

INCH-POUND

MIL-PRF-26626F
w/Amendment 1
21 January 2010
SUPERSEDING
MIL-PRF-26626F
05 February 2008

PERFORMANCE SPECIFICATION

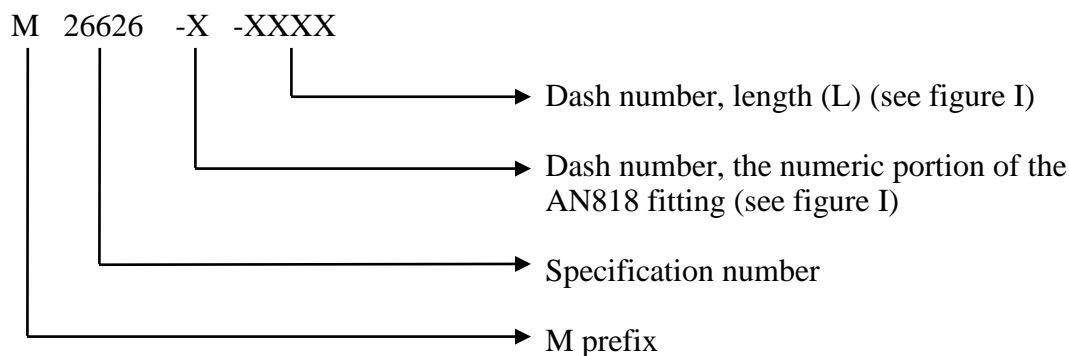
HOSE ASSEMBLY, REINFORCED, CRYOGENIC, OXYGEN

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 hose assemblies with flared tube style fittings.

1.2 Part or identifying number (PIN). The PIN to be used for the hose assembly acquired to this specification are created as follows.



2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does 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 this list, document users are cautioned that they must meet all specified requirements of the documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Comments, suggestions, or questions on this document should be addressed to: Oklahoma City Air Logistics Center/ENEP, 3001 Staff Drive, Suite 2AG-68A, Tinker AFB, OK 73145-3036 or e-mailed to ocalc.enrs.sma@tinker.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at <http://assist.daps.dla.mil/>.

MIL-PRF-26626F
w/Amendment 1

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL SPECIFICATIONS

A-A-59503 Nitrogen, Technical

DEPARTMENT OF DEFENSE SPECIFICATIONS

AN818 Nut, Tube, Coupling, Short

MIL-PRF-27617 Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant

(Copies of these documents are available online at <http://assist.daps.dla.mil/> or 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 issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ASQC Z1.4 Procedures, Sampling and Tables for Inspection by Attributes (DoD-adopted)

(Copies of these documents are available online at <http://www.asq.org/> or from American Society for Quality, P.O. Box 3005, Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue, Milwaukee, WI 53203.)

ASTM INTERNATIONAL

ASTM B117 Salt Spray (Fog) Apparatus, Operating (DoD-adopted)

ASTM D1149 Rubber Deterioration - Surface Ozone Cracking in a Chamber (DoD-adopted)

(Copies of these documents are available online at <http://www.astm.org/> or from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.)

MIL-PRF-26626F
w/Amendment 1

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS-QQ-S-763	Steel Bars, Wire, Shapes, and Forgings; Corrosion Resistant
SAE ARP908	Hose and Tube Fitting, Installation and Qualification Test Torque Requirements (DoD-adpoted)
SAE ARP1176	Oxygen System and Component Cleaning and Packaging (DoD-adopted)
SAE AS1065	Quality & Serviceability Requirements for Aircraft Cylinder Assemblies Charged with Aviator's Breathing Oxygen Fitting End-Flared Tube Connections, Design Standard
SAE AS4395	Tube Connection, Fitting End-Flared, Design Standard (DoD-adopted)
SAE AS8010	Aviator's Breathing oxygen Purity Standard
SAE AS8879	Screw Threads – UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter (DoD-adpoted)

(Copies of these documents are available online at <http://www.sae.org/> or from SAE World Headquarters, 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 the 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 costs.

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

MIL-PRF-26626F
w/Amendment 1

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 6.8).

3.3.2 Ozone resistance. Elastomers and inner lining materials shall be ozone resistant (see 4.6.12).

3.3.3 Lubricants. Lubricants, if used, shall meet the requirements of MIL-PRF-27617. These lubricants shall be used only on mating surfaces, such as the threads of the AN818 coupling nut (see 6.7).

3.4 Interface.

3.4.1 End fittings. Flared fitting inserts shall conform to SAE AS4395 and shall be constructed of material conforming to Class 304 or Class 316 of SAE AMS-QQ-S-763 or constructed from materials with equivalent properties and composition. Coupling nuts shall conform to AN818 (see figure I). End fittings shall be permanently attached to the hose assembly (see 6.5 and 6.8).

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

3.4.3 Threads. All threads shall conform to SAE AS8879, 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 I.

3.5.2 Inner liner. The hose liner, if used shall be seamless and smooth bored (see 6.4 and 6.6).

3.5.3 Proof pressure. The hose assembly shall withstand a proof pressure of 1,000 psig (see 4.6.2). The leak rate shall be less than 2 cubic centimeters (cm³) per minute (see 6.8).

3.5.4 Burst pressure. The hose assembly shall withstand a hydrostatic pressure of 2,200 psig (see 4.6.3). The leak rate shall be less than 2 cm³ per minute (see 6.8).

3.5.5 Ultimate tensile strength. The hose assembly shall not break when subjected to a tensile load of 300 pounds (see 4.6.4).

3.5.6 High temperature. The hose assembly shall withstand exposure to 260° ± 5°F for 48 hours (see 4.6.5).

MIL-PRF-26626F
w/Amendment 1

3.5.7 Low temperature. The hose assembly shall withstand exposure to $-65^{\circ} \pm 5^{\circ}\text{F}$ for 48 hours (see 4.6.6).

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 (see 4.6.7).

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 (see 4.6.8).

3.5.10 Odor. The hose assembly shall be odorless (see 4.6.9).

3.5.11 Cleanliness. The hose assembly surfaces shall be free of contaminants such as rust, scale, dirt, paints, oils, hydrocarbons, and cleaning compounds (see 4.6.10).

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 inspection (see 4.2).
- b. Conformance inspection (see 4.3).

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

MIL-PRF-26626F
w/Amendment 1

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

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

- 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 guidance in 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 test conditions specified below:

- a. Tests shall be performed at ambient atmospheric conditions.
- b. (1) Qualification tests shall be performed with oxygen conforming to SAE AS8010.

(2) Quality conformance tests may be performed with either oxygen conforming to SAE AS8010 or nitrogen conforming to A-A-59503.
- c. The torque applied to the AN818 nuts of the hose assembly shall be in accordance with SAE ARP908.

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

MIL-PRF-26626F
w/Amendment 1

TABLE I. Requirements cross-reference matrix
(continued)

Requirement	Verification	Requirement	Verification
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	4.6.1
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.

4.6.2 Proof pressure. The hose assembly shall be pressurized to 1,000 psig and the leak rate shall be less than 2 cm³ 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 cm³ per minute and there shall be no loosening of the end fittings.

4.6.4 Ultimate tensile strength. The hose shall be attached by the fittings and a tensile force shall be applied at a rate no less than 1 pound 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° ± 5°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 (see 4.6.2).

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° ± 5°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 (see 4.6.2).

4.6.7 Low temperature bending. Liquid oxygen or liquid nitrogen shall be passed through the hose assembly at a pressure of 25 ± 5 psig for a period of not less than 15 minutes and then subjected to a temperature of -65° ± 5°F for not less than 30 minutes. While at this temperature, the hose assembly shall undergo 5 bending cycles allowing 4 seconds per cycle.

MIL-PRF-26626F
w/Amendment 1

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 the 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 (see 4.6.2).

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 from 10 to 50 Hz at a constant rate. The hose assembly shall then be subjected to the proof pressure test (see 4.6.2).

4.6.9 Odor. Gaseous oxygen 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 AS1065.

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 subjecting the hose assemblies to the tests specified in SAE ARP1176 or industrially accepted test methods (see 6.2).

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 proof pressure (see 4.6.2), burst pressure (see 4.6.3), odor (see 4.6.9), and cleanliness tests (see 4.6.10).

4.6.12 Ozone resistance test. Samples of elastomer and inner liner materials shall be tested in accordance with ASTM D1149 (see 6.5). 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 magnified for evidence of damage such as blooming, checking, or cracking as specified in ASTM D1149.

5. PACKAGING

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

MIL-PRF-26626F
w/Amendment 1

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

6.2 Acquisition requirements. Acquisition documents should 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.

6.3 Qualification. 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 QPL-26626 whether or not such products have actually been listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Richmond, Attn: DSCR-VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616 or via email at STDZNMGT@dla.mil.

6.4 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.

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

MIL-PRF-26626F
w/Amendment 1

6.6 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.

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

6.8 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 tetrafluorethylene inner liner, or equivalent, reinforced with corrosion resistant wire braid, and the AN818 coupling nuts or SAE AS4395 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.
- e. Proof pressure. Proof pressure is that internal pressure to which the hose assembly is pressure tested to prove its integrity without causing damage.

6.9 Supersession data. The M26626 dash numbers superseding MS 24548 dash numbers are listed in table II.

TABLE II Supersession data.

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

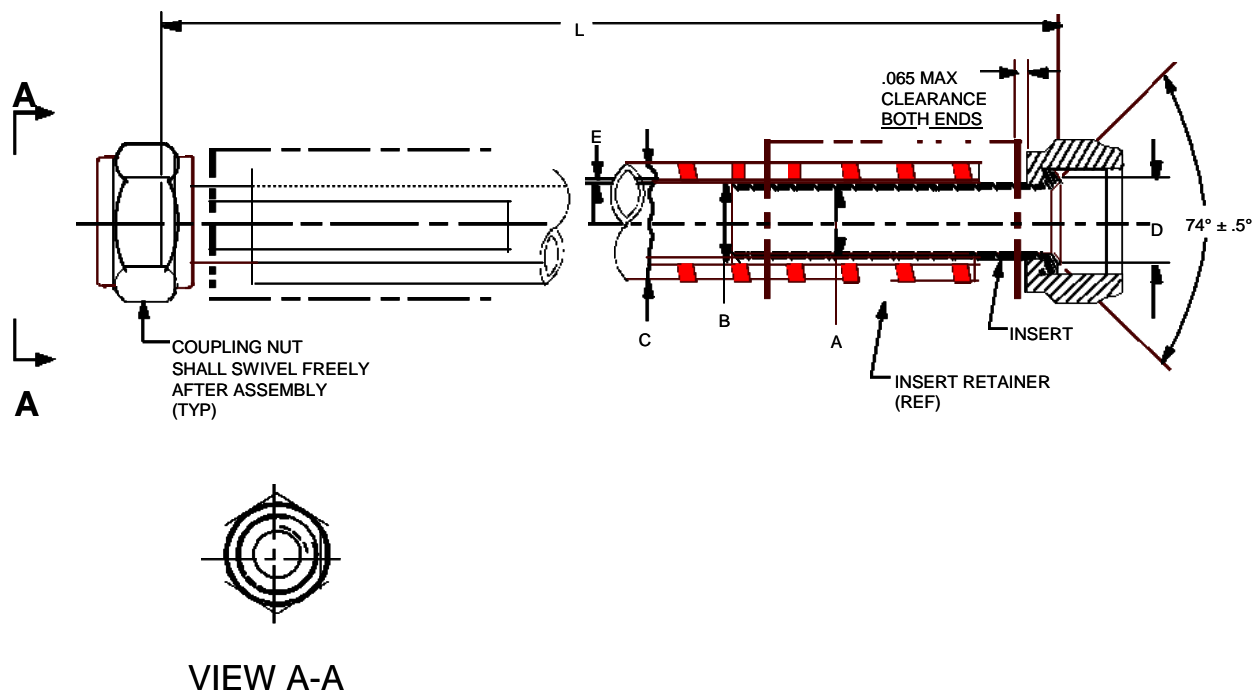
6.10 Subject term (key word) listing.

Aircraft oxygen systems
Breathing oxygen
Liquid oxygen

MIL-PRF-26626F
w/Amendment 1

6.11 Amendment notations. The margins of this specification are marked with vertical lines to indicate where modifications from this amendment 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.

MIL-PRF-26626F
w/Amendment 1



M26626 dash number	Reference	A	B	C	D	E	End fitting
	OD rigid tubing insert	Minimum diameter	ID of inner liner +.015	OD of hose +.031,-.016	Diameter +.005, -.000	Inner liner wall +.007,-.005	AN818-
-5 - (L)	5/16	.193	.250	.375	.355	.040	5J or 5K
-6 - (L)	3/8	.256	.313	.438	.435	.040	6J or 6K
-8 - (L)	1/2	.340	.406	.562	.570	.043	8J or 8K

Notes:

1. End fittings notes and dimensions apply to both ends.
2. Last dash number (L) in inches with tolerances +2% of L, -0% of L.
3. Dimensions in inches.

FIGURE I. Hose assembly

MIL-PRF-26626F
w/Amendment 1

Custodians:

Air Force - 71
Army - AV
DLA - CC
Navy - AS

Preparing Activity:

Air Force - 71

(Project 4720-2010-006)

Review Activities:

Air Force – 99

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