

DETAIL SPECIFICATION

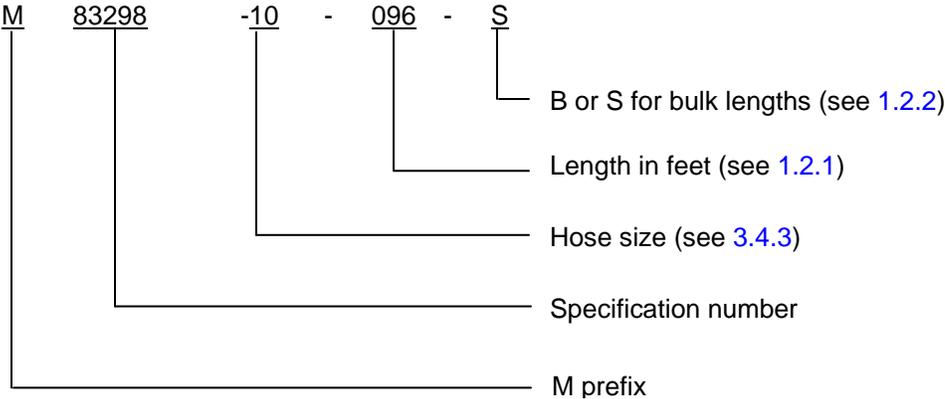
HOSE, CONDUCTIVE POLYTETRAFLUOROETHYLENE TUBE,
HIGH TEMPERATURE, HIGH PRESSURE (3000 PSI),
HYDRAULIC AND PNEUMATIC

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 hose, conductive polytetrafluoroethylene tube, high-temperature, high pressure (3000 psi), hydraulic and pneumatic (see 6.1).

1.2 Part or Identifying Number (PIN) bulk hose or specific lengths. The hose PIN consists of the letter M, the specification number, a dash, hose size, a dash, length in feet, a dash, and a B or S for bulk hose.



PIN example: M83298-10-096-S, describes a 5/8 inch ID hose, 92 continuous feet long.

1.2.1 Length. Specify length in feet using three numbers; use the number zero as place holders as applicable.

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 FluidFlow@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>.

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1.2.2 Bulk hose lengths. Bulk hose lengths are represented by the letter B or S. Bulk lengths are in increments of 20 feet or more (see 3.4.3.1.1). The S designator is used to define specific lengths in feet (see 3.4.3.1.2).

Examples:

When 30 feet total length is required the designator is: 030-B

When 30 feet continuous length is required with a 1% tolerance the designator is: 030-S

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.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-5606	-	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-PRF-680	-	Degreasing Solvent
MIL-PRF-7808	-	Lubricating Oil, Aircraft, Turbine Engine, Synthetic Base
MIL-PRF-83282	-	Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft
MIL-DTL-83296	-	Fitting, Corrosion Resistant Steel, High Temperature, High Pressure, General Requirements for
MIL-PRF-87257	-	Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile
MIL-DTL-32330	-	Hose Assembly, Conductive Polytetrafluoroethylene Tube, Smooth Bore, Flared and Flarless, Tube to Hose, with Swivel Nut

DEPARTMENT OF DEFENSE STANDARD

MIL-STD-130	-	Identification Marking of US Military Property
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(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> 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.

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D4895 - PTFE Resin Produced from Dispersion

(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.)

NCSL INTERNATIONAL

NCSL Z540.3 - Requirements for the Calibration of Measuring and Test Equipment

(Copies of these documents are available online at <http://www.ncsli.org> or from NCSL International 2995 Wilderness Place, Suite 107 Boulder, Colorado 80301-5404.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 17025 - General requirements for the competence of testing and calibration laboratories

(Copies of these documents are available online at <http://www.iso.ch> or from the International Organization for Standardization American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

SAE INTERNATIONAL

SAE-AS603 - Impulse Testing of Hydraulic Hose, Tubing, and Fitting Assemblies
SAE-AS611 - Hose Assembly and Tubing, Polytetrafluoroethylene, Cleaning Methods for
SAE-AS2078 - Test Methods, Hose Assemblies, Polytetrafluoroethylene (PTFE)
SAE-AMS2700 - Passivation of Corrosion Resistant Steels

(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. Unless otherwise noted herein or in the contract, in the event of a conflict between 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 furnished under this specification shall be a product that is authorized by the qualifying activity for listing on the applicable qualified products list (QPL) before contract award (see 4.4 and 6.3). The hose shall be qualified with approved fittings listed on QPL-83296 from two or more manufacturers.

3.2 Materials. Materials used shall be as identified herein or as approved by the qualifying activity. However, materials not specified herein or approved by the qualifying activity, shall be of a quality that will enable the hose to meet the requirements specified herein.

3.2.1 Hose construction. The hose shall consist of a polytetrafluoroethylene tube with corrosion-resistant steel reinforcement.

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3.3 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.

3.4 Design and construction. The hose shall be so designed and constructed that, when assembled with approved end fittings in accordance with MIL-DTL-83296; the resulting hose assemblies shall meet the requirements of this specification and MIL-DTL-32330.

3.4.1 Tube. The tube shall be a seamless extrusion of virgin polytetrafluoroethylene resin. Base resin shall conform to ASTM D4895, except for the specific gravity (SG) requirements. Additives may be included in the compound from which the tube is extruded.

3.4.1.1 Reinforcement. The reinforcement shall be braided corrosion-resistant stainless steel wire, uniform in quality and size, and of sufficient strength to insure that the hose shall meet the requirements specified herein. There shall be no broken or spliced reinforcing wires nor shall any wires be omitted in any length of hose. Corrosion resistant steel shall be passivated in accordance with SAE-AMS2700, method 2 (see 6.7.1).

3.4.1.2 Interlayers. Interlayers, if used, shall be resistant to or suitably protected from all fluids with which the hose may come in contact. They shall be capable of withstanding temperature and pressures specified in table I. Interlayers shall not extrude through the outer braid.

TABLE I. Performance requirements of hose. 1/ 2/

Size dash no.	Hose dia. fraction	Maximum operating pressure		Proof pressure		Min. burst pressure at room temp		Min. burst pressure at high temp	
		psi	MPa	psi	MPa	psi	MPa	psi	MPa
-4	1/4	3,000	21	6,000	41	16,000	110	12,000	83
-6	3/8	3,000	21	6,000	41	14,000	97	10,500	72
-8	1/2	3,000	21	6,000	41	14,000	97	10,500	72
-10	5/8	3,000	21	6,000	41	12,000	83	9,000	62

TABLE I. Performance requirements of hose - Continued. 1/ 2/

Size dash no.	Min. bend radius (inside of bend) inches (mm)	Volume expansion (cc/in.)	Pneumatic temperature range	Hydraulic temperature range °F (°C)
-4	3.00 (76.2)	.065	-65°F to +160 °F -54°C to 71°C	-65°F to +400°F -54°C to 204°C
-6	5.00 (127)	.085		
-8	5.75 (146)	.135		
-10	6.50 (165)	.220		

1/ Dimensions are in inches.

2/ Metric equivalents are given for information only.

3.4.2 Hose end fittings. Hose end fittings required to test hose assemblies to the requirements of this specification shall conform to MIL-DTL-83296 and the applicable detail specification sheet.

3.4.3 Dimensions. The hose dimensions shall be as specified in [table II](#).

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TABLE II. Hose dimensions. 1/ 2/

Size dash no.	Min. hose ID inches (mm)	Tubing wall thickness inches (mm) ±.005 (0.13)	Max. over braid OD inches (mm)
-4	.217 (5.51)	.050 (1.27)	.470 (11.94)
-6	.310 (7.87)	.050 (1.27)	.575 (14.61)
-8	.425 (10.80)	.050 (1.27)	.742 (18.85)
-10	.552 (14.02)	.050 (1.27)	.882 (22.40)

1/ Dimensions are in inches.

2/ Metric equivalents are given for information only.

3.4.3.1 Length. Lengths of hose may be ordered in bulk lengths (see 3.4.3.1.1) or specific lengths (see 3.4.3.1.2).

3.4.3.1.1 B designator for bulk hose. Bulk hose may be furnished in various lengths. If the hose is supplied in various lengths they shall be specified in table III.

TABLE III. Bulk hose lengths.

Size dash no.	Lengths 3 ft to 14 ft (0.9 to 4.3 m) (max. %)	Lengths above 14 ft (4.3 m) (min. %)
-4	35	65
-6	35	65
-8	35	65
-10	45	55

3.4.3.1.2 S designator for specific bulk hose lengths. When the order is for a specific length in feet, a tolerance of ±1% of the required length shall be used.

3.5 Examination of product. The hose shall conform to the materials (see 3.4), cleaning (see 3.5.1), dimensions (3.4.3, hose identification (see 3.7)), and workmanship (see 3.8), when examined as specified in 4.8.1.

3.5.1 Cleaning. All hose shall be cleaned in accordance with SAE-AS611, class 0. The interior surface of the hose shall be free from oil, grease, dirt, moisture, cleaning solvents and foreign materials when examined in accordance with 4.8.1.2 and 4.8.1.3. After cleaning ends of each hose length shall be capped or plugged to prevent entrance of moisture and foreign matter. The caps or plugs shall be securely attached and shall withstand normal strains, jarring and vibrations encountered during shipping, storage, and handling.

3.6 Performance. The hose shall be capable of meeting the following performance requirements within the physical requirements specified in table I.

3.6.1 Tests on PTFE inner tube.

3.6.1.1 Density and relative density. When tested in accordance with 4.8.2.1, the PTFE inner tube specific gravity shall not exceed 2.155 apparent and 2.210 relative.

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3.6.1.2 Tensile strength. The longitudinal tensile strength for all sizes of tube shall be 2200 psi (15.2 Mpa) minimum, and the transverse tensile strength (-10 size only) shall be 1800 psi (12.4 Mpa) minimum at 73°F ±4 °F (22.8°C ± 2.2°C). The tensile strength test shall be conducted in accordance with [4.8.2.2](#).

3.6.1.3 Elongation. The longitudinal and transverse elongation at 73°F ±4°F (22.8°C ± 2.2°C) shall be a minimum of 200% when tested in accordance with [4.8.2.3](#).

3.6.1.4 Electrical conductivity of tube. Tube sizes -4 through -8 when tested in accordance with [4.8.2.4](#) shall be capable of conducting a current equal to or greater than 6 microamperes. Tube size -10 shall be equal to or greater than 12 microamperes with a test potential of 1,000 volts dc, when tested in accordance with [4.8.2.4](#).

3.6.1.5 Tube roll. When tested in accordance with [4.8.2.5](#), the PTFE inner tube shall meet the gap dimensions for rolling requirements in accordance with SAE-AS2078. The PTFE inner tube shall not leak, split, burst, or show any evidence of failure.

3.6.1.6 Tube proof pressure. The tube without any reinforcing wires shall not leak, burst, or show any evidence of permanent deformation when tested in accordance with [4.8.2.6](#).

3.6.2 Hose and hose assembly. The hose, when assembled with end fittings in accordance with MIL-DTL-83296, shall meet the following performance requirements.

3.6.2.1 Proof pressure. There shall be no leakage through the wall of the hose or around the fittings when the hose assembly is subjected to testing in accordance with [4.8.3.1](#).

3.6.2.2 Leakage. The hose assembly shall not leak or rupture when subjected the minimum room temperature burst pressure specified in [table I](#) when tested in accordance with [4.8.3.2](#).

3.6.2.3 Burst testing.

3.6.2.3.1 Room temperature burst pressure. The hose assembly shall not leak or rupture at any pressure below the minimum room temperature burst pressure specified in [table I](#), when tested in accordance with [4.8.3.3.1](#).

3.6.2.3.2 High temperature burst pressure. When tested in accordance with [4.8.4.3.2](#), the hose assembly shall not leak, rupture, or blow off the hose at any pressure below the minimum high temperature burst pressure specified in [table II](#).

3.6.2.4 Elongation and contraction. The hose assembly shall not change in length by more than ±.20 inch (5.08 mm) in 10 inches (254 mm) of length when tested in accordance with [4.8.3.4](#).

3.6.2.5 Stress degradation. The average air effusion shall not exceed 2.0 cc/in/min when tested in accordance with [4.8.3.5](#).

3.6.2.6 Impulse. The hose assembly shall not burst, leak, or show evidence of malfunctioning when subjected to a minimum of 250,000 impulse cycles when tested in accordance with [4.8.3.6](#).

3.6.2.7 Thermal shock. The hose assembly shall not leak or rupture at any pressure below the minimum high temperature burst pressure specified in [table I](#), when tested in accordance with [4.8.3.7](#).

3.6.2.8 Flexibility. The hose assembly shall not leak or show any evidence of malfunction when tested in accordance with [4.8.3.8](#).

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3.6.2.9 Volumetric expansion. The volumetric expansion of the hose shall not exceed the limits specified in [table I](#) when tested in accordance with [4.8.3.9](#).

3.6.2.10 Pneumatic effusion. The hose assembly effusion rate shall not exceed 8.0 cc/ft/30 min. when tested in accordance with [4.8.3.10](#).

3.6.2.11 Pneumatic surge. The tube of the hose assembly shall not collapse and there shall be no evidence of degradation when examining the sectioned hose and the down stream filter, when tested in accordance with [4.8.3.11](#).

3.6.2.12 Corrosion. The hose assembly shall function satisfactorily at the specified operating pressure after 172 hours of cycling when tested in accordance with [4.8.3.12](#).

3.7 Identification of product. The hose shall be permanently and legibly marked in accordance with MIL-STD-130 at each end and at 10 ft (3.0 m) intervals with the following information:

- a. Specification PIN (see [1.2](#)). The length and letter B or S shall be omitted. PIN example: M83298-10
- b. The rated working pressure in PSI (3000 psi).
- c. Hose manufacturer's CAGE code.

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 as specified in [table IV](#). Workmanship shall be such as to enable the hose and hose assemblies to meet the applicable performance requirements of this specification.

TABLE IV. Workmanship defects.

Defect	Inspection	Reference
Dimensions affecting interchangeability not within tolerance	Standard inspection equipment (SIE)	3.4.3
Hose inside diameter at fitting junction out of tolerance	SIE (hose assembly only)	3.4.3
Ridge on tube - Severe	SIE	N/A
Bunching of tube - Severe	SIE	N/A
Loose tube	SIE	N/A
Hole in tube	SIE	N/A
Restriction in the tube	SIE	N/A
Nad lap or delamination of tube	SIE	N/A
Reinforcement through tube	SIE	3.4.1.1
Broken or spliced reinforcing wires	Visual	3.4.1.1
Misbranding	Visual	3.7
Bulge behind the coupling	Visual	N/A
Cocked couplings	Visual	N/A
Cracked couplings	Visual	N/A
Freedom of swivels	Visual	N/A
Rusted couplings	Visual	N/A
Internal contaminants	SIE	3.5.1

4. VERIFICATION

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

- a. Qualification inspection (see 4.4).
- b. Conformance inspection (see 4.5).

4.2 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 established and maintained or identified by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ISO 17025 and NCSL Z540.3 as applicable.

4.3 Inspection conditions. Unless otherwise specified, all testing shall be conducted at an atmospheric pressure within the range of 28 to 31 inches of mercury (71.1 to 78.7 cm of mercury), a temperature between 60°F and 100°F (15.6°C and 37.8°C), and a relative humidity of not more than 90%. Tolerances of the test conditions are as follows:

- a. Temperature: +10°F, -5°F (+5.55°C, -2.8°C)
- b. Pressure (gauge): ±5%

4.3.1 Stabilization of test temperatures. Unless otherwise specified, the test temperature in the chamber shall be stabilized before conducting the test (see 6.6.1).

4.3.2 Test fluids. Unless otherwise specified, the pressure test fluid shall be hydraulic fluid in accordance with MIL-PRF-5606, MIL-PRF-83282, MIL-PRF-87257, or water (proof, burst or leakage test only). When a high temperature test fluid is specified the test fluid shall be lubricating oil in accordance with MIL-PRF-7808.

4.3.3 Oil aging. In all of the tests using oil-aged samples, the assembly shall be filled with a high temperature test fluid and soaked in an air oven at a temperature of 400°F (204°C) for 7 days. All air shall be excluded from the bore of the assembly during the test.

4.3.4 Air aging. In all of the tests using air aged samples the hose assemblies shall be kept at a temperature of 400°F (204°C) for 7 days.

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

4.4.1 Samples for qualification. Samples for qualification shall be representative of the products proposed to be furnished to this specification. Test samples shall consist of 16 assemblies of each size and length, as well as two 6-inch (152 mm) and two 14-inch (356 mm) lengths of tubing (reinforcement removed) of each size, as specified in table V. Hose assemblies shall be made up from hose specified herein and end fittings in accordance with MIL-DTL-83296. Hose shall be qualified with fittings from a minimum of two specific qualified manufacturers. Test samples shall be examined and tested by the manufacturer activity in accordance with this specification and the results will be submitted to the qualifying activity.

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TABLE V. Tube and hose assembly lengths for testing. 1/ 2/

Hose size dash no.	Hose assemblies (20) 3/									
	Category 1		Category 2		Category 3		Category 4		Category 5	
	Length inches (mm)	Qty.	Length inches (mm)	Qty.	Length inches (mm)	Qty.	Length inches (mm)	Qty.	Length inches (mm)	Qty.
-4	16 (406)	4	20 (508)	4	18 (457)	4	14 (356)	2	6 (152)	2
-6	21 (533)	4	27 (686)	4	18 (457)	4	14 (356)	2	6 (152)	2
-8	24 (610)	4	30 (762)	4	18(457)	4	14 (356)	2	6 (152)	2
-10	30 (762)	4	33 (762)	4	18 (457)	4	14 (356)	2	6 (152)	2

1/ Dimensions are in inches.

2/ Metric equivalents are given for information only.

3/ Hose assemblies vary in length among sizes. Category numbers shall be used to decide appropriate length of hose for testing.

4.4.2 Qualification inspection routine. All samples shall be subjected to qualification testing in accordance with table VI and in the sequence specified in table VII.

4.4.3 Acceptance of qualification data. For identical requirements and test procedures, using an identical fitting or hose assembly, qualification test data from MIL-DTL-83296 and MIL-DTL-32330 may be accepted as qualification test data for MIL-DTL-83298 providing that documented approval has been obtained from the qualifying activity. Unless otherwise approved by the qualifying activity, qualification test data from one manufacturer shall not be accepted for another.

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

TABLE VI. Qualification inspection.

Inspection or test	Requirement paragraph	Test method paragraph
Tube inspections		
Tube roll	3.6.1.5	4.8.2.5
Tube proof pressure	3.6.1.6	4.8.2.6
Tensile strength	3.6.1.2	4.8.2.2
Elongation	3.6.1.3	4.8.2.3
Electrical conductivity test	3.6.1.4	4.8.2.4
Density and relative density	3.6.1.1	4.8.2.1
Hose inspections		
Examination of product	3.5, 3.7, and 3.8	4.8.1
Hose proof pressure	3.6.2.1	4.8.3.1
Leakage	3.6.2.2	4.8.3.2
Room temperature burst pressure	3.6.2.3.1	4.8.3.3.1
High temperature burst	3.6.2.3.2	4.8.3.3.2
Elongation and contraction	3.6.2.4	4.8.3.4
Stress degradation	3.6.2.5	4.8.3.5
Impulse	3.6.2.6	4.8.3.6
Thermal shock test	3.6.2.7	4.8.3.7
Flexibility test	3.6.2.8	4.8.3.8
Volumetric expansion test	3.6.2.9	4.8.3.9
Pneumatic effusion test	3.6.2.10	4.8.3.10
Pneumatic surge test	3.6.2.11	4.8.3.11
Corrosion test	3.6.2.12	4.8.3.12

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TABLE VII. Qualification test sequence.

Sample no.	Sample type	Length(s) <u>2/</u>	Qty.	Test sequence - paragraph numbers					
				4.8.1	4.8.2.6	4.8.2.5	4.8.2.3	4.8.2.2	4.8.2.1
1, 2	Tube <u>1/</u>	6 inch	2	4.8.1	4.8.2.6	4.8.2.5	4.8.2.3	4.8.2.2	4.8.2.1
3, 4	Tube <u>1/</u>	14 inch	2	4.8.1	4.8.2.6	4.8.2.5	4.8.2.4	—	—
5, 6	Hose assembly	Category 4	2	4.8.1	4.8.3.1	4.8.3.4	4.8.3.8	—	—
7, 8	Hose assembly	Category 3	2	4.8.1	4.8.3.1	4.8.3.9	4.8.3.10	4.8.3.3.1	—
9, 10 <u>3/</u>	Hose assembly	Category 3	2	4.8.1	4.8.3.1	4.8.3.2	4.8.3.3.2	—	—
11, 12	Hose assembly	Category 5	2	4.8.1	4.8.3.1	4.8.3.2	4.8.3.7	—	—
13, 14	Hose assembly	Category 1	2	4.8.1	4.8.3.1	4.8.3.5	4.8.3.11	—	—
15, 16	Hose assembly	Category 2	2	4.8.1	4.8.3.1	4.8.3.12	—	—	—
17 thru 22	Hose assembly	Category 1	2	4.8.1	4.8.3.1	4.8.3.6	—	—	—
		Category 2	2						
		Category 3	2						

1/ Reinforcement removed.

2/ Where applicable, categories shall be specified in table III.

3/ These samples shall have a 90° elbow fitting on one end of the assembly.

4.5 Conformance inspection.

4.5.1 Samples for conformance. Samples for conformance shall be made up of tube or hose, as specified herein and qualified fittings from MIL-DTL-83296. Fittings may be from any one or multiple producers.

4.5.2 Individual inspection. Inspection of the product for delivery shall consist of subjecting each length of tube and hose of each size to the individual tests specified in table VIII. Any item failing to meet the requirements of the individual tests shall be immediately removed from the lot.

TABLE VIII. Individual inspection. 1/

Inspection or test	Requirement paragraph	Test method paragraph
Examination of product	3.5, 3.7, and 3.8	4.8.1
Tube roll	3.6.1.5	4.8.2.5
Tube proof pressure	3.6.1.6	4.8.2.6
Proof pressure (hose)	3.6.2.1	4.8.3.1

1/ 100% inspection required on all hose supplied to this specification.

4.5.3 Sampling inspection. Hose lengths, randomly selected from a production lot (see 4.5.3.1) to form an inspection sample (see 4.5.3.2), shall be subjected to the sampling tests specified in table IX.

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TABLE IX. Sampling inspection.

Inspection or test	Requirement paragraph	Test method paragraph
Elongation and contraction	3.6.2.4	4.8.4.4
Leakage	3.6.2.2	4.8.3.2
Room temperature burst pressure	3.6.2.3.1	4.8.4.3.1

4.5.3.1 Production lot. A production lot shall consist of one size hose assembly manufactured on the same production line(s) by means of the same production techniques, materials, controls, and design during the same continuous production run.

4.5.3.2 Inspection sample. An inspection sample shall consist of hose lengths randomly selected from the production lot without regard to quality. For each full or partial increment of 750 feet (228.6 m) of bulk hose produced in the continuous run, one sample shall be subjected to the sampling tests.

4.5.3.3 Nonconformance of sampling tests. If one or more defects are found in the inspection sample, both the qualifying and inspection activities shall be immediately notified and the production lot shall be rejected and not be supplied to this specification. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity, has been taken. The corrective measures shall be performed on the materials or processes, or both, as warranted, and on all products considered subjected to the same failure. Once the corrective action has been completed, either the specific sampling test in which the original sample failed or all sampling tests may be required to be repeated on additional samples, at the option of the qualifying activity. However, final acceptance shall be withheld until testing has shown that the corrective action was successful. In the event of a failure after re-inspection, information concerning the failure and the corrective action taken shall be furnished to both the qualifying and inspection activities.

4.5.3.4 Disposition of sampling inspection samples. Samples that have been subjected to sampling inspection are considered damaged and shall not be delivered as part of a contract or purchase order.

4.5.4 Periodic control test plan. Testing shall be specified in table X.

4.5.4.1 Tests. The hose shall be individually selected from a periodic control test lot and subjected to the tests below.

4.5.4.2 Periodic inspection samples (see table X). For each size manufactured under essentially the same conditions, periodic control testing shall be performed on either four samples for each periodic test from every 20,000 feet (of bulk hose produced or one sample for each periodic test from every 5,000 feet (1524 m). If there has been some production but the total number of footage produced has not reached 5000 feet (1524 m) for a specific size within three years, the manufacturer shall perform periodic control tests on one sample for each periodic test of that size unless documented approval has been obtained from the qualifying activity.

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TABLE X. Periodic inspection.

Inspection or test	Requirement paragraph	Test method paragraph
Tube		
Specific gravity	3.6.1.1	4.8.2.1
Tensile strength	3.6.1.2	4.8.2.2
Elongation	3.6.1.3	4.8.2.3
Electrical conductivity test	3.6.1.4	4.8.2.4
Hose		
Stress degradation	3.6.2.5	4.8.4.5
Impulse	3.6.2.6	4.8.4.6

4.5.4.3 Nonconformance of periodic inspections. If a sample fails a periodic control test, both the qualifying and inspection activities shall be immediately notified of such failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity, has been taken. The corrective measures shall be performed on the materials or processes, or both, as warranted, and on all products considered subjected to the same failure. Once the corrective action has been completed, either the specific periodic control test in which the original sample failed or all periodic control tests may be required to be repeated on additional samples, at the option of the qualifying activity. Furthermore, the sampling tests may be reinstated in addition to the periodic control tests if deemed applicable by the qualifying activity. However, final acceptance shall be withheld until testing has shown that the corrective action was successful. In the event of a failure after re-inspection, information concerning the failure and the corrective action taken shall be furnished to both the qualifying and inspection activities.

4.5.4.4 Disposition of periodic test specimens. Samples that have been subjected to periodic control tests are considered damaged and shall not be delivered as part of a contract or purchase order.

4.5.5 Discontinuation and resumption of production. If there has been no production of a specific size for a period of three years or more, 16 samples shall be randomly selected from the first lot produced when production of that size has been resumed. Eight of the samples shall be subjected to the sampling tests and the remaining eight shall be subjected to the periodic inspections (see table X).

4.5.6 Acceptance of conformance inspection data. For identical requirements and test procedures, using an identical fitting, conformance inspection data from MIL-DTL-83296 and MIL-DTL-32330 may be accepted as conformance inspection data for MIL-DTL-83298, providing that documented approval has been obtained from the qualifying activity. When conformance inspection data from MIL-DTL-83296 or MIL-DTL-32330 is to be accepted as conformance inspection data for MIL-DTL-83298, one hose assembly shall be considered to be the equivalent of two feet of bulk hose.

4.6 Additional QPL test and reporting requirements.

4.6.1 Retention of qualification. To retain qualification, the contractor shall submit a test report to the qualifying activity at 12 month intervals. The qualifying activity shall establish the initial reporting date. Each report shall consist of a summary of test and inspection results required by this specification that were performed during the 12 month reporting interval. As a minimum, the report shall include the following:

- a. Number of lots produced and tested, including lot and sample sizes for each lot.
- b. Identify which tests were performed.
- c. Quantities passed.
- d. Quantities failed.
- e. All reworked sampling lots shall be accounted for and identified. A summary of corrective action taken shall be included.

4.7 Loss of product qualification.

4.7.1 Failure to meet test requirements. The manufacturer shall immediately notify the qualifying activity at any time during the 12-month reporting period when the qualified product fails to meet the test and inspection requirements of this specification. The manufacturer shall identify and indicate what corrective action will be taken to correct the problem. Failure to take corrective action acceptable to the qualifying activity may result in removal of the product from the QPL.

4.7.2 Failure to submit summary test data report. Failure to submit a report within 30 days after the end of the 12 month reporting period may result in loss of qualification for the product.

4.7.3 Change to manufacturing process, materials or equipment. The manufacturer shall notify the qualifying activity, in writing, of any changes in the manufacturing process, materials, or equipment used to manufacture a qualified product list (QPL) product. Subsequently, the qualifying activity shall notify the manufacturer, in writing, if a full re-qualification, partial re-qualification, or no additional testing is required as a result of these changes.

4.7.4 No production during reporting period (12 months). When no production occurs during the reporting period, a report shall be submitted to the qualifying activity certifying that the manufacturer still has the capability and facilities necessary to produce the QPL product.

4.8 Test methods.

4.8.1 Examination of product.

4.8.1.1 Hose and tube. The tube and hose shall be examined to determine compliance with this specification with respect to the following:

- a. Hose identification (see 3.7).
- b. Tube dimensions (see table II).
- c. Hose dimensions (see table II).
- d. Cleaning (see 3.5.1)

4.8.1.2 Tube. The tube shall be visually inspected for workmanship before reinforcing. Cleanliness, scratches and projections shall be cause for rejection.

4.8.1.3 Hose inspection. The hose shall be visually inspected for broken or missing reinforcing wires which shall be cause for rejection. Crossed over reinforcing wires shall not be cause for rejection. The hose shall be visually inspected for cleanliness. Moisture or any particulate matter on the inner surface of the hose shall be cause for rejection.

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4.8.2 Tube tests.

4.8.2.1 Density and relative density (see 3.6.1.1). Density and relative density when tested in accordance with SAE-AS2078 the specific gravity of the PTFE tube shall meet the requirements of 3.6.1.1.

4.8.2.2 Tensile strength (see 3.6.1.2). Two 6-inch (15.2 mm) tubes shall be tested as specified in SAE-AS2078, except that the separation speed shall be 2 inches (51 mm) per minute.

4.8.2.3 Elongation (see 3.6.1.3). Two 6-inch (152 mm) tubes shall be tested as specified in SAE-AS2078, except the separation speed shall be 2 inches per minute and shall meet the requirements of 3.6.1.3.

4.8.2.4 Electrical conductivity test of tube (see 3.6.1.4). Two tubes shall be tested as specified in SAE-AS2078 and shall meet the requirements of 3.6.1.4.

4.8.2.5 Tube roll (see 3.6.1.5). Prior to reinforcing, the two tubes shall be tested as specified in SAE-AS2078 and shall meet the requirements of 3.6.1.5.

4.8.2.6 Tube proof pressure test (see 3.6.1.6). Prior to reinforcing the inner PTFE tube when tested in accordance with SAE-AS2078 shall meet the requirements of 3.6.1.6. The following details shall apply:

- a. Proof pressure of PTFE inner tube - minimum 3000 psig (20.7 Mpa) and higher.
- b. An alkaline wetting agent may be added to the water bath to assist in defining the leakage.
- c. Minimum testing time should be one minute.

4.8.3 Hose tests.

4.8.3.1 Proof pressure test (see 3.6.2.1). The hose shall be tested as specified in SAE-AS2078. When subjected to the rated proof pressure specified in [table II](#) the hose shall meet the requirements of 3.6.2.1.

4.8.3.2 Leakage (see 3.6.2.2). Prior to testing, the exterior of the samples shall be cleaned free of oil and of any residues. Samples shall be subjected to testing in accordance with SAE AS2078. Test fluid shall be water or fluid in accordance with MIL-PRF-5606, MIL-PRF-83282, or MIL-PRF-87257. A white paper towel, wrapped tightly around the entire length of the sample, shall be used to check for leakage. Conformance shall be as specified in 3.6.2.2.

4.8.3.3 Burst tests (see 3.6.2.3).

4.8.3.3.1 Room temperature burst pressure test (see 3.6.2.3.1). A hose assembly shall be subjected to the room temperature burst pressure test in accordance with SAE-AS2078 and shall meet the requirements of 3.6.2.3.1. The assembly shall be observed throughout the test and the type of failure and the pressure at which failure occurred shall be recorded.

4.8.3.3.2 High temperature burst pressure test (see 3.6.2.3.2). Hose assemblies when subjected to high temperature burst pressure testing shall meet the requirements of 3.6.2.3.2. The assembly shall be filled with one of the high temperature test fluids specified in 4.3.2 and tested as specified in SAE-AS2078.

4.8.3.4 Elongation and contraction test (see 3.6.2.4). The unpressurized assembly shall be tested as specified in SAE-AS2078 and shall meet the requirements of 3.6.2.4. After 5 minutes, while still pressurized, the gauge length shall be remeasured and the change in length recorded.

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4.8.3.5 Stress degradation test (see 3.6.2.5). The assembly shall be tested as specified in SAE-AS2078 and shall meet the requirements of 3.6.2.5. When necessary, the assembly shall be drained and flushed with fluid in accordance with MIL-PRF-680.

4.8.3.6 Impulse test (see 3.6.2.6). Six hose assemblies shall be impulse tested in accordance with SAE-AS2078 and shall meet the requirements of 3.6.2.6. The following details shall apply:

- a. Prior to impulsing, two assemblies shall be oil-aged, two shall be air-aged, and two shall be unaged.
- b. The assemblies shall then be subjected at room temperature to the rated proof pressure specified in [table I](#) for a minimum of 5 minutes.
- c. The assemblies shall be tested as specified in SAE-AS2078.
- d. Electronic measuring devices shall be used to determine and control the impulse pressures in the inlet manifold to the magnitude as specified in SAE-AS603.
- e. The impulse shall occur at 70 ± 10 cycles per minute .
- f. The rate of pressure rise shall not be less than 100,000 psi/sec (689.5 MPa/sec) or more than 200,000 psi/sec (1379 MPa/sec).
- g. The test fluid shall be one of the high temperature test fluids specified in 4.3.3.

4.8.3.7 Thermal shock test (see 3.6.2.7). Two hose assemblies shall be thermal shock tested in accordance with SAE-AS2078 and shall meet the requirements of 3.6.2.7. The following details shall apply:

- a. One hose assembly shall be air-aged and one assembly shall be unaged.
- b. The assemblies shall then be subjected to the rated proof pressure specified in [table I](#) for a minimum of 5 minutes.
- c. High temperature test fluid shall be as specified in 4.3.2.

4.8.3.8 Flexibility test (see 3.6.2.8). A hose assembly shall be tested in accordance with SAE-AS2078 and shall meet the requirements of 3.6.2.8. The following details shall apply:

- a. The distance between fitting ends shall be as specified in [table XI](#).
- b. The uncapped assembly shall be filled with oil conforming to one of the high temperature test fluids specified in 4.3.2.

TABLE XI. Flexibility dimension. 1/

Size dash no.	Distance between fitting ends inches (mm)
-4	6.50 (165)
-6	10.63 (270)
-8	12.25 (311)
-10	14.00 (356)

1/ Metric equivalents are given for information only.

4.8.3.9 Volumetric expansion test (see 3.6.2.9). A hose assembly shall be volumetric expansion tested in accordance with SAE-AS2078 and shall meet the requirements of 3.6.2.9. The change in fluid level shall be recorded and the volume change shall be converted to cc/in.

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4.8.3.10 Pneumatic effusion test (see 3.6.2.10). A hose assembly shall be pneumatic effusion tested in accordance with SAE-AS2078 and shall meet the requirements of 3.6.2.10. The hose assembly shall be subjected to the rated operating pressure specified in table I.

4.8.3.11 Pneumatic surge test (see 3.6.2.11). A hose assembly shall be tested in accordance with SAE-AS2078 and shall meet the requirements of 3.6.2.11. The hose assembly shall be subjected at room temperature, to the rated operating pressure specified in table I. At the end of this period, the hose shall be sectioned for inspection.

4.8.3.12 Corrosion test (see 3.6.2.12). A hose assembly when subjected to the corrosion test shall meet the requirements of 3.6.2.12. The following details shall apply:

- a. The hose assembly shall be mounted in a vertical position and immersed in a 2.5% solution of sodium chloride for 5 minutes.
- b. The assembly shall then be air dried at 140°F (60°C) for 25 minutes.
- c. This cycling shall be continued for 172 hours with the assembly pressurized to the rated operating pressure specified in table I.

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 packaging activities within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Service 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 which may be helpful, but is not mandatory).

6.1 Intended use. This is military unique hose covered by this specification is for use in military aircraft and missile high pressure (3,000 psi), and high temperature (-65°F to 160°F) pneumatic and (-65°F to +400°F) hydraulic systems. Medium pressure pneumatic storage system applications are not recommended. This hose is capable of withstanding the severe environment encountered in military applications. Installations in which the limits specified herein are exceeded, or in which the application is not covered specifically by this specification will be subjected to the approval of the acquiring activity.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Size and length of hose to be furnished.
- c. Packaging requirements (see 5.1).

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 No. 83298, 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 purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the qualifying activity Defense Logistics Agency, Defense Supply Center, Columbus (DSCC-VQP), P.O. Box 3990, Columbus, OH 43218-3990. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <http://assist.daps.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.

6.3.2 Prequalification. An assessment of each manufacturer intending to qualify product to this specification is to be conducted by the qualifying activity prior to initial qualification and periodically thereafter to assure compliance with specification requirements. This assessment will review the manufacturer's quality system, including production and testing, to ensure that adequate controls are in place to provide compliant product on a recurring basis. This assessment may include a facility survey as determined necessary by the qualifying activity.

6.4 Subject term (key words) listing.

Corrosion-resistant steel
Medium
Smooth bore
Wire braid

6.5 Hose assemblies. When hose assemblies are produced, they need to conform to quality conformance inspection as specified in 4.5.

6.6 Definitions. For the purpose of this specification, the following definition applies.

6.6.1 Stabilization temperature. Temperature which, within 6 inches of an object, does not change more than +10°F, -5°F (+5.55°C, -2.78°C) per hour.

6.7 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Included in the EPA list of 31 priority chemicals are cadmium, lead, and mercury. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see section 3).

6.7.1 Passivation. Nitric acid is a highly corrosive and toxic strong acid that can cause severe burns. Citric acid is naturally found in citrus fruits. It easily mixes into liquids, making it a valuable acid. Lemons and limes have high concentrations of citric acid, accounting for their bitter taste. In industry, citric acid can be used to make good "natural" cleaners. One of the best benefits of citric acid in all its applications is that it is natural and poses little to no risk to the environment.

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

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CONCLUDING MATERIAL

Custodians:

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

Preparing activity:
DLA - CC

(Project 4720-2008-010)

Review activities:

Navy - MC, SA
Air Force - 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>.