

INCH-POUND

MIL-O-27210F  
 1 August 1990  
 SUPERSEDING  
 MIL-O-27210E  
 21 July 1977

## MILITARY SPECIFICATION

## OXYGEN, AVIATOR'S BREATHING, LIQUID AND GAS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers the requirements for two types of aviator's breathing oxygen.

1.2 Classification. Oxygen shall be of the following types as specified (see 6.2).

## TYPES

Type I - Gaseous  
 Type II - Liquid

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

## SPECIFICATIONS

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to San Antonio ALC/SFRM, Kelly AFB TX 78241-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 6830

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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MILITARY

- MIL-V-2/39 - Valve, Cylinder, Gas, Oxygen Outlet 541.
- MIL-S-27626 - Sampler, Cryogenic Liquid.
- MIL-C-83690 - Cylinder, Sampling.

STANDARDS

MILITARY

- MIL-STD-101 - Color Code for Pipelines and for Compressed Gas Cylinders.
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-1411 - Inspection and Maintenance of Compressed Gas Cylinders.
- MIL-STD-1564 - Procedure for Calibration and Analysis of Trace Contaminants in Aviator's Breathing Oxygen by Infrared Spectroscopy.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia PA 19111-5094.)

NATIONAL BUREAU OF STANDARDS (NBS)

- Technical Note 1079 - Tables of Industrial Gas Container Contents and Density for Oxygen, Argon, Nitrogen, Helium and Hydrogen.

(Application for copies of NBS Technical Note 1079 should be addressed to the National Technical Information Service, 5285 Port Royal Rd, Springfield VA 22161. Order Number PB 86105269.)

2.1.2 Other Government documents. The following other Government document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those cited in the solicitation.

DEPARTMENT OF TRANSPORTATION

- 49 CFR 171 - 199 - Code of Federal Regulations.

(Copies of the Code of Federal Regulations are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified,

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the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D 1142 - Test Method for Water Vapor Content of Gaseous Fuels by Measurement of Dew-Point Temperature.
- ASTM E 29 - Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.
- ASTM F 307 - Practice for Sampling Pressurized Gas for Gas Analysis.
- ASTM F 310 - Practice for Sampling Cryogenic Aerospace Fluids.

(Application for copies of ASTM publications should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia PA 19103-1877.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 Preproduction and periodic inspection. Preproduction and periodic inspection shall be performed as specified in 4.3 and 4.4.

3.2 Purity.

3.2.1 Type I. Gaseous oxygen shall contain not less than 99.5 percent oxygen by volume when tested in accordance with 4.8.4. The remainder, except for moisture and minor constituents specified in Table I, shall be argon and nitrogen.

3.2.2 Type II. Liquid oxygen shall contain not less than 99.5 percent oxygen by volume when gasified and tested in accordance with 4.8.4. The remainder, except for moisture and minor constituents specified in Table I, shall be argon and nitrogen.

3.3 Impurities. The oxygen shall be free from all contaminants of known toxicity to the maximum practicable extent. Limitations on specific impurities shall be as follows:

3.3.1 Odor.

3.3.1.1 Type I. Type I oxygen shall contain no odor when tested as specified in 4.8.2.1.

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3.3.1.2 Type II. Type II oxygen shall contain no odor when tested as specified in 4.8.2.2.

3.3.2 Minor constituents. Minor constituents of Types I and II shall not exceed the quantity specified in Table I.

\* 3.3.3 Moisture. Moisture in Types I and II shall not exceed 7 ppm of water vapor or a maximum dew point of  $-82^{\circ}\text{F}$  when tested as specified in 4.8.5.

3.4 Materials. There is no requirement included herein which should be interpreted to exclude the use of reclaimed materials in the manufacture of this commodity.

TABLE I. Constituent concentrations.

Constituent	Maximum concentration in parts per million (by volume)	
	Type I	Type II
Carbon dioxide ( $\text{CO}_2$ )	10	5
Methane ( $\text{CH}_4$ )	50	25
Acetylene ( $\text{C}_2\text{H}_2$ )	0.1	0.05
Ethylene ( $\text{C}_2\text{H}_4$ )	0.4	0.2
Ethane ( $\text{C}_2\text{H}_6$ ) and other hydrocarbons as ethane equivalents	6	3
Nitrous oxide ( $\text{N}_2\text{O}$ )	4	2
Halogenated compounds:		
Refrigerants (freons, etc)	2	1
Solvents (trichloroethylene, carbon tetrachloride, etc)	0.2	0.1
Other (each discernible from background noise on infrared spectrophotometer)	0.2	0.1

3.5 Filter. Type II oxygen shall be filtered through a 10-micrometer nominal (40-micrometer absolute) filter located in the fill line to the shipping container.

3.6 Limiting values. The following applies to all specified limits in this specification: For purposes of determining conformance with these requirements, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand digit used in expressing the specification limit according to the rounding-off method of ASTM Practice E 29

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for Using Significant Digits in Test Data to Determine conformance with Specifications.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The inspections specified herein are classified as follows:

- a. Preproduction inspection (see 4.3).
- b. Periodic inspection (see 4.4).
- c. Quality Conformance inspection (see 4.5).

4.3 Preproduction inspection. Prior to initial delivery of Type I or Type II oxygen, a representative product specimen shall be selected as specified in 4.5.1.1.2 (Type I) or 4.5.1.2.2 (Type II) and forwarded to the laboratory designated in the contract or order (6.2). The product shall meet the requirements in 3.2 and 3.3.

4.4 Periodic inspection. A representative product specimen of oxygen shall be selected as specified in 4.5.1.1.2 (Type I) or 4.5.1.2.2 (Type II) shall be taken once every 45 calendar days for the duration of the contract. This sample shall be shipped to the laboratory specified in the contract (6.2) for testing to determine compliance with requirements specified in Table I. The specified laboratory shall also test for purity and moisture if there is sufficient sample. The purity and moisture results shall be reported for correlation purposes and shall not be used to determine compliance to requirements of 3.2 or 3.3.3.

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4.5 Quality conformance inspection. Quality conformance inspection shall consist of the following:

- a. Individual inspection (see 4.5.2).
- b. Sampling inspection (see 4.5.3).

4.5.1 Place of inspection (see 6.2).

4.5.1.1 Type I oxygen.

4.5.1.1.1 Quality conformance inspection on cylinders filled with Type I oxygen shall be performed at the site of filling (see 6.2).

4.5.1.1.2 Preproduction and periodic inspection samples shall be taken from the manifold during filling operations.

4.5.1.2 Type II oxygen.

4.5.1.2.1 Quality conformance inspection shall be performed on samples taken from Type II oxygen transport container prior to leaving the site of filling. The transport container shall not be permitted to take on further liquid oxygen between inspection at the filling point and arrival at its destination, unless all quality conformance inspections are performed on the contents after such filling.

4.5.1.2.2 Preproduction and periodic inspection shall be performed on samples taken from Type II oxygen storage tanks at the manufacturing site or any distribution facilities. If a distribution facility is supplied from more than one storage or manufacturing facility, each facility shall be checked as specified above.

- \* 4.5.2 Individual inspection. Each cylinder filled with Type I oxygen and the contents of each filled container of Type II oxygen shall be subjected to tests as follows:

TEST	TYPE I	TYPE II
Leak Test	4.8.1	---
Odor Test	---	4.8.2.2
Purity Test	---	4.8.4
Moisture Test	---	4.8.5

4.5.2.1 Type II individual inspection. After filling the shipping container, two product specimens shall be drawn from each container. One specimen shall be in liquid state and subjected to the odor test specified in 4.8.2.2 The other specimen shall be vaporized and subjected to the purity and moisture tests specified in 4.8.4 and 4.8.5.

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4.5.3 Sampling inspection.

- \* 4.5.3.1 Type I. Randomly selected samples of Type I oxygen as specified in Table II shall be subjected to the following inspection:

Odor Test	4.8.2.1
Fill Pressure	4.8.3
Purity	4.8.4
Moisture	4.8.5
Packaging	Section 5

The fill pressure test shall be performed prior to the odor, purity, and moisture tests. The cylinder pressure shall be checked after completion of all tests. If the sample cylinder pressure is then found to be below the minimum acceptable value, the cylinder shall be filled to within the acceptable range.

4.5.3.2 Lot definition. Each set of Type I oxygen cylinders filled on the same manifold at the same time shall constitute a lot.

4.5.3.3 Samplers. The sampler for Type I oxygen shall be in accordance with MIL-C-83690 or functionally equivalent thereto. The sampler for Type II oxygen shall be in accordance with MIL-S-27626 or functionally equivalent thereto. Only liquid samplers that convert the entrapped liquid to gas shall be used. The aliquots taken for analysis are representative samples.

TABLE II. Sampling for test.

Number of containers in lot	Number of containers to be sampled
1	1
2 - 40	2
41 - 70	3
71 or more	4

TABLE III. Sampling particulars.

Sampler	Oxygen type	Method	Recommended final pressure
MIL-C-83690 (1-liter size)	I	ASTM F 307	1800 psig
TTU-131/E	II	ASTM F 310	400 to 500 psig
P/N 600646	II	Manufacturer's Instructions	1300 to 1800 psig

4.5.3.4 Sampling. Unless otherwise specified (see 6.2), oxygen shall be sampled according to the methods of Table III. Sample size shall be sufficient to provide the analyzer with 7 liters of oxygen at 10 atmospheres of pressure.

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4.5.3.5 Sample Identification. The following data shall be provided on each sample sent to a Government laboratory for analysis: Item name, specification number, Type (I or II), sample number, sampler serial number, contractor's name, address, phone number and return shipping address for sampler, Government representative's name, address, and phone number, reason for analysis (preproduction, periodic or resample), contract number, date sample taken, and pressure in sampler.

4.6 Rejection. When any sample of the oxygen tested in accordance with 4.8 fails to conform to the requirements specified herein, the entire lot represented by the sample shall be rejected. Disposition of the rejected product shall be specified by the procuring activity (see 6.2).

4.7 Test conditions.

4.7.1 Temperatures. Temperatures shall be measured using thermocouples or thermometers. Thermocouples shall be connected to accurately calibrated potentiometers. Thermometers shall be of laboratory accuracy and shall have a sufficient number of scale divisions to be read within 1/2 degree F.

4.7.2 Pressures. Pressures shall be measured by means of accurately calibrated Bourdon tube gauges or any other laboratory type pressure measuring device capable of being accurately read within  $\pm 5$  psig. For the purposes of this specification, a gauge or other laboratory type pressure measuring device having scale increments of 10 psig or less is considered satisfactory.

4.8 Inspection methods.

4.8.1 Leak test. Each cylinder shall be leak tested in accordance with procedures in MIL-STD-1411.

4.8.2 Odor test.

\* 4.8.2.1 Odor test (Type I). Samples shall be tested for odor by attaching an appropriate regulator, adjusting the cylinder and regulator valves to obtain a gentle flow, and smelling the escaping gas.

4.8.2.2 Odor test (Type II). Approximately 200 milliliters of a liquid sample shall be poured into a clean 400-milliliter beaker or similar container after covering the bottom of the beaker with a clean, dry filter paper or other absorbent paper. A watch glass cover or some other means of partially covering the top of the beaker shall be provided as the 200 milliliters evaporates to dryness. This will prevent atmospheric constituents from being absorbed by the exposed liquid. The liquid shall be permitted to evaporate to dryness and warm up to approximately room temperature in an area free from air currents or extraneous odors. When the liquid has completely evaporated, the watch glass shall be removed and the beaker contents smelled at frequent intervals until the accumulated frost on the outside of the beaker has completely melted. Odors will be most prevalent when the beaker has warmed to nearly room temperature.

4.8.3 Filling pressure test. Samples shall be tested for proper filling

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pressure by attaching a gauge of the type described in 4.7.2 to the valve outlet and by attaching either a thermocouple or thermometer of the type described in 4.7.1 to the cylinder wall. If a thermometer is used, the bulb shall be protected from alien temperatures by a fireproof insulating material secured by either spring clips or tape. The insulation shall not be applied between the bulb and the cylinder wall. The cylinder shall stand until it stabilizes at approximately room temperature. The cylinder valve shall be opened and the internal pressure observed on the gauge.

4.8.4 Purity. Samples shall be tested for purity in accordance with one of the following methods. In cases of dispute the nitrometer method in 4.8.4.1 shall be used as referee.

a. Nitrometer method in accordance with 4.8.4.1.

b. Volumetric or manometric gas absorption (Orsat type) analysis apparatus using a suitable oxygen absorbing reagent.

c. Paramagnetic type analyzer. The analyzer shall be calibrated (zeroed and spanned) at appropriate intervals by use of calibrated purity standards. The range shall be no greater than ten times the difference between the specified minimum percent oxygen and 100 percent. Thus, for 99.5 percent minimum oxygen the analyzer would have a maximum range of five percent impurity or from 95 percent to 100 percent oxygen.

d. Thermal conductivity type analyzer. The analyzer shall be calibrated (zeroed and spanned) at appropriate intervals by use of calibrated purity standards. The range shall be no greater than ten times the difference between the specified minimum percent oxygen and 100 percent. Thus, for 99.5 percent minimum oxygen the analyzer would have a maximum range of five percent impurity or from 95 percent to 100 percent oxygen.

e. Gas chromatograph method by determining the total aggregate of impurities. The impurities are expressed as volume percent and subtracted from 100 to obtain the percent oxygen value. This method may be used not only for the noble gases (inerts e.g., argon, krypton, and xenon) and nitrogen, but also for the determination of any of the other limiting gaseous compositions. The analyzer must be capable of separating and determining the composition with a sensitivity of 0.1 ppm or 20 percent of the specified maximum amount of the composition, whichever is greater. Appropriate impurity concentrating techniques may be used to attain the sensitivity.

#### 4.8.4.1 Nitrometer method.

4.8.4.1.1 Procedure. The test for purity shall be conducted by placing a sufficient quantity of mercury in a 100-mL calibrated nitrometer, provided with a two-way stopcock, a two-way outlet, and properly connected with a balancing tube. Connect one of the outlet tubes of the nitrometer with a gas pipette of suitable capacity. Place in the pipette a coil of copper wire that extends to the uppermost portion of the bulb, and add approximately 125 mL of ammonium chloride - ammonium hydroxide solution prepared in accordance with 4.8.4.1.2. Draw the solution (free from air bubbles) through the capillary and stopcock

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openings in the nitrometer by reducing the pressure in the nitrometer tube and opening the stopcock connection to the gas pipette. Close the stopcock. Having completely filled the nitrometer, the other stopcock opening, and the other intake tube with mercury, draw exactly 100 mL of oxygen into the nitrometer by reducing the pressure in the tube. Close the stopcock. Increase the pressure on the oxygen in the nitrometer tube, and open the stopcock connection to the gas pipette. Force the entire volume of gas into the pipette. Close the stopcock and rock the pipette gently, providing frequent contact of the liquid gas and the copper spiral. At the end of 15 minutes, most of the gas will have been absorbed by the liquid. At this time, to facilitate absorption of the last portion of the oxygen, draw some of the liquid into the nitrometer tube, and force the residual gas back upon the surface of the liquid in the gas pipette. Again, rock the pipette until no further decrease in the gas volume occurs. Draw the residual gas, if any, into the nitrometer tube and measure its volume. The volume of gas remaining undissolved shall not exceed 0.5 mL. If desired, the ammonium chloride - ammonium hydroxide solution may be used for leveling purposes.

4.8.4.1.2 Preparation of ammonium chloride - ammonium hydroxide. The test for purity requires the use of freshly prepared ammonium chloride - ammonium hydroxide solution (made by mixing 950 mL of water and 950 mL of concentrated ammonium hydroxide (27 percent), and saturating with 565 to 570 grams of ammonium chloride). This solution shall be aged by making five or six runs before taking test data for purity.

4.8.5 Moisture. Samples shall be tested for moisture content in accordance with one of the following methods. In cases of dispute the dew point method in 4.8.5b shall be used as a referee.

- a. Electrolytic moisture apparatus (hygrometer) on a range no greater than ten times the specified maximum moisture content.
- b. Dew point method in accordance with ASTM D 1142.
- c. Piezoelectric sorption hygrometer on a range no greater than ten times the specified maximum moisture content.
- d. Aluminum oxide capacitor-equipped analyzer on a range no greater than ten times the specified maximum moisture content.

4.8.6 Examination of packaging. Type I oxygen cylinders and Type II oxygen containers shall be examined to ensure that the packaging conforms to the applicable requirements of section 5.

## 5. PACKAGING

5.1 Shipping containers. The product furnished under this specification is a hazardous material regulated by the Department of Transportation. All containers shall comply with the requirements of Title 49, CFR 170 - 190 or DOT special permit (see 6.2 and 6.8).

5.2 Preparation of shipping containers. The contractor shall establish

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the condition of all containers and ensure that the requirements of 5.3 and 5.4 are met as applicable. Government owned containers shall be cleaned, tested, and repaired in accordance with the schedule established in the contract or purchase order (see 6.2). All containers shall be free from oils, greases, and other odorous or toxic impurities.

5.3 Gas cylinders. Cylinders to be filled with Type I oxygen shall be furnished or obtained as specified in the contract or order (see 6.2) and shall be processed prior to filling as specified in MIL-STD-1411.

5.3.1 Valves. Cylinder valves shall be inspected in accordance with MIL-STD-1411 for proper operation and damage. Any valves found damaged or otherwise unsatisfactory shall be repaired if only minor adjustments are required or replaced with a new valve. Valves shall conform to MIL-V-2/39.

5.3.2 Rejected cylinders. Government owned cylinders considered unsatisfactory for filling or refilling shall be processed as specified in the contract or purchase order (see 6.2). The disposition of other cylinders shall be the responsibility of the contractor.

5.3.3 Filling pressure. The cylinders shall be filled to a pressure within a range of 99 to 100 percent of a value selected from the applicable pressure temperature conversion chart. Selection of the above value shall be based on the rated service pressure stamped on the cylinders and the ambient temperature. The pressure - temperature conversion chart of NBS Technical Note 1079 shall be used. Cylinders having more than the maximum allowable filling pressure shall be discharged to within the acceptable range. Cylinders having less than the specified minimum filling pressure shall be recharged to within the acceptable range.

5.3.4 Leakage. No leakage shall be observed when filled cylinders are tested in accordance with MIL-STD-1411.

5.3.5 Rejected filled cylinders. Filled cylinders rejected because of impurity content shall be discharged to zero pressure and reprocessed in accordance with 5.3.

5.4 Liquid containers. Qualification, maintenance, and use of liquid containers (cryogenic tank trailers) shall conform to DOT requirements and as follows:

5.4.1 Cleaning. The contractor shall perform his usual inspection and cleaning to assure that the container is free from contamination and will not contaminate the liquid oxygen. Containers which have been used for other than liquid oxygen service shall be purged prior to loading with liquid oxygen. The contractor shall ensure that the container has sufficient insulation and vacuum for liquid oxygen shipment.

5.5 Labeling and marking. Each container shall be labeled and placarded in accordance with MIL-STD-129 and established DOT regulations or special permit. In addition, an identification tag, and container color code shall be used.

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5.5.1 Identification tag. Unless otherwise specified in the contract or purchase order, an identification tag impervious to climatic conditions shall be wired to the outlet port of each container and shall contain the following information: Product name, specification number with revision letter, type designation, National Stock Number (NSN), quantity, name of manufacturer, name of contractor (if different from manufacturer), date of manufacture, and lot identification number (see 6.2).

5.5.2 Cylinder color code. Unless otherwise specified by the procuring activity, each cylinder shall be color coded in accordance with MIL-STD-101 for Type I, and the exact name identification to be marked on the outside of the cylinders shall be "Oxygen, Aviator's." Any other name identification shall be obliterated by removing or overpainting.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The oxygen covered by this specification is intended for use in aircraft breathing oxygen systems.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, type and date of this specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. Method of shipment, type and capacity of container (see 5.1).
- d. When inspection requirements are to be performed by other than the supplier (see 4.1).
- e. The name and address of the laboratory to which the representative product specimen is to be submitted (see 4.3, 4.4 and 6.10).
- f. When variation in points of inspection are granted (see 4.5.1).
- g. When waiver on quality conformance tests on each sample is granted (see 4.5.1.1.1).
- h. When variation in sampling method is granted (see 4.5.3.4).
- i. When disposition of rejected product has to be specified (see 4.6).
- j. When cleaning and repair schedule is required for leased or Government owned containers (see 5.2).
- k. When instructions for disposition of rejected cylinders are required

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(see 5.3.2).

1. When cleaning and repair provisions are other than specified (see 5.3 and 5.4).

m. When identification tag is to be other than specified (see 5.5.1).

- \* **6.3 Consideration of data requirements.** The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
4.5	DI-ND:1-80604/T	Test Report	Delete all preparation instructions in block 10 except 10.2.3.3a, 10.2.6.4.2c, and 10.2.7.1.

The above DID was cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

**6.4 Material Safety Data Sheets.** Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

**6.5 Subject term (key word) listing.**

Code, Color  
Contaminant  
Cryogenic  
Cylinder  
Pressure, filling  
Solvent  
Spectroscopy, infrared  
Valve

**6.6 International standardization agreements.** Certain provisions of this specification are the subject of international standardization agreements ASCC STD 14/9 and NATO STANAG 3053. When amendment, revision, or cancellation of this specification is proposed that will modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels, including departmental standardization offices, to change the agreement or make other appropriate accommodations.

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6.7 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

6.8 Containers. As of the date of this specification, the following listed containers are considered acceptable for military use and approved for oxygen as specified by DOT:

6.8.1 Type I (Gaseous).

6.8.1.1 Cylinders of specifications DOT 3A, 3AA, 3AAX and 3E1800.

6.8.2 Samplers.

6.8.2.1 The sampler TTU-131/E for Type II oxygen identified in Table III is shipped in accordance with Department of Transportation exemption DOT-E 3004.

6.8.3.2 Samplers should be suitably packaged to protect them during shipment. Packagings should be inspected and those with large amounts of wear or damage should be replaced to ensure prompt shipment to and from the laboratory.

6.9 Price of services for Government-owned cylinders. The bidder's price for the gas should include the furnishing, at no additional cost, of all services which are required at each and every filling of a cylinder to comply with applicable regulations, specifications, and normal good practices. Such services shall include, but not be limited to inspection, testing, evacuation, and cleaning, and attaching Government-furnished warning tags, when required.

\* 6.10 Government laboratories. Laboratories perform tests on preproduction and periodic samples using the procedures in MIL-STD-1564. These laboratories also participate in the Air Force Aviator's Breathing Oxygen Correlation Program. Contracting officers may obtain a list of approved Government laboratories by contacting San Antonio ALC/SFTT, Kelly AFB TX 78241-5000.

6.11 Particulate contamination. Particulate matter may be introduced and accumulate during transfer and storage of oxygen. Recommend that users control particulate matter by the installation of filters in oxygen transfer lines.

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**Custodians:**

Navy - AS  
Air Force - 68

**Preparing Activity:**

Air Force - 68

(Project 6830-1006)

**Review activities:**

DLA - GS

**User activity:**

Army - ME

**Civil Agencies Coordinating Activities:**

GSA - FSS  
NASA - JFK