

INCH-POUND

MIL-DTL-26499E
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SUPERSEDING
MIL-DTL-26499D
17 November 2003

DETAIL SPECIFICATION

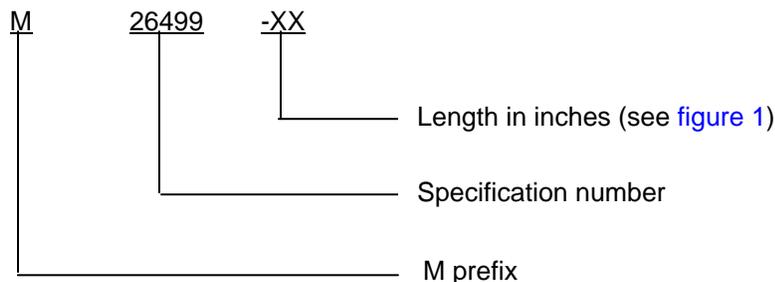
HOSE ASSEMBLY, METAL, FLEXIBLE, BREATHING OXYGEN

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

1. SCOPE

1.1 Scope. This specification covers one type of metal flexible hose assembly with a nominal working pressure of 2,400 psi (165.47 bar) in the operating temperature range from -65°F to +160°F (-53.89°C to +71.11°C).

1.2 Part or Identifying Number (PIN). The definitive specification PIN will be formatted to identify each item covered by this specification. The PIN format will consist of the letter M, specification number followed by a dash, and a 2 digit number length in inches available in this specification as follows:



Example: M26499-24 - Represents a 24 inch hose assembly.

Comments, suggestions, or questions on this document should be addressed to: Defense Supply Center, Columbus, Attn: DSCC-VAI, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Construction@dsc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil>.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4 or 5 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 documents cited in sections 3, 4 or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks 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

QQ-B-654 - Brazing Alloys, Silver

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

Compressed Gas Association, Inc.

CGA V-1 - Compressed Gas Association Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections.

(Copies of these documents are available from www.cganet.com or Compressed Gas Association Customer Service, 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923.)

ASTM INTERNATIONAL

ASTM B16/B 16M - Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines
ASTM G93 - Standard Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment used in Oxygen-Enriched Environments

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

SAE INTERNATIONAL

SAE AS611 - Hose Assembly and Tubing, Polytetrafluoroethylene, Cleaning Methods For

(Copies of these documents are available online at <http://www.sae.org> or from the SAE World Headquarters, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 Order of precedence. In 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 4.3 and 6.3).

3.2 Components. The hose assembly shall consist of the following major components:

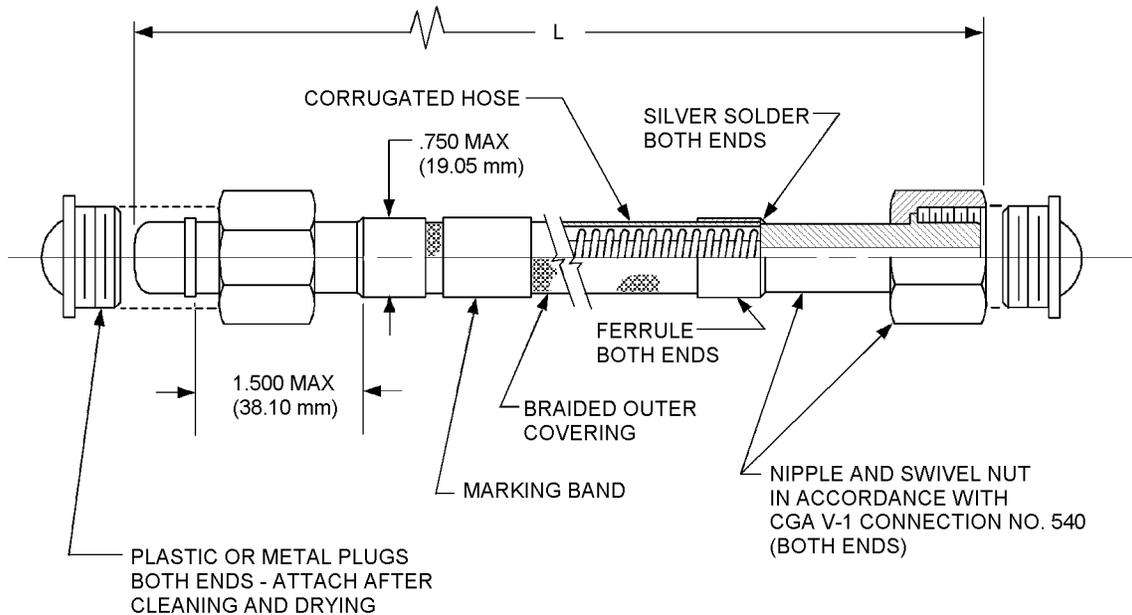
- a. Corrugated hose (see 3.4.1).
- b. Internal support coil (see 3.4.2)
- b. Braided outer covering (see 3.4.3).
- c. End connections (see 3.4.4).

3.3 Materials. All parts of the hose assembly shall be made of corrosion resistant metal. No materials shall be used that are toxic or give off toxic fumes, deteriorate easily, or are otherwise adversely affected by continued use with high-pressure oxygen, or that are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service usage (see 6.1.4).

3.3.1 Recycled, recovered, or environmentally preferable material. 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.

3.4 Design and construction. The design and construction of the hose assembly shall be specified on figure 1. Nominal lengths shall be as specified (see figure 1 and 6.2). The hose shall be constructed to meet the requirements specified herein and to retain the end fittings without slipping or leaking when tested as specified in section 4. The hose assembly shall be designed for a 99.5 percent purity gaseous oxygen working pressure of 2,400 psi (165.47 bar) and a minimum hydrostatic burst pressure of 9,600 pounds per square inch gage (psig) (661.90 bar).

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| Dash number | Nominal length "L" (cm) |
|-------------|--------------------------------|
| -XX | Specify in inches (see note 3) |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Tolerance for lengths less than 24 inches (60.96 mm) shall be $\pm .250$ (6.35). For lengths less than 24 inches the tolerance shall be $\pm 1\%$.

FIGURE 1. Design and construction.

3.4.1 Corrugated hose. The flexible pressure carrying hose shall be helical or annular corrugated from corrosion-resistant, seamless or welded and redrawn steel tubing. The corrugated hose shall be inspected in accordance with 4.7.1 to determine if the hose inside diameter is .250 inch (6.35 mm), +.063 inch (1.60 mm), -.016 inch (0.41 mm). A corrugated hose sample not within this tolerance shall be cause for rejection of the lot.

3.4.2. Internal support coil. The corrugated hose shall be wrapped with a corrosion resistant steel support coil.

3.4.3 Braided outer covering. The outer covering shall be one or more layers of corrosion-resistant steel-wire braid.

3.4.4 End connections. A nipple and swivel nut, in accordance with pamphlet CGA V-1, Compressed Gas Association, connection No. 540, shall be silver soldered onto each end of the hose (see 3.4.6). The nipple shank length shall not exceed 1.500 inches (38.10 mm). The nipple and swivel nut shall be made of material conforming to ASTM B16/B 16M.

3.4.5 Ferrules. A hexagonal ferrule, approximately .500 inch (12.70 mm) long and .750 inch (19.05 mm) across the flats, shall be provided at each end of the hose as shown on figure 1. When held by a wrench, the ferrule shall prevent the twisting of the hose assembly during installation.

3.4.6 Silver soldering. The ferrule, corrugated hose, braided outer covering, and nipple shank shall be silver soldered together at each end of the hose assembly as shown on figure 1. All soldering/brazing operations shall use silver brazing alloys in accordance with QQ-B-654 and shall be of the following classifications grade IV, V, or VI.

3.5 Performance.

3.5.1 Proof pressure. The hose assembly shall be capable of withstanding a proof pressure of 4,800 psig (330.95 bar) without leakage.

3.5.2 Low temperature. The hose assembly when subjected to low temperature testing in accordance with 4.7.4 shall be capable of bending without damage 180° around a 4-inch (101.60 mm) diameter mandrel.

3.5.3 Vibration. The hose assembly when tested in accordance with 4.7.5 shall be capable of withstanding vibration of 3,600 cycles per minute (cpm) without failure, while the hose assembly is pressurized to proof pressure 4,800 psig (330.95 bar).

3.5.4 Pressure impulse. The hose assembly when subjected to impulse pressure testing in accordance with 4.7.6 shall be capable of withstanding 15,000 pressure impulses from 0 to 2,400 to 0 psig (0 to 1544.43 to 0 bar) without failure.

3.5.5 Hose assembly tensile strength. The hose assembly when subjected to the tensile strength testing in 4.7.7 shall be able to withstand a tensile pull of 1,000 pounds (453.59 kg) without failure.

3.5.6 Burst pressure. The hose assembly when tested in accordance with 4.7.8 shall not burst or otherwise break at any seam or junction at less than 9,600 psig (661.90 bar) hydraulic pressure.

3.6 Cleaning instructions. The hose assembly after cleaning shall meet the requirements of 4.7.9.

3.6.1 General cleaning instructions. Prior to and during assembly, metal chips, hose cuttings, and other foreign material shall be removed during and after final assembly. Hose assembly components shall be cleaned in accordance with the highest commercial standards. Precautions shall be used during handling and assembly to preclude contamination of component parts. Final assembly and inspection shall be done in a laminar-airflow clean work area whenever possible. Following completion of fabrication and assembly operations, the hose assembly shall be thoroughly cleaned (see 3.6.2). The hose assembly shall not be adversely affected by the cleaning method or procedures. The organization performing the cleaning services shall have responsibility for all safety aspects of oxygen cleaning procedures. Guidance for safe procedures can be found in ASTM G93.

3.6.2 Cleaning requirements. The hose assembly cleaning, processing, testing and inspection shall be in accordance with SAE AS 611, class II to assure compatibility with 99.5 percent pure oxygen at a pressure of 2,400 psig (165.47 bar) and compliance with the cleaning effectiveness requirements of 4.7.9.

3.6.3 Preservation. Preservation for hose assemblies shall be in accordance with SAE AS611, class II.

3.7 Identification of product. For hose sizes under 4 feet (1.22 m) each hose assembly shall be identified by a permanently attached snug-fitting aluminum or stainless steel band around the hose near the end fitting. Hose assemblies 4 feet (1.22 m) and greater in length, a band shall be attached near each end fitting of the assembly. The metal band shall be marked in raised, etched, or stamped lettering with the following information appropriately identified:

- a. Date of assembly in month and year.
- b. The rated working pressure in psi, followed by the word "OXYGEN".
- c. Hose assembly manufacturer's commercial and government entity (CAGE).
- d. Hose manufacturer's CAGE if different from hose assembly manufacturer.
- e. Specification PIN (see 1.2).

3.8 Workmanship. All hose and hose assemblies shall be manufactured and processed in such a manner as to be uniform in quality and shall be free from foreign material and other defects that will affect life, serviceability, strength, assembly or durability (see table I). Workmanship shall be such as to enable the hose and hose assemblies to meet the applicable performance requirements of this specification.

TABLE I. Workmanship defects.

| Defect | Inspection | Reference |
|---|--|-----------|
| Dimensions affecting interchangeability not within tolerance | Standard inspection equipment | 3.1 |
| Hose inside diameter at fitting junction out of tolerance | Standard inspection equipment (hose assembly only) | 3.4.1 |
| Fitting slippage on hose | Visual | N/A |
| Braided covering - Damaged, cut, or abraded cover (any reinforcement exposed) | Visual | N/A |
| Braided covering - Broken end or ends in the wire reinforcements protruding from the surface of the braid | Visual | N/A |
| Braided covering - Missing strands on braided outer cover | Visual | N/A |
| Kinked, crushed, flattened or twisted hose | Visual | N/A |
| Silver solder uniform, adequate penetration and no balling | Visual | 3.4.6 |
| Misbranding | Visual | 3.7 |

4. VERIFICATION

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

- a. Qualification Inspection (see 4.3).
- b. Conformance Inspection (see 4.5).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the applicable test method referenced in the test procedures. Unless otherwise specified, room temperature shall be defined as +60°F to +90°F (15.56°C to 32.22°C).

4.3 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the qualifying activity (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.3.1 Materials and component inspection. Materials and components of the hose assembly shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

4.4 Qualification sampling.

4.4.1 Qualification inspection and tests. The products, which this specification covers, shall pass qualification inspections and tests specified herein. If the product is later modified in any way, the modified form shall be subjected to and shall pass the same qualification inspections and tests. Qualification inspections and tests shall be performed by the manufacturer and shall consist of the inspections and tests shown in [table II](#).

4.4.2 Qualification sampling (see [table II](#)).

- a. Dimension inspection requires one corrugated hose sample prior to soldering (see 4.7.1).
- b. Group 2 and 3 tests require seven hose assemblies, 24 ±6 inches (60.91 ±15.24 cm) long, and shall be fabricated from random samples of bulk hose and end fittings using production processes and procedures.
Note: Tensile and burst test hose assembly samples length may be reduced to 18 ±6 inches (45.72 ± 15.24 cm) long if necessary because of test equipment limitations.
- c. Group 4 requires one sample. This sample shall be randomly selected after the cleaning process.

4.4.3 Inspection routine. The samples shall be subjected to the inspections specified in [table II](#). Group 2 test sequence is at manufacturer's discretion.

TABLE II. Qualification inspection and tests.

| Inspection | Requirement paragraph | Test paragraph |
|---|-----------------------|-----------------|
| Group 1 (1 sample see, 4.7.1) | | |
| Dimension inspection (corrugated hose) | 3.4.1 | 4.7.1 |
| Group 2 (all 7 samples, see 4.4.2) | | |
| Visual and mechanical inspection | 3.4.5, 3.7, and 3.8 | 4.3.1 and 4.7.2 |
| Design and construction | 3.4 | 4.7.2 |
| Group 3 (1 sample per test) | | |
| Proof pressure | 3.5.1 | 4.7.3 |
| Low temperature | 3.5.2 | 4.7.4 |
| Vibration | 3.5.3 | 4.7.5 |
| Pressure impulse | 3.5.4 | 4.7.6 |
| Tensile strength | 3.5.5 | 4.7.7 |
| Burst pressure | 3.5.6 | 4.7.8 |
| Group 4 (1 sample) | | |
| Cleanliness | 3.6 | 4.7.9 |

4.4.4 Failures. One or more failures shall be cause for refusal to grant qualification.

4.4.5 Retention of qualification. To retain qualification, the contractor shall make available to the qualifying activity a report at 12-month intervals. The qualifying activity shall establish the initial reporting date. Each report shall consist of the number of lots produced in the reporting period, the quantity of production in each lot, the tests performed during the reporting period, how many times each test was performed, the number of samples per test, the number of test samples passing and the number of test samples failing. All reworked sampling lots shall be accounted for and identified.

4.4.5.1 Removal from QPL. If the summary of test results indicates nonconformance with requirements specified herein but the corrective measures acceptable to the qualifying activity have not been taken, action may be taken to remove the failing product from the qualified products list. Failure to submit the report within 30 days after the end of each 12-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the contractor shall immediately notify the qualifying activity at any time during the 12-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

4.4.5.2 No production. In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during two consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit his qualified products to testing in accordance with the qualification inspection requirements specified in [table II](#).

4.5 Conformance inspections.

4.5.1. Individual and sampling inspection. Individual and sampling inspections shall consist of the inspections specified in [table III](#) in the order shown.

TABLE III. Individual and sampling inspections.

| Test | Requirement paragraph | Inspection paragraph | Number of samples |
|----------------------------------|---|---|---------------------------|
| Visual and mechanical inspection | 3.4.5 , 3.7 , and 3.8 . | 4.3.1 and 4.7.2 | 100% 1/ |
| Configuration | 3.4 | 4.7.2 | 100% 1/ |
| Cleanliness | 3.6 | 4.7.9 | SAE AS611 |
| Proof pressure | 3.5.1 | 4.7.3 | 100% |
| Tensile test | 3.5.5 | 4.7.7 | See 4.5.3 |
| Burst test | 3.5.6 | 4.7.8 | See 4.5.3 |

[1/](#) Sampling plan for configuration and for visual and mechanical inspection shall be at 100% or at an inspection plan approved in writing by the qualifying activity.

4.5.2 Sampling hose assemblies. For hose assemblies, the inspection lot shall be product selected at random from the production lot without regard to quality and shall be the sample size specified in [table III](#).

4.5.3 Sampling for tensile and burst test. The manufacturer shall tensile test one hose and burst test a different hose for each lot of 0 to 100 pieces. For lots over 100 pieces, one additional hose shall be tested for tensile and one additional hose shall be tested for burst for each full or partial increment of 100 pieces. The tensile and burst tests must be done prior to delivery and tested hoses shall not be shipped or considered part of the order.

4.5.4 Nonconformance. If a sample fails to pass any individual and sampling (see [table III](#)), the manufacturer shall immediately notify the qualifying activity and cognizant inspection activity of such failure. The manufacturer shall take corrective action on the materials or processes, or both, as warranted, on all units of products which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After the corrective action has been taken, individual and sampling shall be repeated on additional samples (all inspections, or the inspection which the original sample failed, at the option of the qualifying activity). Individual and sampling inspections shall be reinstated. However, final acceptance of the hose or hose assemblies shall be withheld until the individual and sampling inspection has shown that the corrective action was successful.

4.5.5 Disposition of test specimens. Test specimens that have been subjected to tensile and burst pressure testing shall not be delivered on the contract or purchase order.

4.6 Changes to QPL product. QPL manufacturers shall notify the qualifying activity in writing, if any changes are made in regards to materials, equipment or processes involved in the production of a QPL item. Subsequently, the qualifying activity shall notify the manufacturer, in writing, if a full requalification, partial requalification or no additional testing is required as a result of the change to materials, equipment or processes.

4.7 Test methods.

4.7.1 Dimension inspection (see 3.4.1). A corrugated hose sample shall meet the requirements of 3.4.1. The dimension inspection shall be conducted after the hose has been cut to length, but prior to the soldering of the end connection to the corrugated hose.

4.7.2 Examination of product. The hose assembly shall be inspected to determine compliance with the requirements specified herein with respect to workmanship (see 3.8), materials (see 3.3), marking (see 3.7) and cleaning (see 3.6.1). The hose overall length shall be checked against figure 1 as applicable to the nominal length specified (see 6.2).

4.7.3 Proof pressure test (3.5.1). Each hose assembly shall be subjected proof pressure testing and meet the requirements of 3.5.1. The following details shall apply:

- a. Hydrostatic pressure of 4,800 psig (330.945 bar) for a minimum of 3 and a maximum of 10 minutes.
- b. Clean water shall be used as the pressurizing fluid.
- c. Evidence of leakage from any part of the hose assembly shall be cause for rejection.
- d. Except for hose assemblies selected for the sampling tests or qualification test, satisfactory hose assemblies shall be cleaned, dried, and plugged in accordance with 3.6 after completion of the proof pressure test.

4.7.4 Low temperature test (see 3.5.2). The hose assembly when exposed to low temperature extremes shall meet the requirements of 3.5.2. The following details shall apply:

- a. Hose assembly shall be brought to a stabilized temperature of -65°F (-53.89°C).
- b. While at -65°F (-53.89°C), the hose assembly shall be grasped by the end connections and bent 180° around a 4-inch (101.60 mm) mandrel, after which the hose assembly shall be inspected for cracks or breaks in any component or junction.

4.7.5 Vibration (see 3.5.3). The hose assembly shall be subjected to a vibration and meet the requirements of 3.5.3. The following details shall apply:

- a. Hose assembly shall be subjected to a vibration of 3,600 cycles per minute (cpm) while pressurized to 4,800 psig (330.95 bar).
- b. One end of the assembly shall be connected to a fixed object and the other end shall be connected to a moving object having a double amplitude of vibration of at least .125 inch (3.18 mm).
- c. The end connected to the moving object shall be so mounted that the central axis of the hose end is parallel to the direction of vibration.
- d. The hose shall be bent 180° during the entire test and shall be vibrated for at least 4 hours. Any sign of leakage or cracking shall be cause for rejection.

4.7.6 Pressure impulse test (see 3.5.4). The hose assembly shall be subjected to a pressure and shall meet the requirements of 3.5.4. The following details shall apply:

- a. Impulse cycle from 0 to 2,400 to 0 psig (165.47 bar) at the rate of approximately 1 cycle per second for 15,000 cycles.
- b. The hose assembly shall be bent 180° during the entire test.
- c. Any sign of leakage or cracking shall be cause for rejection.

4.7.7 Tensile strength test (see 3.5.5). The hose assembly shall be subjected to tensile strength test and shall meet the requirements of 3.5.5. The following details shall apply:

- a. Attached by the end connections to the heads of a tensile testing machine and pulled at the rate of approximately 1 inch (25.40 mm) per minute up to 1,000 pounds (453.59 kg) pull.
- b. Any failure below 1,000 pounds (453.59 kg) shall be cause for rejection of the lot.

4.7.8 Burst pressure test (see 3.5.6). The hose assembly shall be tested for burst pressure and shall meet the requirements of 3.5.6. The following details shall apply:

- a. Hydraulically pressurized from 0 to 9,600 psig in approximately 2 minutes.
- b. If any component of the hose assembly bursts or the assembly cracks at any junction, the lot shall be rejected.

4.7.9 Cleaning effectiveness (see 3.6). Cleaning effectiveness testing shall be in accordance with SAE AS611 (quality assurance provisions). If a hose assembly fails any part of the quality assurance inspections the entire lot shall be rejected. If the lot is rejected, the hose assemblies shall be recleaned in accordance with 3.6 and a new sample taken for compliance with this test. If the test shows the cleaning methods to be satisfactory, the hose assemblies, if required, shall be re-cleaned in accordance with the quality assurance provisions of SAE AS611 and preserved in accordance with 3.6.3.

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 material 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 activity 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.

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 assemblies covered by this specification are intended for use as flexible manifold connections on ground servicing equipment supplying breathing oxygen to aerospace equipment. The use is military unique in its intended application the hose assembly will be used in charging aerospace vehicle breathing oxygen systems and must be able to operate satisfactory with a nominal working pressure of 2,400 psig (165.47 bar) in the operating temperature range from -65°F to +160°F (-53.89°C to +71.11°C).

6.1.1 Oxygen system cleanliness needs. This specification specifies cleanliness in accordance with SAE AS611, class II. Users are cautioned that the hose assembly should be evaluated to their cleanliness requirements before installing in any equipment. Only qualified technical personnel with knowledge for the selection of cleaning methods for oxygen rich environments should make the determination as to what cleanliness level is acceptable for their application.

6.1.2 Cleaning a component or system for oxygen service. Cleaning a component or system for oxygen service involves the removal of combustible contaminants, including the surface residue from manufacturing, hot work, and assembly operations, as well as the removal of all cleaning agents. These cleaning agents and contaminants include solvents, acids, alkalis, water, moisture, corrosion products, non-compatible thread lubricants, filings, dirt, scale, slag, weld splatter, organic material (such as oil, grease, crayon, and paint), lint, and other foreign materials. Injurious contaminants can be removed by cleaning all parts and maintaining this condition during construction; by completely cleaning the system after construction; or by a combination of the two. The prevention of recontamination before final assembly, installation, and use is essential to safe oxygen system operation.

6.1.3 Potential ignition energy mechanisms. Safe use of oxygen requires the control of potential ignition energy mechanisms within oxygen systems by maintaining scrupulously clean systems. Cleanliness (contamination control) is critical in oxygen components and systems. Contamination can cause ignition of components or systems by a variety of mechanisms, such as particle impact, mechanical or pneumatic impact, or spontaneous ignition. In an oxygen environment, contaminants increase the ignitability of both metallic and nonmetallic materials.

6.1.4 Restricted materials.

- a. Cadmium: The toxicity and vapor pressure of cadmium restrict its use.
- b. Titanium: Titanium metal is not be used with liquid oxygen at any pressure or with gaseous oxygen or air at oxygen partial pressures above 30 psig. Titanium and its alloys are impact sensitive in oxygen.
- c. Magnesium: Magnesium metal is not be used in oxygen systems. In addition, its alloys are not to be used except in areas with minimal exposure to corrosive environments. Reactivity with halogenated compounds constrains its use with lubricants containing chlorine and fluorine.
- d. Mercury: Mercury is not be used in oxygen systems in any form because it is toxic; in addition, it and its compounds can cause accelerated stress cracking of aluminum and titanium alloys.
- e. Beryllium: Beryllium and its oxides and salts are highly toxic and are not be used in oxygen systems or near oxygen systems where they could be consumed in a fire.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Specification PIN nominal lengths of hose assemblies required, according to dash numbers shown on [figure 1](#) (see [1.2](#) and [3.4](#)).
- c. Applicable levels of packaging and packing (see [5.1](#)).

6.2.1 Responsibility of product. This specification does not preclude the supplier's responsibility for providing a product that meets the system performance requirements and acceptability for oxygen use. It should be considered an integral part of the purchase agreement between the vendor and the procuring agency

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 Qualified Products List QPL No.26499 whether or not such products have actually been so 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 Columbus, P.O. Box 3990, ATTN: DSCC-VQ, Columbus, Ohio 43218-3990 or emailed to vqp.chief@dla.mil.

6.3.1 Provisions governing qualification (SD-6). Copies of "Provisions Governing Qualification" 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.

6.4 Environmentally preferable materials. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. Table IV lists the Environmental Protection Agency (EPA) top seventeen hazardous materials targeted for major usage reduction. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see section 3).

TABLE IV. EPA top seventeen hazardous materials.

| | | |
|------------------------|------------------------|-------------------------|
| Benzene | Dichloromethane | Tetrachloroethylene |
| Cadmium and compounds | Lead and compounds | Toluene |
| Carbon Tetrachloride | Mercury and compounds | 1,1,1 - Trichloroethane |
| Chloroform | Methyl Ethyl compounds | Trichloroethylene |
| Chromium and compounds | Methyl Isobutyl Ketone | Xylenes |
| Cyanide and compounds | Nickel and compounds | |

6.5 Subject term (key word) listing.

Connections
Ground
Servicing

6.6 Changes for 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 change.

MIL-DTL-26499E

CONCLUDING MATERIAL

Custodians:

Army - AV
Navy - AS
Air Force - 99
DLA - CC

Preparing activity:

DLA - CC

(Project 4720-2006-010)

Review activities:

Navy - MC, SA, SH
Air Force - 11, 70, 71

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online data at <http://assist.daps.dla.mil>.