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SUPERSEDING
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MILITARY SPECIFICATION

OXYGEN SYSTEMS, PORTABLE, HIGH PRESSURE, AIRCRAFT

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

1. SCOPE

1.1 Scope. This specification covers requirements for aircraft high pressure portable oxygen systems, 1800 psi.

1.2 Classification. Portable oxygen systems shall be of the following types, as specified (see 6.2.1b):

Type I - For 295 cu. in. cylinder.
Type II - For 96 cu. in. cylinder.

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

WW-T-775	- Tube, Copper, Seamless (For Refrigeration and General Use).
PPP-B-601	- Boxes, Wood, Cleated - Plywood
PPP-B-621	- Box, Wood, Nailed and Lock Corner
PPP-B-636	- Boxes, Shipping, Fiberboard
PPP-B-640	- Boxes, Fiberboard, Corrugated, Triple Wall

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- MIL-P-116 - Preservation, Methods of.
- MIL-C-5501 - Caps and Plugs, Protective, Dust and Moisture Seal, General Specification for.
- MIL-B-22191 - Barrier Materials, Transparent, Flexible, Heat Sealable.
- MIL-L-25567 - Leak Detection Compound, Oxygen Systems.
- MIL-P-26514 - Polyurethane Foam, Rigid or Flexible, for Packaging.
- MIL-O-27210 - Oxygen, Aviator's Breathing, Liquid and Gas.
- MIL-T-27730 - Tape, Antiseize, Polytetrafluoroethylene, with Dispenser,
- MIL-C-81302 - Cleaning Compound, Solvent, Trichlorotrifluoroethane.
- MIL-T-81533 - 1,1,1 Trichloethane (Methyl Chloroform), Inhibited, Vapor Decreasing.
- MIL-H-81581 - Hose Assemblies, Breathing Oxygen and Air, General Specification for.

STANDARDS

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes,
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-130 - Identification Marking of U.S. Military Property.
- MIL-STD-143 - Standards and Specifications, Order of Precedence for the Selection of.
- MIL-STD-889 - Dissimilar Metals.
- MS22059 - Oxygen System, Portable, 295 Cu. In., High Pressure, Aircraft,
- MS22061 - Oxygen System, Portable, 96 Cu. In., High Pressure, Aircraft.

AIR FORCE - NAVY AERONAUTICAL

- AN780 - Nipple, Union.
- AN800 - Cone, Union.
- AN805 - Nut, Union.

(Copies of specifications, standards, drawings and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First Article. When specified (see 6.2.1c), a portable oxygen system shall be subjected to first article inspection and approval (see 4.3 and 6.3).

3.2 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

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3.3 Materials. Materials shall conform to applicable specifications and shall be as specified herein and on applicable drawings. Materials which are not covered by applicable specifications or which are not specifically described herein shall be of the best quality, of the lightest practicable weight and suitable for the purpose intended.

3.3.1 Metal arts. All metal parts shall be of a corrosion-resistant material or treated in a manner to render them adequately resistant to corrosion.

3.3.1.1 Dissimilar metals. Dissimilar metals, such as defined by MIL-STD-889, shall not be used in intimate contact with each other unless suitably protected against electrolytic corrosion with protective coatings.

3.3.2 Nonmetallic materials. Any nonmetallic material that is adversely affected by continued use with oxygen shall not be used.

3.3.3 Protective treatment. When materials are used in the construction of the system that are subject to deterioration when exposed to environmental conditions likely to occur during service usage, they shall be Protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. Protective coating which might crack, chip or scale during normal service life or under extremes of environmental conditions shall not be used.

3.4 Design and construction. The design and construction of the systems shall be in accordance with MS22059 or MS22061, as specified (see 6.2.1b).

3.4.1 Antiseize tape. Antiseize tape shall be used on all male pipe thread fittings. Antiseize tape shall conform to and shall be applied as specified in MIL-T-27730. Tape shall not be used on flare tube fittings, straight threads, coupling sleeves or on the outer side of tube flares. None of the tape shall be allowed to enter the inside of a fitting.

3.4.2 Degreasing. Prior to assembling, all internal surfaces of the system shall be degreased by flushing with a cleaning compound conforming to MIL-C-81302 or by using a vapor phase degreaser in accordance with MIL-T-81533. Components shall be cleaned by immersing, scrubbing or pressure spraying with MIL-C-81302 cleaning compound or ultrasonics may be used in conjunction with vapor decreasing or MIL-C-81302 cleaning compound. After completion of the cleaning and when assembled, a General Electric Type H leak detector or equivalent halide testing apparatus shall be used to determine the absence of the cleaning compound.

3.4.3 Line assembly. Tubing used in the line assembly shall conform to WW-T-775. Fittings used in the line assembly shall conform to AN780, AN800 and AN805.

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3.5 Performance.

3.5.1 Leakage. The system, when tested as specified in 4.6.2, shall not show any evidence of bubbles within two minutes after maximum operating pressure is obtained nor shall there be any change in pressure after the storage period.

3.5.2 Odor. The hose, when tested as specified in 4.6.3, shall not emit oxygen having any odor.

3.6 Cylinder charge requirement. The cylinder shall be kept charged to a maximum of 20 pounds per square inch gage (psig) with oxygen conforming to MIL-O-27210, type I. The cylinder valve shall be closed to retain the oxygen in the cylinder.

3.7 Interchangeability. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

3.8 Identification of product. The systems shall be marked for identification in accordance with MIL-STD-130, except that the national shock number shall be omitted from the nameplate.

3.9 Workmanship. The systems shall be uniform in quality and shall be free from irregularities, defects or foreign matter which could adversely affect safety, performance, reliability or durability.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements of the oxygen systems shall be classified as follows:

a. First article inspection. First article inspection consists of examinations and tests Performed on samples which are representative of the production item after award of a contract to determine that the production item meets the requirements of this specification (see 4.3).

b. Quality conformance inspection. Quality conformance inspection consists of examinations and tests performed on individual products or lots to determine conformance of the products or lots with the requirements set forth in this specification (see 4.4).

4.3 First article inspection. First article inspection shall consist of all the tests and examinations of this specification.

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4.3.1 First article samples. Unless otherwise specified, as soon as practicable after the award of a contract or order, the manufacturer shall submit two systems of each type specified in the contract or order. The samples shall be representative of the construction, workmanship, components and materials to be used during the production. When a manufacturer is in continuous production of these systems from contract to contract, submission of further first article samples may be waived at the discretion of the acquiring activity (see 6.2.1c). Approval of the first article samples or the waiving of the first article inspection does not exclude the requirements of submitting to the quality conformance inspection. The first article samples shall be furnished to the Government as directed by the contracting officer (see 6.2.1c).

4.3.1.1 First article information. Upon completion of the first article inspection, all the applicable inspection reports and, when applicable, recommendations and comments pertinent for use in monitoring production will be forwarded to the cognizant Government activity. One approved system will be returned to the manufacturer for use in monitoring production. The other sample may be consumed or destroyed in the first article inspection and shall not be considered as part of the quantity to be delivered under contract,

4.4 Quality conformance inspection. The sampling and inspection levels shall conform to MIL-STD-105. The quality conformance inspection shall consist of the following examinations and tests:

- Visual examination
- Dimensions
- Leakage
- Odor
- Packaging

4.4.1 Sampling.

4.4.1.1 Inspection lot.

4.4.1.1.1 Oxygen system. An inspection lot size shall be expressed in units of one oxygen system made under essentially the same conditions and from the same materials and components. The sample unit shall be one oxygen system.

4.4.1.1.2 Packaging. An inspection lot size shall be expressed in units of one fully prepared shipping containers containing oxygen systems of one type, fully prepared for delivery from essentially the same materials and components. The sample unit shall be one shipping container, containing oxygen systems of one type, fully prepared for delivery with the exception that it need not be sealed.

4.4.1.2 Sampling for tests and examinations of the oxygen systems. The sample size, acceptance criteria, tests and examinations required for the oxygen systems shall be as specified in table I.

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4.5 Test conditions.

4.5.1 Gas. Unless otherwise specified, the gas used in testing the oxygen system shall be oxygen conforming to MIL-O-27210, type I.

4.5.2 Temperature and pressure. Unless otherwise specified, tests shall be conducted at local ambient temperature and barometric pressure. The temperature and barometric pressure shall be recorded at the time of inspection and, when required, the test results shall be corrected to normal temperature and pressure (NTP) conditions. NTP conditions are 29.92 inches of mercury (101.3kPa) and 70°F (21°C). Test instruments shall be calibrated or adjusted according to their required usage in conducting individual tests.

4.6 Inspection methods.

4.6.1 Visual examination.

4.6.1.1 Oxygen system. Every oxygen system shall be examined visually for critical defects to determine conformance to this specification. Each oxygen system, selected as a sample unit from the lot, shall be examined visually for minor defects to determine conformance to this specification. The classification of defects, table II, shall be used to classify the defects found.

4.6.1.1.1 Dimensions. The oxygen system shall be checked dimensionally to determine conformance to the dimensions specified in MS22059 or MS22061, as applicable.

4.6.1.1.2 Packaging. Each of the fully prepared shipping containers, containing oxygen systems of one type, selected as a sample unit from the lot, shall be examined to determine that the packaging, packing and marking conform to this specification. The list of defects, table III, shall be used to enumerate the defects found.

4.6.2 Leakage. The cylinder shall be charged to maximum operating pressure and the cylinder valve opened. The "on-off" mechanism of the regulator shall be placed in the "off" position for this test. Leak test compound conforming to MIL-L-25567 shall be applied to all connections, except regulator outlet, and any areas of potential leaks, to check system leakage. Upon completion of this test procedure, the cylinder shall be allowed to reach room temperature, the cylinder valve closed and the pressure gage shall be marked. The system shall then be stored for a 6 hour period. After this period, the reading on the pressure gage shall be noted. The system shall meet the performance requirements specified in 3.5.1.

4.6.3 Odor. The hose shall be subjected to the odor test specified in MIL-H-81581 and shall pass the requirements specified in 3.5.2.

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5. PACKAGING.

5.1 Preservation. Preservation shall be level A or C, as specified (see 6.2.1d).

5.1.1 Level A. Unless otherwise specified, each oxygen system shall be cleaned for oxygen service in accordance with industry practice and 3.4.2. All threaded ports and orifices which are not otherwise protected by permanently attached, captive caps or plugs, shall be sealed off by rigid plastic fittings only, conforming to MIL-C-5501 or commercial equivalent, Directly after cleaning oxygen systems, each assembly shall be individually packaged in accordance with Method IC-1 of MIL-P-116, using barrier material conforming to MIL-B-22191, Type II. Each assembly shall be cushioned with a minimum of two inches of prefoamed, molded polyurethane pads (i.e. top and bottom pads) conforming to MIL-P-26514, Type I, Class 2 or other similar cushioning material capable of fully supporting all surfaces of the unit container. Each cushioned oxygen system shall then be packaged in a PPP-B-636 weather-resistance class fiberboard box, Type CF, Grade V3c or V3s, style RSC. Closure of the container shall be according to applicable procedures for style RSC in the appendix to PPP-B-636.

5.1.2 Level C. Each oxygen system shall be packaged in a manner that will afford adequate protection against contamination and physical damage during shipment. As a minimum, all threaded ports and orifices which are not otherwise protected by permanently attached captive caps shall be capped by rigid plastic fittings only, conforming to MIL-C-5501 or commercially equivalent plastic caps, fittings, etc.

5.2 Packing. Packing shall be Level A, B or C, as specified (see 6.2.1d). As far as practicable, containers shall be of minimum tare and cube consistent with the type and class of container specified.

5.2.1 Level A. Eight oxygen systems, packaged as specified in 5.1.1 shall be packed in a wooded box conforming to PPP-B-621, Class 2, or PPP-B-601, overseas type.

5.2.2 Level B. Eight oxygen systems, packaged as specified in 5.1.1 shall be packed in wooden boxes conforming to PPP-B-621, Class 1, PPP-B-601, domestic type, or PPP-B-640, Class 1. Non-metallic strapping as specified in PPP-B-640 shall be used to reinforce fiberboard containers.

5.2.3 Level C. Oxygen systems shall be packed in a manner to insure safe transportation to point of delivery and shall meet the requirements of the carrier utilized.

5.3 Marking. Unless otherwise specified (see 6.2.1g), marking shall be in accordance with MIL-STD-129.

5.3.1 Precautionary marking. The following precautionary marking shall appear on each unit package:

**"CAUTION: DO NOT ALLOW CONTAMINANTS OF ANY KIND
TO BE USED ON OR ABOUT PORTABLE OXYGEN SYSTEMS."**

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6. NOTES

6.1 Intended use. The aircraft high pressure portable oxygen systems covered by this specification are intended to supply respirable oxygen or air-oxygen mixture to the user.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Type of portable oxygen system required (see 1.2 and 3.4).
- c. Whether first article inspection is required and where the sample should be redelivered (see 4.3.1 and 6.3).
- d. Selection of applicable levels of preservation, packaging and packing required (see 5.1 and 5.2).
- e. Applicable methods of cleaning and preservation,
- f. Items of data required (see 6.2.2).
- g. Whether any special markings are required (see 5.3).
- h. Whether QPL's are applicable for the cylinder, valve, regulator and hose assembly,

6.2.2 Data Requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DAR 7-104.9(n)(2) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs:

<u>Paragraph</u>	<u>Data requirements</u>	<u>Applicable DID</u>
4.3.1.1	First article inspection reports	DI-T-5329-inspection test reports

(Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the acquiring activity or as directed by the contracting officer.)

6.3 First article. When a first article inspection is required, the item will be tested and should be a first article sample. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, test and approval of the first article.

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6.4 International standardization. Certain provisions of this specification are the subject of international standardization agreement ABC-AIR-STD 14/5 "Walk-Around Oxygen Sets." When amendment, revision or cancellation of this specification is proposed, the department custodians will inform their respective Departmental Standardization offices so that appropriate action may be taken respecting the international agreement concerned.

6.5 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Army - AV

Navy - AS

Preparing activity:

Navy - AS

(Project No. 1660-0387)

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TABLE I. Sample size, acceptance criteria, tests and examination of the oxygen systems.

Inspection	Method	Sample size	Acceptance criteria
Visual examination (See classification of defects)	4.6.1.1	Every oxygen system for critical defects. Inspection level II for minor defects.	Reject all units with any critical defect. An acceptable quality level of 2.5 defects per hundred units for minor defects.
Dimensions	4.6.1.1.1	Inspection level S-2	Acceptance number zero, rejection number 1.
Leakage	4.6.2	Every oxygen system	Reject all defective units.
Odor	4.6.3	Every oxygen system	Reject all defective units.
Packaging	4.6.1.2	Inspection level S-2	Total acceptable quality level of 4.0 percent defective.

TABLE II. Classification of defects for visual examination of the oxygen system.

Critical	Minor
<ol style="list-style-type: none"> 1. Material imperfections - foreign matter embedded 2. Surface - unclean, rough, mis-aligned or contains cracks, nicks or other flaws. 3. Any component missing, malformed, fractured or otherwise damaged. 4. Any component loose or otherwise not securely retained. 5. Incorrect assembling or improper positioning of components. 6. Any functioning part that works with difficulty. 7. Faulty workmanship or other irregularities. 	<ol style="list-style-type: none"> 201. Marking-missing, insufficient, incorrect, illegible or not permanent.