

MIL-C-83960
15 April 1971

MILITARY SPECIFICATION
CYLINDER, OXYGEN PURIFIER

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

1. SCOPE

1.1 Scope. This specification covers the requirement for one type of oxygen purifier cylinder.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

O-T-634
TT-I-735
TT-N-95
PPP-B-636

Trichlorethylene, Technical
Isopropyl Alcohol
Naphtha, Aliphatic
Box, Fiberboard

Military

MIL-P-116
MIL-C-26058

Preservation, methods of
Cartridge, Gas Purifier, Extremely
Low Dewpoint, Type MA-2

STANDARDS

Military

MIL-STD-105
MIL-STD-129
MIL-STD-130
MIL-STD-143

Sampling Procedures and Tables for
Inspection by Attributes
Marking for Shipment and Storage
Identification Marking of US Military
Property
Specifications and Standards, Order of
Precedence for the Selection of

DRAWINGS

Air Force

7032094

Cylinder, Assembly, Oxygen Purifier

FSC 4440

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

3. REQUIREMENTS

3.1 Preproduction. This specification makes provisions for preproduction testing.

3.2 Components. The cylinder shall consist of all the components shown on drawing 7032094 and associated drawings.

3.3 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.

3.4 Materials. Unless otherwise specified, materials shall be as specified on drawing 7032094 and associated drawings.

3.4.1 Packing. O-ring seals shall be in accordance with the configuration and design of AN 6227. The material shall be suitable for use with oxygen and shall pass the seal material oxygen compatibility test specified in 4.7.6.

3.5 Design and construction. The cylinder shall be designed for working pressures of 5,000 pounds per square inch guage (psig) and burst pressures of not less than 20,000 psig as specified on Drawing 7032094 and associated drawings.

3.5.1 Cleaning and degreasing.

3.5.1.1 Cleaning and degreasing prior to final assembly. After testing, the cylinder body, cap head assembly without pressure seals, perforators, and all other metal parts shall be cleaned and degreased before final assembly. All traces of oils, waxes, greases, or other contaminants which could present a health, odor, or safety hazard when the cylinder is pressurized to 5,000 psi with 99.5 percent purity gaseous oxygen shall be removed. Cleaning and degreasing shall be accomplished by one of the following or equally effective methods.

3.5.1.1.1 Method A. A vapor degreasing method with trichloroethylene conforming to Q-T-634 shall be used. The cylinder and parts shall be blown clean and dry with a stream of clean, dry, oil-free air or nitrogen until all traces of the trichloroethylene fluid have been removed.

3.5.1.1.2 Method B. The cylinder and parts shall be flushed with naphtha conforming to TT-N-95 and blown clean and dry of all solvent with oil-free air. All parts shall then be flushed with fluid conforming to TT-I-735 or anhydrous ethyl alcohol and rinsed thoroughly with fresh, clean water. Following this, all parts shall be thoroughly dried with a stream of clean, dry, oil-free air.

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3.5.1.1.3 Method C. The cylinder and parts shall be flushed with a hot, inhibited, alkaline cleaner until all traces of foreign matter have been removed and thoroughly rinsed with clean water and then thoroughly dried with a stream of clean, dry, oil-free air.

3.5.1.1.4 Final assembly. The pressure seals shall be incorporated after the cylinder components are clean and dry to preclude the possibility of the cleaning fluid reacting with the pressure seals. Following component inspection for cleaning effectiveness and final assembly, the inlet and outlet ports shall be closed with removable plugs or caps to prevent the entry of contaminants.

3.6 Identification of product. Each cylinder shall be marked for identification in accordance with MIL-STD-130 as specified for an assembly.

3.6.1 Additional marking. Additional marking shall be provided to specify that the type MA-2 Cartridge, conforming to MIL-C-26058, is to be used in the cylinder.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 tests. The inspection testing of cylinders shall be classified as follows:

- a. Preproduction tests
- b. Acceptance tests

4.3 Preproduction testing.

4.3.1 Test samples. The preproduction test samples shall consist of four complete cylinder assemblies.

4.3.2 Preproduction tests. The preproduction tests shall consist of all the tests described under 4.6 and 4.7. The burst test (4.7.5) shall be performed on the following:

- a. Two samples after all other tests are completed
- b. Two samples after all other tests excluding the cycling test (4.7.4) are completed.

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4.4 Acceptance tests. Acceptance tests shall consist of:

- a. Individual tests
- b. Sampling plans and tests

4.4.1 Individual tests. Each cylinder shall be subjected to the following tests as described under paragraphs 4.6 and 4.7:

- a. Examination of Product
- b. Material Hardness Examination
- c. Hydrostatic Pressure
- d. Cleaning Effectiveness

4.4.2 Sampling plans and tests.

4.4.2.1 Lot. A lot shall consist of cylinders manufactured under essentially the same conditions and submitted for inspection at substantially the same time.

4.4.2.2. Sampling plan. Sampling plan test samples shall be selected in accordance with inspection level S-2 of MIL-STD-105 and shall be subjected to the following test as described under paragraph 4.6 and 4.7:

- a. Dimensional Examination
- b. Cylinder Leakage
- c. Cartridge to Cylinder Seal
- d. Cycling
- e. Burst Pressure

4.4.3 Rejection. A sample failing to pass any examination or test shall be cause for rejection of the lot.

4.5 Test conditions.

4.5.1 Pressure measurements. Pressures shall be recorded in pounds per square inch gauge (psi).

4.5.2 Preparation for test. The cylinder shall be prepared for testing as required by the specific test instructions.

4.5.3 Observations. During the progress of all tests, the performance of the cylinder shall be observed to determine the degree of compliance with all requirements specified herein.

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4.5.4 Test data. Test data shall be recorded as required under the specific tests.

4.5.4.1 Tolerance. The tolerance on pressure readings shall be accurate to within 2 percent of the numerical figure recorded.

4.6 Examinations.

4.6.1 Examination of product. The cylinder shall be examined to determine compliance with the requirements specified herein with respect to materials, workmanship, finishes, and marking.

4.6.2 Dimensional examination. The cylinder shall be examined to determine dimensional compliance with drawing 7032094.

4.6.3 Material hardness examination. The materials hardness shall be within the range specified on the applicable drawings. Materials harder or softer than those specified shall be cause for rejection.

4.7 Test methods.

4.7.1 Cylinder leakage. With the outlet (upper port) of the cylinder plugged, the cylinder (without mounting brackets or cartridge inserted) shall be pressurized to 5,000 psig with clean, dry, oil-free air or nitrogen. The cylinder shall be submerged in water for a minimum of 5 minutes to check for leakage. A definite continuous forming and breaking away of air bubbles from definite points on the surface of the cylinder shall be an indication of leakage and cause for rejection. Presence of bubbles clinging to the surface of the cylinder or occasional formation of bubbles due to escape of air trapped within threads shall not be considered cause for rejection.

4.7.2 Hydrostatic pressure. The cylinder shall be hydrostatically pressurized to 7,500 psi and inspected for leaks or damage. Water shall be used for pressurization.

4.7.3 Cartridge-to-cylinder seal. With the bottom perforator blade removed, a cartridge or can conforming to MIL-C-26058 shall be inserted in the cylinder, using an appropriate spacer or shims so that the cartridge is in its proper position in the cylinder. The cap shall then be tightened and the cylinder pressurized with clean, dry, oil-free air or nitrogen alternately from each connection to not less than 15 psig and held at this pressure for 5 minutes. No leakage shall result past the cartridge-to-cylinder seal in either direction. A definite forming and breaking away of air or nitrogen bubbles as a result of leakage from either connection as determined by a connected tube with the free end submerged in a beaker of water shall be cause for rejection.

4.7.4 Cycling. The cylinder shall be cycled 1,000 times from 0 to 5,000 psig hydrostatically. One cycle constitutes pressurization from 0 psig to 5,000 psig and reduce to 0 psig.

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4.7.5 Burst pressure. The cylinder shall be hydrostatically pressurized until failure. Failure occurring at a pressure less than 20,000 psi shall be cause for rejection. A special cap-to-body seal, such as a high-durometer O-ring or suitable backup ring may be used for this test.

4.7.6 Seal material oxygen compatibility. One-half gram of the material to be tested shall be placed in a reaction chamber. The temperature of the reaction chamber shall be raised to $+160^{\circ} \pm 2^{\circ}$ F, and maintained at this temperature for 10 minutes. At the end of 10 minutes, a pressure of 2,000 psig of 99.5% purity gaseous oxygen shall be applied instantaneously. The applied temperature and pressure shall be maintained at a constant level for 5 minutes. At the end of this interval, the pressure shall be released and reapplied instantaneously. A sudden rise of more than 77° F during application of pressure or a discoloration or change in appearance of the sample under test shall be considered evidence of combustion and shall constitute failure of this test.

4.7.7 Cleaning effectiveness.

4.7.7.1 Visual inspection. During and after assembly, the cylinder components shall be visually examined for evidence of corrosion products, metal chips, scale, oil, grease, paints, preservatives, decals, or other contamination or foreign matter. Any evidence of contamination or foreign matter shall require recleaning and retest.

4.7.7.2 Ultraviolet light inspections. All cylinder surfaces and component parts that will contact the gas flowing through the cylinder shall be visually inspected for hydrocarbons with ultraviolet light. With all assemblies and subassemblies complete and with pressure seals installed, all parts and surfaces of the cylinder body and cap that will contact the gas flow shall again be visually inspected for hydrocarbons with ultraviolet light. Evidence of fluorescence during either inspection shall require recleaning and retest.

4.8 Inspection of preparation for delivery. Preservation, packaging, packing, and marking shall be inspected to determine conformance to the requirements of section 5.

5. PREPARATION FOR DELIVERY

5.1 Preservation and Packaging. Preservation and packaging shall be Levels A or C as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Cleaning and Drying. The cylinder shall be thoroughly cleaned and dried in accordance with the requirements as specified in Para. 3.5.1 which will insure that all parts are clean and free of oils and any of these foreign matter that might adversely affect the operation of the cylinder.

5.1.1.2 Preservation and Packaging. The cylinder shall be packaged, one each, Method 1A without contact preservation in accordance with Specification MIL-P-116, and placed in a snug fitting container conforming to Specification

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PPP-B-636 overseas type. Closure of container shall be in accordance to the specification and appendix thereto.

5.1.2 Level C.

5.1.2.1 Cleaning and Drying shall be as specified in Para. 5.1.1.1.

5.1.2.2 Packaging shall be in accordance with the manufacturers commercial process required to provide protection from deterioration and damage during shipment to the initial receiving activity.

5.2 Packing.

5.2.1 Packing shall be levels A, B or C, as specified (see 6.2). Shipping container insofar as practical shall be uniform in size and shape and of minimum cube and tare weight consistent with protection required and shall contain identical quantities.

5.2.1.1 Level A. Cylinder preserved and package as specified in paragraph 5.1 shall be packed six each in an overseas type container conforming to Specification PPP-B-636 and sealed in accordance with the specification and appendix thereto.

5.2.1.2 Level B. Same as paragraph 5.2.1.1 except container shall be domestic type, and closure shall be in accordance with requirements for domestic container.

5.2.1.3 Level C. Packages which require overpacking for acceptance by carrier shall be packed in a shipping container in a manner that will insure safe delivery at the lowest transportation rate. Container shall meet consolidated freight rules and regulations or other rules and regulations applicable to the mode of transportation.

5.3 Marking.

5.3.1 Unit packs, interior and exterior containers shall be marked in accordance with MIL-STD-129, and Para. 3.6.1.

6. NOTES

6.1 Intended use. The cylinder covered by this specification is intended for use with the type MA-2 extremely low dewpoint gas purifier cartridge in dehydrating high-pressure oxygen, hydrogen, helium, or nitrogen gases during ground servicing of aircraft or missile gas systems.

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6.2 Ordering Data.

- a. Title, number and date of this specification.
- b. Applicable levels of preservation, packaging and packing (see 5.1).

Custodian:
Air Force - 84

Preparing activity:
Air Force - 84

User:
Army - ME, AV

Project No. 4440-0020

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
<p align="center">INSTRUCTIONS</p> <p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.</p>		
SPECIFICATION		
ORGANIZATION		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT \$
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES" IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE