

DETAIL SPECIFICATION

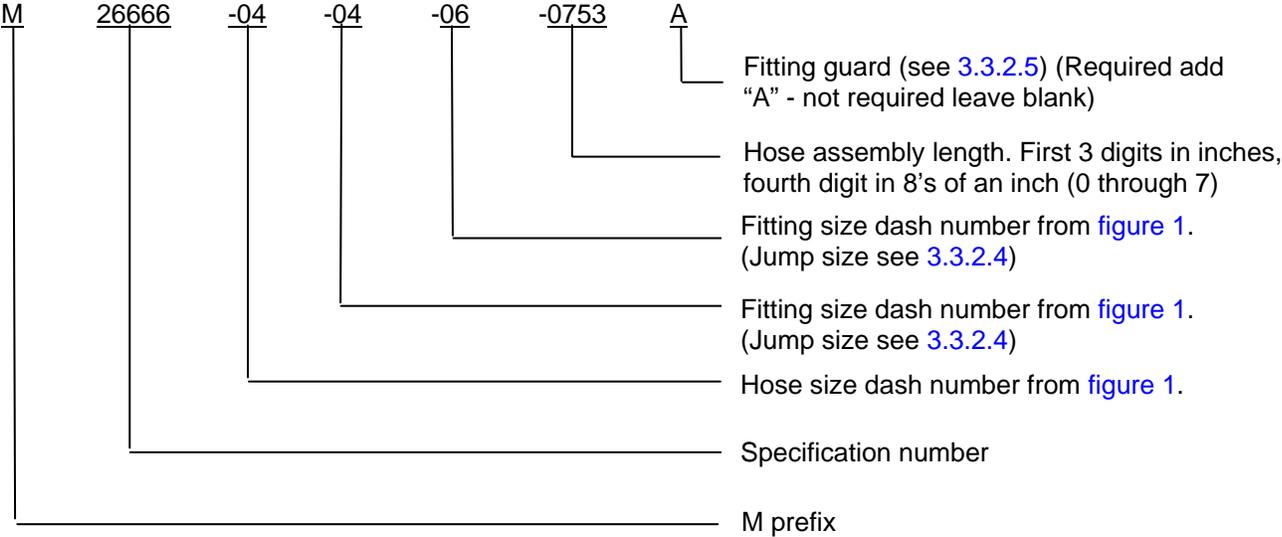
HOSE ASSEMBLY, PNEUMATIC, HIGH PRESSURE

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

1. SCOPE

1.1 Scope. This specification covers the requirements for a hose assembly, pneumatic, high pressure having a nominal working pressure of 4,000 psig (275.79 bar) in the operating temperature range of -65 to +160°F (-53.89°C to 71.11°C). DO NOT USE FOR OXYGEN. DO NOT USE ON AIRCRAFT.

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, a dash, a 2 digit number hose size, a dash and a 2 digit fitting size, a dash and 2 a digit fitting size, a dash hose assembly length in inches (3 digits), fourth digit in 8's of an inch (0 through 7), and coupling guard "A" (as required) as follows:



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@dsccl.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 issue of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARD

MIL-STD-889 - Dissimilar Metals

(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, the issues of these documents are those cited in the solicitation or contract.

ASTM INTERNATIONAL

ASTM D1248 - Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D2000 - Rubber Products in Automotive Applications

(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 AMS 2700 - Passivation of Corrosion Resistant Steels
SAE ARP908 - Hose and Tube Fitting, Installation and Qualification Test Torque Requirements
SAE AS4395 - Tube Connection, Fitting End-Flared, Design Standard
SAE AS5175 - Nut, Coupling, Flared
SAE AS8879 - Screw Threads, Controlled Radius Root with Increased Minor Diameter, General Specification 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 the event of a conflict between this 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 First article. When specified (see 6.2), samples shall be subjected to first article inspection in accordance with 4.5.

3.2 Materials. Materials shall be as identified herein or as approved by the acquiring activity. However, when a specific material is not specified, a material shall be used which will enable the hose assemblies to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guarantee of acceptance of the finished product.

3.2.1 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.

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

3.2.3 Other materials. Materials not otherwise specified shall be in accordance with applicable specifications and to the requirements specified herein. All materials that are not specifically described shall be of the highest quality and suitable for the purpose intended.

3.2.4 Fungus proof materials. Materials which are not nutrients for fungi shall be used to the greatest extent practicable without effecting performance. Where materials that are nutrients for fungi must be used, such materials shall be treated with a fungicidal agent to render the material fungus-resistant.

3.2.5 Rubber products. Rubber products, such as, seals, covers, and friction layers shall be fabricated from rubber components in accordance with ASTM D2000.

3.2.6 Dissimilar metal. Unless protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889.

3.3 Design and construction. The hose assembly shall be designed for a pneumatic working pressure of 4,000 psig (275.79 bar) in an operating temperature range of -65°F to +160°F (-53.89°C to 71.11°C).

3.3.1 Hose construction. The hose assembly shall consist of a hose with a seamless inner tube, reinforced with corrosion resistant steel wire coupled with corrosion resistant steel end fittings, and a protective outer cover. The hose shall be capable of retaining end fittings without slippage or leakage.

3.3.1.1 Inner tube. The inner tube shall consist of a high density polyethylene compound of seamless construction and uniform gage. It shall be compounded and processed to permit the least amount of effusion of compressed gases consistent with the requirements specified herein. The uncompounded polyethylene material shall conform to ASTM D1248, type 3. The inner tube shall have a smooth bore, be free from pitting and other defects, and free of any foreign material or lubricants.

3.3.1.2 Reinforcement. The reinforcement shall consist of two or more spirally wrapped or braided (or combination there-of) plies of high tensile steel wires. Reinforcement separation materials, if used, shall permit gas effusion from the inner tube to escape to the atmosphere. There shall be no broken or spliced reinforcing wires nor shall any wires be omitted in any length of hose.

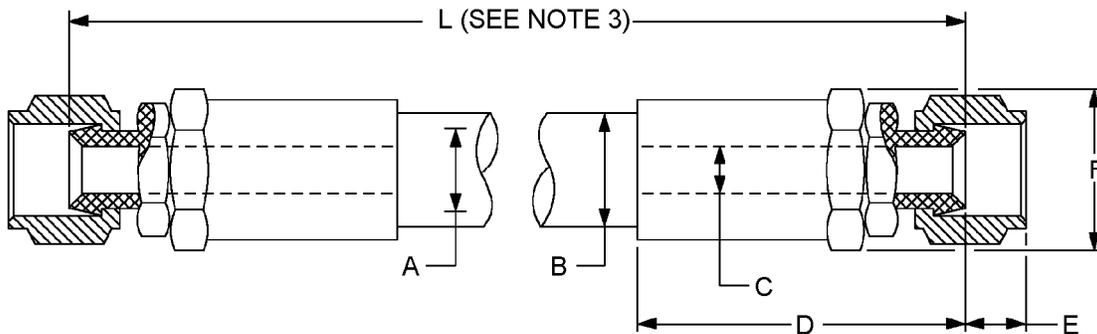
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3.3.1.3 Outer protective cover. An outer protective cover extending the full length of the hose, .125 to .250 inch (3.18 to 6.35 mm) from the end of the fitting, shall be furnished on the outside of the hose. The cover shall be a minimum of .0625 inch (1.588 mm) thick, consist of an abrasion-resistant, oil-resistant, and ozone-resistant chloroprene polymer or equivalent synthetic material compounded to meet the requirements specified herein. The cover need not be bonded to the outer-most reinforcement ply, but shall not be free to slip or turn along the length of hose. The cover shall permit gas that may effuse from the inner tube to escape to the atmosphere.

3.3.2 Hose assembly configuration. The hose assembly shall meet the requirements as specified herein.

3.3.2.1 Diameter. The inside and outside diameters of the hose shall be within the limits shown on figure 1 as applicable to the hose size specified by the acquiring activity (see 1.2).

3.3.2.2 Length of hose assembly. The hose assembly shall be furnished in lengths as specified by the acquiring activity (see 1.2). The hose assembly length shall be measured as shown on figure 1.



Hose size and fitting size designator	Tube ID	A hose ID min (mm)	B hose OD max (mm)	C coupling ID min (mm)	D (max) (mm)	E (mm)		F (dia) (max) (mm)	Hose min. inside bend rad (mm)
04	1/4	.234 (5.94)	.703 (17.86)	.125 (3.18)	2.100 (53.34)	.375 (9.53)	±.015 (0.38)	.875 (22.23)	3.250 (82.55)
06	3/8	.297 (7.54)	.859 (21.82)	.188 (4.78)	2.470 (62.74)	.375 (9.53)		1.160 (29.46)	5.250 (133.35)
08	1/2	.422 (10.72)	1.000 (25.40)	.297 (7.54)	2.730 (69.34)	.438 (11.13)		1.375 (9.53)	6.000 (152.40)
10	5/8	.547 (13.89)	1.218 (30.94)	.391 (9.93)	3.020 (76.71)	.515 (13.08)	±.031 (0.79)	1.550 (39.37)	6.750 (171.45)
12	3/4	.672 (17.07)	1.375 (34.93)	0.547 (13.89)	3.230 (82.04)	.602 (15.29)		1.740 (44.20)	8.000 (203.20)

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are for information only.
3. Length "L" shall be within +3% or -1% of specified nominal value.
4. Provisions for wrenching by a hex or flats on fitting body shall be optional.

FIGURE 1. Hose assembly details.

3.3.2.3 End fittings. The hose assembly end fittings shall conform to the general configuration shown on [figure 1](#). The end fittings shall be retained on the assembly without slipping or leaking when coupled to the hose and tested as specified herein. The fittings shall be made of corrosion resistant steel and shall be passivated in accordance with SAE AMS 2700 method 1, class 2. The hose assembly end fittings shall mate with fittings accordance with SAE AS4395 corresponding to the hose size.

3.3.2.3.1 Swivel nuts. The swivel nut dimensions across flats shall conform to an applicable size of SAE AS5175. The nipple bore diameter shall conform to the limits shown on [figure 1](#).

3.3.2.3.2 End fittings working pressure. The end fitting shall be designed for a working pressure of 4,000 psig (275.79 bar) and a minimum burst pressure of 16,000 psig (1103.16 bar).

3.3.2.4 Jump sizes. When specified (see [1.2](#)), the hose assembly shall be supplied with an end fitting(s) of a different nominal size than the hose itself. In such cases, the end fitting swivel nut and nipple shall mate with fittings accordance with SAE AS4395 for the specified jump size while the fitting body and nipple bore diameter shall conform to the applicable dimensions for the specified nominal hose size (see [figure 1](#)).

3.3.2.5 Fitting guard. When specified (see [1.2](#) and [6.2.h](#)) a fitting guard shall be securely attached to each end of the hose assembly to restrict the hose bend angle at the fitting. The fitting guard shall have less flexibility than the hose and encase the ends of the hose and fitting.

3.3.3 Finish. Unless otherwise specified, all corrosion-resistant steel fitting components shall be passivated in accordance with SAE AMS 2700 prior to assembly. Parts shall then be thoroughly rinsed in water and dried.

3.4 Screw threads. All coupling nut threads shall be in accordance with SAE AS8879.

3.5 Performance.

3.5.1 Visual examination and dimensional check.

3.5.1.1 Visual examination. The hose assembly shall conform to the requirements of this specification when visually examined as specified in [4.7.1.1](#).

3.5.1.2 Dimensional check. The hose assembly shall be in accordance with [figure 1](#) when dimensionally checked in accordance with [4.7.1.2](#).

3.5.2 Proof pressure. The hose assembly shall not show any evidence of leakage, distortion or material failure, when tested in accordance with [4.7.2](#).

3.5.3 Leakage. The hose assembly shall not leak when subjected to a pneumatic pressure of 4,000 psig (275.79 bar), when tested in accordance with [4.7.3](#).

3.5.4 Cold temperature flexing. The hose assembly shall not show any evidence cracking, splitting, distortion, or leakage when tested in accordance with [4.7.4](#).

3.5.5 Elongation and contraction. The change in hose length shall be within ± 3 percent, when tested in accordance with [4.7.5](#).

3.5.6 Tensile strength. The hose assembly shall not show any evidence of material failure from a tensile pull of not less than 1,000 pounds (453.59 kg), when tested in accordance with [4.7.6](#).

3.5.7 Burst pressure. The hose assembly shall not burst or show any evidence of material failure when tested in accordance with 4.7.7.

3.5.8 Overtightening torque. The end fitting of the hose assembly shall not show any evidence of material failure, thread damage, deformation or difficulty in turning the swivel nut on the nipple by hand, when tested in accordance with 4.7.8

3.5.9 Pressure impulse cycling (see 4.7.9).

3.5.9.1 Ambient temperature pressure impulse cycling (see 4.7.9.1). The hose assembly when tested in accordance with 4.7.9.1 shall not show any evidence of cracking, splitting, distortion, or leakage.

3.5.9.2 Elevated temperature pressure impulse cycling (see 4.7.9.2). The hose assembly when tested in accordance with 4.7.9.2 shall not show any evidence of cracking, splitting, distortion, or leakage.

3.5.10 Cleanliness. All hose assemblies shall be free from oil, grease, dirt, moisture, cleaning solvents and other foreign material, both internally and externally. The hose assembly shall not contain any particle size larger than 30 microns or a total residue weight greater than one milligram per milliliter of the measured fluid sample, when tested in accordance with 4.7.10.

3.6 Identification of product. The hose assembly shall be identified by a permanently snug-fitting aluminum or stainless steel band around the hose near the end fitting. The band shall be designed to remain tight on the hose to prevent relative movement and resultant chafing. Where the hose assembly exceeds 4 feet (1.22 m) 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. Number and title of this specification.
- b. DO NOT USE ON AIRCRAFT
- c. Date of assembly in month and year.
- d. The rated working pressure in psig, followed by the word PNEUMATIC.
- e. Manufacturer's name and trademark.
- f. PIN (see 1.2).
- g. Hose manufacturer's cage code if different from hose assembly manufacturer.

3.7 Pre-packaging. Immediately after cleaning the hose assembly the end fittings on both ends of the hose shall be capped or plugged. The hose assembly shall then be double packed and sealed with polyethylene (.006-inch thick minimum (0.15 mm)) before they are put into a shipping container (see 5). Pad sharp edges before packaging to preclude puncturing the package. Exercise care in packaging to prevent shredded or abraded polyethylene material from becoming a contaminant.

3.8 Workmanship. The hose assembly, including all parts, shall be uniform in quality and free from irregularities or defects which could adversely affect safety, performance, reliability, or durability. All surfaces shall be smooth and free from burrs.

4. VERIFICATION

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

- a. First article inspection (see 4.5).
- b. Conformance inspection (see 4.6).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the applicable test method referenced in the test procedures.

4.2.1 Temperature and pressure. Unless otherwise specified, tests shall be conducted at local ambient temperature and barometric pressure. The temperature and barometric pressure shall be recorded at the time of inspection. This information shall be available for computation of test data, where required to normal temperature and pressure conditions. Normal temperature and pressure conditions are 29.92 inches (759.97 mm) of mercury (101.3 kPa) and 70°F (21.1°C). Test instruments shall be calibrated or adjusted according to their required usage in conducting tests.

4.2.2 Gas. Unless otherwise specified, the gas used for testing, purging or drying the hose assemblies shall be clean, dry, oil-free air or nitrogen having a dew point at 0 psig of not more than 30°F (-1.11°C) and contain not more than 3 parts per million (ppm) by volume of total hydrocarbons expressed as methane equivalent.

4.2.3 Test fluid. Unless otherwise specified, the fluid used for testing, cleaning and flushing the hose assembly shall be clean, grease free, demineralized water having a specific resistance of not less than 50,000 ohms and shall not have suspended or dissolved impurities exceeding 50 ppm.

4.3 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be used.

4.3.1 Pressures. Pressures and pressure differentials shall be measured by means of Bourdon-type gages or other pressure sensing device. The pressure gage shall have an accuracy of one percent of scale reading.

4.3.2 Temperatures. Temperatures shall be measured by appropriately located thermometers or thermocouples used with calibrated potentiometers. The thermometers or thermocouples shall have accuracy within $\pm 2^\circ\text{F}$ (1.11°C).

4.4 Responsibility for compliance. All items shall meet all requirements of sections 3, 4, and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.4.1 Lot records. Manufacturers shall keep lot records for 3 years minimum. Manufacturers shall monitor for compliance to the prescribed procedures, and observe that satisfactory manufacturing conditions and records on lots are maintained for these hose assemblies. The records, including as a minimum, an attributes summary of all quality conformance inspections conducted on each lot, shall be available to review by customers at all times.

4.5 First article inspection. First article inspection shall be performed at a laboratory acceptable to the procuring activity on sample units produced with equipment and procedures used in production.

4.5.1 Samples for first article. Samples for first article shall be representative of the products proposed to be furnished to this specification. Sampling for hose assemblies shall be in accordance with 4.5.5.

4.5.2 First article inspection routine. All samples shall be subjected to first article testing in accordance with table I. The test sequence shall be determined by the manufacturer unless otherwise specified.

4.5.3 Acceptance of first article inspection. Required first article inspections (see table I) at the hose assembly level that were already performed at the bulk hose level may be eliminated from assembly first article testing if documented approval has been obtained from the procuring activity.

TABLE I. First article inspection.

Inspection	Requirement	Test method
Visual inspection	3.5.1 and 3.8	4.7.1
Configuraton	3.3.2	4.7.1
Cleanliness	3.5.10	4.7.10
Proof pressure	3.5.2	4.7.2
Leakage	3.5.3	4.7.3
Cold temperature flexing 1/	3.5.4	4.7.4
Leakage	3.5.3	4.7.3
Elongation and contraction	3.5.5	4.7.5
Tensile strength	3.5.6	4.7.6
Burst pressure	3.5.7	4.7.7
Overtightening torque	3.5.8	4.7.8
Pressure impulse cycling 2/	3.5.9	4.7.9
Ambient temperature	3.5.9.1	4.7.9.1
Leakage test	3.5.3	4.7.3
Elevated temperature	3.5.9.2	4.7.9.2
Leakage test	3.5.3	4.7.3

1/ Testing shall be performed in the order specified.

4.5.3.1 Waivers or deviations to specification requirements. All waivers or deviations to specification requirements shall be coordinated through the preparing activity; Defense Supply Center, Columbus, Attn: VAI, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Construction@dsccl.dla.mil.

4.5.4 Failures. All samples shall meet all of the contract requirements. Failure of a sample unit to pass any test shall be cause for rejection of the entire lot and to grant first article approval.

4.5.5 First article samples. Unless otherwise specified, after award of the contract or order, the manufacturer shall forward six hose assemblies, 24 inches ± 6 inches (609.6 ± 152.4 mm) long, fabricated from random samples of the bulk hose and end fittings. Samples for the tensile and burst pressure tests may be reduced to a 12 inch (304.8 mm) length to accommodate test equipment, if necessary. The samples shall be representative of the construction, workmanship, components, and materials to be used during production. When a manufacturer is in continuous production of the hose assemblies from one contract to another, submission of additional first article samples for a new contract may be waived at the discretion of the acquiring activity (see 6.2).

4.5.5.1 First article information. Upon completion of first article inspection, the Government activity responsible for conducting the inspection program (see 6.2), shall report the results of the inspection, with appropriate recommendation, to the contracting officer. Approval of the first article samples or the waiving of first article inspection does not preclude the requirements for performing individual, or sampling and periodic inspections.

4.5.5.2 Disposition of samples. First article samples shall be furnished to the Government as directed by the contracting officer (see 6.2).

4.6. Conformance inspection. For manufacturers that have successfully passed first article inspections and are continuously producing hose assemblies to this specification, on going inspections shall consist of individual inspections (see table II) and sampling and periodic inspections (see table III). If first article is waived due to prior successful first article inspection, the individual inspections and sampling and periodic inspections shall be the manufactures in house inspection procedures.

4.6.1. Individual inspection. Individual inspection shall consist of the inspections specified in table II in the order shown. Individual inspections shall be implemented on a continual basis throughout the production of hose assemblies.

TABLE II. Individual inspections.

Inspections	Requirement paragraph	Inspection paragraph	Number of samples
Visual inspection	3.5.1, 3.6, and 3.8	4.7.1	100%
Configuration	3.3.2	4.7.1	100%
Cleanliness	3.5.10	4.7.10	100%
Proof pressure ^{1/}	3.5.2	4.7.2	100%

^{1/} Without the 160°F (71.11°C) conditioning period.

4.6.2. Individual inspections. Individual inspection tests specified in table II shall be performed on a production lot basis.

4.6.2.1 Nonconformance individual inspections. If one or more defects are found in the inspection lot, then the production lot shall be screened for that particular defect and defects removed. An inspection lot shall be selected from the production lot and all individual tests (see table II) shall be performed. If one or more defects are found in the second inspection lot, the production lot shall be rejected and shall not be supplied to this specification. Test data of part performance shall be made available to the contracting agency upon request.

4.6.3 Sampling and periodic inspection. Sampling and periodic inspections shall consist of the inspections specified in table III and shall be made on test samples which have been subjected to and passed the individual inspections (see table II).

TABLE III. Sampling and periodic inspections.

Inspections	Requirement paragraph	Inspection paragraph	Sampling	Periodic
Leakage	3.5.3	4.7.3	X	
Tensile strength	3.5.6	4.7.6	X	
Overtightening torque	3.5.8	4.7.8	X	
Burst pressure	3.5.7	4.7.7		X
Ambient temperature pressure cycling ^{1/} Leakage test	3.5.9.1 3.5.3	4.7.9.1 4.7.3		X

^{1/} Testing shall be performed in the order specified.

4.6.4 Sampling and periodic inspection samples.

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

4.6.4.2 Lot samples. For each lot of five hundred hose assemblies or fraction thereof produced, four hose assembly samples 18 inches \pm 6 inches (5.49 m \pm 182.88 cm) long shall be fabricated from random samples of the bulk hose and end fittings using production processes and procedures.

4.6.5 Non conformance sampling and periodic inspections. In the event a failure should occur during sampling or periodic inspection tests, specified in table III, then the production lot shall be screened for that particular defect and defects removed. An inspection lot shall be selected from the production lot and all sampling and periodic tests shall be performed. If one or more defects are found in the second inspection lot, the production lot shall be rejected and shall not be supplied to this specification. Test data of part performance shall be made available to the contracting agency upon request.

4.7 Inspection methods.

4.7.1 Visual examination and dimensional check.

4.7.1.1 Visual examination. The hose assembly shall be visually examined to ascertain whether both ends are firmly sealed with a protective device and to determine conformance with respect to materials, configuration and workmanship. The hose assembly shall meet the requirements specified in 3.5.1.1.

4.7.1.2 Dimensional check. The hose assembly shall be checked dimensionally to determine conformance to the requirements specified in 3.5.1.2.

4.7.2 Proof pressure (see 3.5.2). The hose assembly when subjected to proof pressure shall meet the requirements specified in 3.5.2. The following details shall apply:

- a. The hose assembly shall be conditioned at not less than 160°F (71.11°C) for a minimum of one hour.
- b. Immediately after the conditioning period, the hose assembly shall be subjected to 8,000 psig (551.58 bar) hydrostatic pressure for not less than 30 seconds or exceeding 5 minutes.

4.7.3 Leakage (see 3.5.3). The hose assembly when subjected to the leakage test shall meet the requirements in 3.5.3. The following details shall apply:

- a. The hose assembly shall be pressurized to 4,000 psig (275.79 bar) pneumatic pressure, with the assembly under water.
- b. The pressure shall be maintained for not less than 1 minute nor more than 15 minutes.
- c. Indication of rapid forming and breaking away of bubbles from any point on the outer surface of the hose or any part of the end fitting shall be considered as not meeting the requirements. In the event of a dispute, the effusion from any 12-inch (30.5 cm) section of the hose assembly shall be collected in an inverted graduate for 15 minutes.
- d. At the end of 15 minutes, the amount of gas accumulated in the graduate shall not exceed 50 cc.

4.7.4 Cold temperature flexing (see 3.5.4). The hose assembly when subject to cold temperature flexing shall meet the requirements in 3.5.4. The following details shall apply:

- a. The hose assembly shall be placed in a cold chamber and soaked at $-65^{\circ}\text{F} \pm 2^{\circ}\text{F}$ ($-53.9^{\circ}\text{C} \pm 1.11^{\circ}\text{C}$) for a minimum of 24 hours.
- b. At the end of the soaking period, and with the hose assembly still at the specified temperature, the hose assembly shall be flexed through 180° to the applicable bend radius shown on [figure 1](#) and then straightened.
- c. The hose assembly shall again be flexed through 180° to the same bend radius in such a direction that the portion of the hose under maximum compression during the first flexing will be under maximum expansion during the second flexing.
- d. The hose assembly shall be flexed in both directions within 4 seconds.
- e. The hose assembly shall then be subjected to and meet the leakage test (see 4.7.3).

4.7.5 Elongation and contraction (see 3.5.5). The hose assembly when subjected to the elongation and contraction test shall meet the requirements in 3.5.5. The following details shall apply:

- a. The hose assembly shall be placed in a straight position with one end unrestrained.
- b. Before applying pressure, the free length of the hose assembly shall be measured.
- c. The hose assembly shall then be pressurized to a minimum of 4,000 psig (275.79 bar) and maintained at that pressure for a minimum of 5 minutes.
- d. At the end of 5 minutes and while still at the test pressure, the change in free length shall be measured.

4.7.6 Tensile strength (see 3.5.6). A hose assembly when subjected to the tensile strength test shall meet the requirements of 3.5.6. The following details shall apply:

- a. The hose assembly shall be placed in a straight position and pressurized to a minimum of 4,000 psig (275.79 bar).
- b. While pressurized, the hose assembly shall be pulled by the end fittings to a minimum of 1,000 pounds (453.59 kg) tensile pull at the minimum rate of 1 inch per minute.
- c. The hose assembly shall meet the requirements specified in 3.5.6.

4.7.7 Burst pressure (see 3.5.7). A hose assembly when subjected to burst pressure shall meet the requirements of 3.5.7. The following details shall apply:

- a. The hose assembly shall be conditioned at not less than 160°F (71.11°C) for a minimum of one hour.
- b. Immediately after the conditioning period, the hose assembly shall be connected to a pressure source and placed in a straight position with one end unrestrained.
- c. The hose assembly shall then be pressurized at a rate of 20,000 psig \pm 5000 psig (13789 \pm 344.74 bar) per minute to a maximum pressure of 16,000 psig (1103 bar), held for 1 minute, and then pressurized until failure occurs.
- d. The hose assembly shall meet the requirements specified in 3.5.7.

4.7.8 Overtightening torque (see 3.5.8). The flared end fittings when subjected to being overtightening torque shall meet the requirements of 3.5.8. The following details shall apply:

- a. The flared end fittings (type I) of the hose assembly shall be assembled on a steel fitting (material I) accordance with SAE AS4395.
- b. The fitting shall be torqued as minimum, 1-3/4 times the maximum torque values specified in SAE ARP908 and loosened.
- c. The tightening and loosening sequence shall be repeated until a total of not less than 15 cycles have been performed.
- d. The end fitting shall then be removed and examined for damage.

4.7.9 Pressure impulse cycling (see 3.5.9). The hose assemblies when tested to the impulse cycling tests specified in 4.7.9.1 and 4.7.9.2 shall meet the requirements of 3.5.9.

4.7.9.1 Ambient temperature pressure impulse cycling (see 3.5.9.1). The hose assembly when subjected to the ambient temperature pressure impulse cycling test shall meet the requirements of 3.5.9.1. The following details shall apply:

- a. Hose assembly shall be fixed in a semicircular position with the longitudinal axes of the end fittings parallel.
- b. The hose assembly shall be subjected to a hydraulic or pneumatic pressure impulse cycle from 0 to 4,000 to 0 psig (0 to 275.79 to 0 bar) at the rate of not less than 60 \pm 10 cycles per minute for not less than 1,000 cycles.
- c. The hose assembly shall then be subjected to and meet the leakage test (see 4.7.3).

4.7.9.2 Elevated temperature pressure impulse cycling (see 3.5.9.2). The hose assembly when subjected to the elevated temperature pressure impulse cycling test shall meet the requirements of 3.5.9.2. The following details shall apply:

- a. The hose assembly shall be subjected to the pressure impulse cycling test specified in 4.7.9.1, except the temperature shall be not less than 160°F (71.11°C).
- b. The hose assembly shall then be subjected to and meet the leakage test (see 4.7.3).

4.7.10 Cleanliness (see 3.5.10). The hose assembly when cleaned shall meet the requirements of 3.5.10. The following details shall apply.

- a. Fill the hose assembly with clean water or isopropyl alcohol.
- b. Using a clean brush, having a diameter at least 1/16 inch (.063 inch) (1.59 mm) larger than the inside diameter of the hose, brush the entire internal length of the hose assembly including the end fittings making sure the entire internal surface of the hose assembly is brushed.
- c. After the brushing operation, the fluid shall be drained from the hose assembly into a clean beaker. Vigorously agitate the fluid in the beaker before transferring 50 ±5 cc of the fluid to a clean evaporating dish that has been previously weighed.
- d. Evaporate to dryness at 219 ± 2°F (103.89°C ± 1.11°C). Determine weight of residue and examine residue microscopically for particle size.
- e. Upon completion of this test procedure, the hose shall be dried by passing 160°F (71.11°C) maximum nitrogen gas through the hose.

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 assembly covered by this specification is intended for use as a component of high-pressure pneumatic ground support equipment used in aircraft ground servicing and engine starting applications. The hose assembly is military unique because it must have a minimum tensile strength of 1,000 pounds (453.59 kg) and must be able to be flexed through 180° at a specified bend radius at a temperature or -65°F (-53.89°C). Commercial hoses do not have these requirements and would experience catastrophic damage. (DO NOT USE FOR OXYGEN.)

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. PIN (see 1.2).
- c. Quantity required.
- d. Whether first article inspection is waived (see 4.5.3).
- e. Lot records if required (see 4.4.1).

- f. Name and address of the first article inspection test facility to which first article samples (if required see 4.5.5) are to be forwarded and the name and address of the Government activity responsible for conducting the first article inspection program (see 4.5.5.1 and 6.3).
- g. Packaging requirements (see 5.1).
- h. Whether fitting guard is require.

6.3 First article. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first article samples. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.3.1 Defense Logistics Agency (DLA) waiver of first article test. A waiver of a first article testing will only be considered by DLA when the contractor has delivered the same item within the last three years, has no unfavorable quality history, has not changed processes, or changed any subcontractors. DLA will not accept first article testing results outside the stated requirements.

6.4 Subject term (key word) listing.

Aircraft air servicing
 End fitting
 Engine air starting
 Fitting guard
 Ground support equipment
 Inner tube
 Low temperature
 Oil resistant
 Ozone resistant
 4000 psig

6.5 Environmentally preferable material. 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 Ketone	Trichloroethylene
Chromium and Compounds	Methyl Isobutyl Ketone	Xylenes
Cyanide and Compounds	Nickel and Compounds	

6.6 Shelf life. This specification covers items where shelf life is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order. The shelf-life codes are contained in the Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoD 4140.27-M, Shelf-life Management Manual, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order. (1) The Inventory Control Points (ICPs), and (2) the DoD Service and Agency Administrators for the DoD Shelf-Life Program. Appropriate POCs for DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: <http://www.shelflife.hq.dla.mil/>.

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

CONCLUDING MATERIAL

Custodians:

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

Preparing activity:

DLA - CC

(Project 4720-2007-002)

Review activities:

Army - AT, MI
Navy - CG, 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 database at <http://assist.daps.dla.mil>.