

INCH-POUND

MIL-PRF-26626E

23 June 19998

SUPERSEDING

MIL-H-26626D

1 NOVEMBER 1994

MS24548J

1 MAY 1995

PERFORMANCE SPECIFICATION

HOSE ASSEMBLY, REINFORCED, CRYOGENIC, OXYGEN

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

1. SCOPE

1.1 Scope. This specification covers reinforced cryogenic oxygen hose assemblies with flared tube style fittings.

1.2 Size. This specification covers hose assemblies with internal diameters and lengths as identified in the table on figure 1 (see 6.2 and 6.10).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are cited in sections 3 and 4 of this specification. These lists do not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of these lists, document users are cautioned that they must meet the requirements specified in the documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: Oklahoma City Air Logistics Center/TICLA, 3001 Staff Drive, Suite 1AE1-101A, Tinker AFB, OK 73145-3036, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
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2.2 Government documents.

2.2.1 Specifications and standard. The following specifications and standard form a part of this document to the extent specified herein. Unless otherwise specified, the applicable issues of these documents are those listed in the specific issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

QQ-S-763	Steel Bars, Wire, Shapes, and Forgings; Corrosion Resistant
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DEPARTMENT OF DEFENSE

AN818	Nut, Tube Coupling, Short
MIL-G-27617	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant

STANDARD

DEPARTMENT OF DEFENSE

MS21344	Fittings - Installation of Flared Tube, Straight Threaded Connectors, Design Standard for
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(Unless otherwise indicated, copies of the above specifications and standard are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the applicable issues of the documents which have been adopted by the DoD are those listed in the specific issue of the DoDISS cited in the solicitation. Unless otherwise specified, the documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE/AMERICAN SOCIETY FOR QUALITY CONTROL (ANSI/ASQC)

ANSI/ASQC Z1.4	Sampling Procedures and Tables for Inspection by Attributes (DoD-adopted)
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(Application for copies should be addressed to American Society for Quality Control, P.O. Box 3066, Milwaukee, WI 53201-3066, or to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus (DoD-adopted)
ASTM D1149	Standard Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber (DoD-adopted)

(Application for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AS 1065	Quality & Serviceability Requirements for Aircraft Cylinder Assemblies Charged With Aviator's Breathing Oxygen
SAE AS 4395	Fitting End-Flared Tube Connection, Design Standard (DoD-adopted)
SAE AS 8010	Aviator's Breathing Oxygen Purity Standard
SAE AS 8879	Screw Threads - UNJ Profile, Inch

(Application for copies should be addressed to Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 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 Qualification. The hose assemblies furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle cost.

3.3 Materials. All materials shall be suitably treated to resist corrosion due to electrolytic decomposition, salt fog, and any other atmospheric condition that may be encountered during

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operational use or storage. The use of toxic chemicals, hazardous substances, or ozone depleting chemicals shall be avoided, whenever feasible.

3.3.1 Safety specific materials. All materials used shall be capable of operating safely in a pure oxygen environment without creating health or fire hazards (see 6.9).

3.3.2 Ozone resistance. Elastomers and inner lining materials shall be ozone resistant.

3.3.3 Lubricants. Lubricants, if used, shall meet the requirements of MIL-G-27617. These lubricants shall be used only on sealing surfaces, such as the threads of the AN818 coupling nut (see 6.8).

3.4 Interface.

3.4.1 End fittings. Flared fitting inserts shall conform to SAE AS 4395 and shall be constructed of material conforming to QQ-S-763, Classes 304 or 316. Coupling nuts shall conform to AN818 (see figure 1). End fittings shall be permanently attached to the hose assembly (see 6.6 and 6.9).

3.4.2 Insert retainer. The insert retainer, if used, shall conform to the tolerances on figure 1.

3.4.3 Threads. All threads shall conform to SAE AS 8879, except the maximum pitch diameter may be exceeded by 10 percent.

3.5 Performance.

3.5.1 Dimensions. The hose assembly shall conform to the dimensions shown in figure 1.

3.5.2 Inner liner. The hose inner liner, if used, shall be seamless and smooth bored (see 6.5 and 6.7).

3.5.3 Proof pressure. The hose assembly shall withstand a proof pressure of 1,000 psig. The leak rate shall be less than 2 cubic centimeters (cm^3) per minute (see 6.9).

3.5.4 Burst pressure. The hose assembly shall withstand a hydrostatic pressure of 2,200 psig. The leak rate shall be less than 2 cm^3 per minute (see 6.9).

3.5.5 Ultimate tensile strength. The hose assembly shall not break when subjected to a tensile load of 300 pounds.

3.5.6 High temperature. The hose assembly shall withstand exposure to $260^\circ \pm 5^\circ\text{F}$ for 48 hours (see 5.2).

3.5.7 Low temperature. The hose assembly shall withstand exposure to $-65^\circ \pm 5^\circ\text{F}$ for 48 hours.

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3.5.8 Low temperature bending. After being exposed to liquid oxygen for 15 minutes and then to $-65^{\circ} \pm 5^{\circ}\text{F}$ for 30 minutes, the hose assembly shall withstand 180° bending.

3.5.9 Low temperature vibration. With liquid oxygen maintained in the hose assembly, the hose assembly shall be subjected to a vibration at a double amplitude of 0.06 inch and a frequency changing from 10 to 50 to 10 Hz.

3.5.10 Odor. The hose assembly shall be odorless.

3.5.11 Cleanliness. The hose assembly surfaces shall be free of contaminants such as rust, scale, dirt, paints, oils, hydrocarbons, and cleaning compounds.

3.5.12 Identification. The hose assembly shall be permanently and legibly marked with the following data (see 6.2).

- a. Nomenclature.
- b. Cure date.
- c. Specification.
- d. PIN.
- e. Manufacturer's CAGE code.
- f. Manufacturer's part number.

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

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification (see 4.2).
- b. Conformance (see 4.3).

4.2 Qualification inspection. Qualification inspection shall consist of subjecting six hose assemblies to all the tests specified in 4.6.

4.3 Conformance inspection. Conformance inspection shall include the individual tests in 4.3.1 and the sampling tests in 4.3.2.

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4.3.1 Individual tests. Each hose assembly shall be subjected to the following tests:

- a. Examination (see 4.6.1).
- b. Proof pressure (see 4.6.2).

4.3.2 Sampling tests. Sampling tests shall be performed in accordance with the guidance in ANSI/ASQC Z1.4. Sampling shall begin at the normal inspection level. The sampling tests are:

- a. Low temperature bending (see 4.6.7).
- b. Odor (see 4.6.9).
- c. Cleanliness (see 4.6.10).

4.4 Test conditions. Unless otherwise specified herein, all tests shall be performed in accordance with the test conditions specified below:

- a. Tests shall be performed at ambient atmospheric conditions.
- b. Tests shall be performed with oxygen conforming to SAE AS 8010.
- c. The torque applied to the AN818 nuts of the hose assembly shall be in accordance with MS21344.

4.5 Requirements cross-reference matrix. Table I provides a cross-reference matrix of the section 3 requirements tested or verified in the paragraphs below.

TABLE I. Requirements cross-reference matrix

Requirement	Verification	Requirement	Verification
3.1	4.2	3.5.3	4.6.2
3.2	4.6.1	3.5.4	4.6.3
3.3	4.6.1, 4.6.11	3.5.5	4.6.4
3.3.1	4.6.1, 4.6.8, 4.6.9	3.5.6	4.6.5
3.3.2	4.6.12	3.5.7	4.6.6
3.3.3	4.6.1	3.5.8	4.6.7
3.4.1	4.6.1	3.5.9	4.6.8
3.4.2	4.6.1	3.5.10	4.6.9
3.4.3	4.6.1	3.5.11	4.6.10
3.5.1	4.6.1	3.5.12	4.6.1
3.5.2	4.6.1	3.6	4.6.1

4.6 Tests.

4.6.1 Examination. The hose assembly shall be examined to determine that the materials, interface, dimensions, inner liner, identification, and interchangeability conform to this specification.

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4.6.2 Proof pressure. The hose assembly shall be pressurized to 1,000 psig and the leak rate shall be less than 2 cm^3 per minute.

4.6.3 Burst pressure. The hose assembly shall be hydrostatically pressurized to 2,200 psig. While at this pressure, the leak rate shall be less than 2 cm^3 per minute and there shall be no loosening of the end fittings.

4.6.4 Ultimate tensile strength. The hose assembly shall be attached by the end fittings and a tensile force shall be applied at a rate of 1 inch per minute until failure. The hose assembly shall not break at 300 pounds or less.

4.6.5 High temperature. Six hose assemblies shall be coupled together, end-to-end, and pressurized to 500 psig. The hose assemblies shall be exposed to a temperature of $260^\circ \pm 5^\circ\text{F}$ for 48 hours. After returning to room temperature, the static pressure remaining shall not be less than 100 psig. The coupled hose assemblies shall then be subjected to the proof pressure test.

4.6.6 Low temperature. Six hose assemblies shall be coupled together, end-to-end, and pressurized to 500 psig. The hose assemblies shall be exposed to a temperature of $-65^\circ \pm 5^\circ\text{F}$ for 48 hours. After returning to room temperature, the static pressure remaining shall not be less than 100 psig. Liquid oxygen shall then be passed through the coupled hose assemblies at a pressure of 25 ± 5 psig for a period of not less than 5 minutes, and there shall be no evidence of leakage. The coupled hose assemblies shall then be subjected to the proof pressure test.

4.6.7 Low temperature bending. The hose assembly shall be subjected to liquid oxygen for not less than 15 minutes and then subjected to a temperature of $-65^\circ \pm 5^\circ\text{F}$ for not less than 30 minutes. While at this temperature, the hose assembly shall undergo 5 bending cycles allowing 4 seconds per cycle. One cycle consists of bending the hose assembly 180° around a mandrel, also at $-65^\circ \pm 5^\circ\text{F}$, then bending it 180° in the opposite direction, and then returning the hose assembly to a straight position. The mandrel shall be 8 inches in diameter except for the -5 hose assembly, which shall use a mandrel with a 6 inch diameter. The hose assembly shall then be subjected to the proof pressure test.

4.6.8 Low temperature vibration. The hose assembly shall have a bend in the plane of vibration with a radius dimensionally equal to the mandrel diameter specified in 4.6.7. With one end of the hose assembly fixed and liquid oxygen maintained in the hose assembly, the hose assembly shall be vibrated with a double amplitude of 0.06 inch for at least 3 hours. The frequency shall be changed from 10 to 50 to 10 Hz at a constant rate. The hose assembly shall then be subjected to the proof pressure test.

4.6.9 Odor. Gaseous oxygen conforming to SAE AS 8010 shall be flowed through the hose assembly at 10 liters per minute for 2 minutes and then the hose assembly shall be tested for odor in accordance with SAE AS 1065.

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4.6.10 Cleanliness. The hose assembly shall be free of contaminants such as rust, scale, dirt, paints, oils, hydrocarbons, and cleaning compounds. Cleanliness shall be demonstrated by industrially accepted test methods and these test methods shall be identified (see 6.2 and 6.4).

4.6.11 Corrosion. With the ends plugged, the hose assembly shall be subjected to the salt fog test specified in ASTM B117 for 50 hours. The hose assembly shall be examined for corrosion and subjected to the proof pressure, burst pressure, odor, and cleanliness tests.

4.6.12 Ozone resistance test. Samples of elastomer and inner liner materials shall be tested in accordance with ASTM D1149 (see 6.6). The test samples shall be elongated 20%, placed in an ozone free atmosphere for 24 hours, and then subjected to an ozone environment. The temperature shall be $100^{\circ} \pm 5^{\circ}\text{F}$, an ozone concentration of 120 ± 1 parts per million by volume, and the air velocity across the sample shall be at least 2 feet per second. The material shall be exposed to these conditions for 60 minutes. The test slabs shall be examined under 10X magnification for evidence of damage such as blooming, checking, or cracking.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department or Defense Agency automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The hose assembly covered by this specification is intended to be used with aircraft gaseous or liquid oxygen systems.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of the DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2 and 2.3).
- c. Size (see 1.2).
- d. Item identification (see 3.5.12 items a, c, and d).
- e. The requirement for the vendor to identify proposed cleaning methods (see 4.6.10).
- f. Packaging requirements (see 5.1).
- g. Data required.

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6.3 Qualification. The attention of the contractors is called to the requirements with respect to products requiring qualification. Awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the Qualified Products List (QPL No. 26626) whether or not such products have actually been listed by that date. In order that the manufacturers may be eligible to be awarded contracts or purchase orders for the products covered by this specification, they are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification. Information pertaining to qualification of products may be obtained from Oklahoma City Air Logistics Center/TICLA, 3001 Staff Drive, Suite 1AE1-101A, Tinker AFB, Oklahoma 73145-3036.

6.4 Cleaning. Cleaning methods identified in MIL-STD-1359 may be used for guidance.

6.5 Construction. Previous manufacturers on the QPL used tetrafluoroethylene in construction of the inner liner. If a compound of tetrafluoroethylene and other ingredients is used in the formulation of the inner liner material, both the added ingredients and the final compound should be non-toxic and odor free in the presence of oxygen over the temperature range of -297° to +260°F.

6.6 Materials. Material certification sheets have been used to validate material requirements.

6.7 Toxicological formulations. The contractor should have the toxicological formulations and associated information available for review to evaluate the safety of the material for the inner liner.

6.8 Lubrication. The previously used lubricant has been Christo-lube. The quantity of lubricants used did not exceed that required to generate a thin film. No lubricants, other than water, were used in assembly.

6.9 Definitions.

- a. Burst pressure. The burst pressure is the greatest applied internal pressure to which the hose assembly can be subjected before ultimate strength is exceeded.
- b. Health hazards. Materials such as cadmium, lead, and polyvinyl chloride can be susceptible to outgasing in the presence of pure oxygen and at elevated temperatures. Outgasing by these and many other materials when used in breathing oxygen equipment are potential health hazards.
- c. Hose assembly. The hose assembly is the seamless tetrafluoroethylene inner liner, or equivalent, reinforced with corrosion resistant wire braid, and the AN818 coupling nuts or SAE 4395 end fittings permanently attached.
- d. Leakage. Previous procurement leak tests were performed by submersion of the hose assembly in water. A leak was defined as the breakaway of one bubble per 30 seconds from a localized area after 5 minutes of stabilization.

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- e. Proof pressure. Proof pressure is that internal pressure to which the hose assembly is pressure tested to prove its integrity without causing damage.

6.10 Part or identifying number (PIN). The PIN to be used for the hose assembly acquired to this specification are created as follows (see figure 1). The M26626 dash numbers superseding MS24548 dash numbers are listed in table II.

<u>M</u>	<u>26626</u>	<u>-X</u>	<u>-XXX</u>
Prefix for military specification	Specification number	Dash number, the numeric portion of the AN 818 fitting	Dash number, length (L)

TABLE II. Superseding data

New PIN	Superseded dash number
M26626-5-(L)	MS24548-5-(L)
M26626-6-(L)	MS24548-6-(L)
M26626-8-(L)	MS24548-8-(L)

6.11 Subject term (key word) listing.

Aircraft oxygen systems
Breathing oxygen
Liquid oxygen

6.12 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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Custodians:

Air Force	-	99
Army	-	AV
Navy	-	AS

Preparing Activity:

Air Force	-	71
Project 4720-XXXX		

Reviewer Activities:

DLA	-	CC
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-PRF-26626E	2. DOCUMENT DATE (YYMMDD) 970531
3. DOCUMENT TITLE HOSE ASSEMBLY, REINFORCED, CRYOGENIC, OXYGEN			
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)</i>			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME <i>(Last, First, Middle Initial)</i>		b. Organization	
c. ADDRESS <i>(Include zip code)</i>	d. TELEPHONE <i>(Include Area Code)</i> (1) Commercial (2) Autovon <i>(if applicable)</i>		7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME Harlena Edwards		b. TELEPHONE <i>(Include Area Code)</i> (1) Commercial (405) 736-5960 (2) Autovon 336-5960	
c. ADDRESS <i>(Include Zip Code)</i> OC-ALC/TICLA 3001 Staff Drive, Suite 1AE1-101A Tinker AFB, OK 73145-3036		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3446 Telephone (703) 756-2340 Autovon 289-2340	