel cell cartridges) as “Fuel cell cartridges contained in equipment.”

A6.27.6. Accessorial hazards. Ensure installed components, equipment, and accessorial hazards (e.g., fire extinguishers, jerricans, etc.) are in properly configured and approved holders designed for use with the unit. The following applies:

A6.27.6.1. Secure batteries upright in designed holders except non-spillable batteries meeting Table A4.2., Special Provision A67 as nonhazardous, may be oriented in a manner to fit designed holder. Protect the terminals of installed batteries to prevent short circuit by use of battery boxes, protective covers, taping, etc. If battery cables are disconnected, secure them away from terminals, and protect the terminals.

A6.27.6.2. When loaded in a freight container, remove acid or alkali batteries and package according to A12.4. Do not ship packaged wet-cell batteries inside a freight container unless accessible during flight. Non-spillable and non-hazardous gel-type batteries may remain in the equipment holder provided they remain upright and the cables are disconnected. Tape the ends of the cables/terminals to prevent short circuit.

A6.28. UN3537, Articles containing flammable gas, N.O.S. and UN3538, Articles containing non-flammable, non toxic gas, N.O.S. are authorized when classified per paragraph A4.2.3., maximum net quantity per package 150kg, when packaged, or unpackaged as follows:

A6.28.1. When packaged, packagings meeting Packing Group II performance are required.

A6.28.2. Pack articles to prevent movement and inadvertent operation during normal conditions of transport.

Inner packaging	Outer packaging
<p>Receptacles: that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastic materials must be properly secured. Any leakage of the contents must not substantially impair the protective properties of the article or of the outer packaging. (T-0).</p> <p>Receptacles containing gases within articles must meet the appropriate requirements for compressed gasses or be capable of providing an equivalent level of protection. (T-0).</p> <p>Where there is no receptacle within the article, the article must fully enclose the dangerous goods and prevent their release under normal conditions of transport. (T-0).</p>	<p>Drums: removable head steel (1A2), removable head aluminum (1B2), removable head metal other than steel or aluminum (1N2), plywood (1D), fiber (1G), or removable head plastic (1H2)</p> <p>or</p> <p>Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), expanded plastic (4H1), or solid plastic (4H2), other metal (4N)</p> <p>or</p> <p>Jerricans: removable head steel (3A2), plastic removable head (3H2), or aluminum removable head (3B2)</p>

A6.28.3. Robust articles.

A6.28.3.1. Robust articles may be transported in strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use; or,

A6.28.3.2. Robust articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained.