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MIL-DTL-27267C
26 September 2003
SUPERSEDING
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DETAIL SPECIFICATION

HOSE, POLYTETRAFLUOROETHYLENE, 450°F, MEDIUM 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 medium pressure, high temperature, polytetrafluoroethylene (PTFE) hose reinforced with corrosion-resistant (CRES) steel (see 3.5.1).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-PRF-680	-	Degreasing Solvent
MIL-PRF-5606	-	Hydraulic Fluid, Petroleum Base; Aircraft, Missile and Ordnance
MIL-PRF-7808	-	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

Comments, suggestions, or questions on this document should be addressed to: (Defense Supply Center, Columbus, DSCC-VAI, 3990 East Broad Street, Columbus, OH 43216-5000), 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 at www.dodssp.daps.mil.

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- MIL-DTL-27272 - Fittings, Polytetrafluoroethylene Hose, High Temperature, Medium Pressure, General Specification for
- MIL-DTL-25579 - Hose Assembly, Polytetrafluoroethylene, High Temperature, Medium Pressure, General Specification for
- MIL-PRF-83282 - Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537

STANDARD

DEPARTMENT OF DEFENSE

- MIL-STD-130 - Identification Marking of U.S. Military Property

(Unless otherwise indicated, copies of the above specifications and standards are available from the Defense Printing Service, Detachment Office, Building 4D, Customer Service, 700 Robbins Avenue, 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 the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

ASTM INTERNATIONAL

- ASTM D471 - Rubber Property - Effect of Liquids (DoD adopted)
- ASTM D792 - Density and Specific Gravity (Relative Density) of Plastics by Displacement (DoD adopted)
- ASTM D4895 - Polytetrafluoroethylene (PTFE) Resin Produced from Dispersion

(Application for copies should be addressed to ASTM International, PO Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI/NCSL Z540-1 - Calibration Laboratories and Measuring and Test Equipment, General Requirements (DoD adopted)

(Application for copies should be addressed to the American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, New York 10036.)

SAE INTERNATIONAL

- SAE ARP1153 - Determining Relative Specific Gravity Polytetrafluoroethylene Tubing, Method for
- SAE AS2078 - Hose Assemblies, Polytetrafluoroethylene (PTFE), Test Methods (DoD adopted)

(Application for copies should be addressed to SAE International, 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The hose 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 6.4). The hose shall be qualified with fittings from two or more manufacturers (see 3.4.3).

3.2 Components. The hose shall consist of a PTFE tube reinforced with a CRES wire braiding.

3.3 Materials. Materials shall conform to the requirements specified herein. Materials which are not covered by specifications, or which are not specifically described herein, shall be of the quality appropriate for the purpose intended (see 6.1).

3.3.1 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.

3.3.2 Hazardous substances. The use of toxic chemicals, hazardous substances or ozone depleting chemicals (ODCs) shall be avoided whenever feasible.

3.4 Design and construction.

3.4.1 Tube. The tube shall be a seamless, uniformly gauged extrusion of virgin PTFE resin. The base resin shall conform to ASTM D4895 except for the specific gravity requirement (see 3.5.2.4). Additives may be included in the compound from which the tube is extruded.

3.4.2 Reinforcement. The reinforcement for the hose shall be braided CRES wires. Hoses under size 16Z shall have a single layer of braiding while size 16Z and above shall have two layers of braiding. The letter "Z" is used to indicate that two layers of wire braiding are required. The arrangement of the wires over the tube shall provide sufficient strength to ensure conformance to the requirements specified herein. Hoses with crossed-over reinforcing wires shall not be cause for rejection; however, hoses with broken or missing reinforcing wires shall not be accepted.

3.4.3 Hose end fittings. Hose shall be compatible with reusable fittings qualified to MIL-DTL-27272 and with permanent fittings as defined in MIL-DTL-25579 and its applicable specification sheets.

3.4.4 Dimensions. The cross section of the hose shall meet the applicable requirements specified in table I.

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3.5 Performance.

3.5.1 Operating temperature and pressure. The hose shall operate in the temperature range of -65° to 450°F when assembled into class 1 hose assemblies in accordance with MIL-DTL-25579. The maximum operating pressures shall be as specified in table II.

TABLE I. Hose dimensional requirements.

Size	Inside diameter (in)		Tube wall thickness (in)		Over-braid outside diameter (in)	
4	0.188	± .015	0.040	+.007 -.005	0.312	+ .031 □ .008
5	0.250		0.040		0.375	+ .031 □ .008
6	0.313		0.040		0.446	+ .023 □ .016
8	0.406		0.043		0.562	+ .023 □ .016
10	0.500		0.047		0.656	+ .031 □ .015
12	0.625	+ .020 □ .010	0.047		0.789	± .023
16Z <u>1/</u>	0.875	+ .031 □ .024	0.047		1.109	± .031
20Z <u>1/</u>	1.125	+ .031 □ .024	0.050		1.359	± .031
24Z <u>1/</u>	1.375	± .031	0.070		1.672	± .035

1/ The letter “Z” is used to indicate that two layers of braiding are required for reinforcement of these sizes (see 3.4.2).

3.5.2 Tube. The extruded PTFE tube shall meet the following requirements.

3.5.2.1 Tube roll and tube proof pressure. The tube shall not leak, split, burst, or show any evidence of malfunctioning when tested in accordance with 4.6.2.1.

3.5.2.2 Tensile strength. When tested in accordance with 4.6.2.2, the longitudinal tensile strength for all sizes of tubes shall not be less than 3000 psi. The transverse tensile strength for sizes 10 and larger shall be not less than 2500 psi. For sizes under 10, the transverse tensile strength need not be tested.

3.5.2.3 Elongation. The elongation of the tube shall not be less than 200% when tested in accordance with 4.6.2.2.

3.5.2.4 Specific gravity. When tested in accordance with 4.6.2.3, the apparent specific gravity of the tube shall be not greater than 2.155 and its relative specific gravity shall be not greater than 2.210 for all sizes of tubes.

3.5.2.5 Tube conductivity. When tested in accordance with 4.6.2.4, tube sizes 4 through 8 shall conduct a direct current of not less than 10 ∞ A. Tube sizes 10 through 24Z shall conduct a direct current of not less than 20 ∞ A.

3.5.3 Hose and hose assembly. The hose (braid reinforced PTFE tube) or the hose assembly, consisting of the hose assembled with end fittings (see 3.4.3), shall meet the following requirements.

3.5.3.1 Braid flare. When tested in accordance with 4.6.3.1, the length of hose shall pass, by its own weight, through a ring of applicable inside diameter.

3.5.3.2 Proof pressure. When subjected to the applicable proof pressure specified in table II and tested in accordance with 4.6.3.2, there shall be no leakage through the wall of the hose or around the end fittings during and at the completion of testing. Furthermore, there shall be no visual evidence of permanent deformation or damage.

TABLE II. Performance requirements and hose assembly test sample lengths.

Size	Length of samples for impulse test (in) <u>1/</u>	Length of samples for all other tests (in) <u>1/</u>	Operating pressure (psi)	Proof pressure (psi)	Room temperature burst pressure (psi)	High temperature burst pressure (psi)	Minimum inside bend radius (in)
4	14.0	18.0	1500	3000	12000	7000	2.00
5	16.0	18.0	1500	3000	10000	6500	2.00
6	18.0	18.0	1500	3000	9000	6500	4.00
8	21.0	18.0	1500	3000	8000	6000	4.63
10	23.5	18.0	1500	3000	7000	5500	5.50
12	27.5	18.0	1000	2000	5000	3500	6.50
16Z	18.0	18.0 <u>2/</u>	1250	2500	5000	3500	7.38
20Z	18.0	18.0 <u>2/</u>	1000	2000	4000	3000	11.00
24Z	18.0	18.0 <u>2/</u>	1000	2000	4000	3000	14.00

1/ The number of samples required for qualification testing is specified in 4.4.1 and in table III.

2/ Samples for the low temperature flexibility and the vacuum tests shall be 30 inches long for these sizes.

3.5.3.3 Elongation and contraction. When subjected to the applicable operating pressure specified in table II and tested in accordance with 4.6.3.3, the hose assembly shall not change length by more than +0.20 or -0.30 inch in 10 inches of length.

3.5.3.4 Impulse. The hose assembly shall not leak, burst, or loosen from the test apparatus and there shall be no evidence of malfunctioning when subjected to 100,000 cycles in accordance with 4.6.3.4.

3.5.3.5 Stress degradation. The effusion rate of the hose assemblies shall not be greater than the values listed in table III when tested in accordance with 4.6.3.5. Following the introduction of hot oil, the hose assembly shall not leak when subjected to the applicable proof pressure test specified in 4.6.3.2.

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TABLE III. Effusion requirement after stress degradation test.

Size	4	5	6	8	10	12	16Z	20Z	24Z
Effusion rate (cc/in/min)	8	8	8	4	2	2	2	2	2

3.5.3.6 Room temperature burst pressure. When subjected to testing in accordance with 4.6.3.6, the hose assembly shall not leak or burst below the applicable room temperature burst pressure specified in table II. There shall be no leakage around the end fittings. The end fittings shall not loosen or separate from the hose.

3.5.3.7 High temperature burst pressure. When subjected to testing in accordance with 4.6.3.7, the hose assembly shall not leak or burst below the applicable high temperature burst pressure specified in table II. There shall be no leakage around the end fittings. The end fittings shall not loosen or separate from the hose.

3.5.3.8 Low temperature flexibility. When tested in accordance with 4.6.3.8 and subjected to the applicable inside bend radius specified in table II, the hose assembly shall not leak or exhibit any visual evidence of permanent deformation or damage.

3.5.3.9 Vacuum. The hose shall not collapse or show any evidence of defects when subjected to testing in accordance with 4.6.3.9. The ball shall roll freely through the entire length of the hose, unaided, to indicate that the inside diameter of the hose has not been distorted or reduced.

3.5.3.10 Volumetric expansion. The volumetric expansion, measured in cc/in of free length, shall not be greater than 0.028 for size 4 and 0.040 for size 5 when tested in accordance with 4.6.3.10.

3.5.3.11 Leakage. There shall be no leakage through the wall of the hose and around the fittings when the hose assembly is tested in accordance with 4.6.3.11.

3.5.3.12 Fuel resistance. When subjected to testing in accordance with 4.6.3.12, the hose assembly shall not leak or show any evidence of deterioration during and at the completion of the test.

3.5.3.13 Corrosion. When subjected to testing in accordance with 4.6.3.13, the hose assembly shall not leak or malfunction when subjected to the applicable room and high temperature burst pressures specified in table II.

3.5.3.14 Pneumatic leakage. When subjected to testing in accordance with 4.6.3.14, a steady stream of bubbles shall not be seen from any area on the hose assembly.

3.5.3.15 Pneumatic effusion. When subjected to testing in accordance with 4.6.3.15, the measured effusion rate of the hose assembly shall not be greater than the values listed in table IV.

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TABLE IV. Pneumatic effusion requirement.

Size	4	5	6	8	10	12	16Z	20Z	24Z
Effusion rate ^{1/} (cc/ft of hose)	4.0	5.0	5.0	5.0	5.0	6.0	8.0	8.0	8.0

^{1/} Collected during the last 30 minutes of the test.

3.5.3.16 Pneumatic surge. When subjected to testing in accordance with 4.6.3.16, the hose assembly shall not leak through the hose wall and around the end fittings. The inner tube of the hose shall not exhibit any evidence of degradation when the filter is examined at the completion of the test.

3.5.3.17 Cleanliness. Prior to shipping, the 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. The interior surface of the hose assembly shall be free from oil, grease, dirt, moisture, cleaning solvents and foreign materials. During individual conformance inspection, hose lengths with uncovered ends shall be rejected and considered as failure. The interior of the hose shall not contain any debris or foreign materials when examined in accordance with 4.6.3.17.

3.6 Product identification. The hose shall be marked in accordance with MIL-STD-130. Bulk hose shall have metal or pliable plastic bands placed on each end of the hose and at ten-foot intervals and shall contain the following information:

- a. Part or Identifying Number (PIN) as described in 6.3.
- b. Operating pressure in psi.
- c. Commercial and Government Entity (CAGE) code.

3.7 Workmanship. The hose shall be uniform in quality, free from foreign inclusions and defects in materials and shall be finished in accordance with good commercial practices.

4. VERIFICATION

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

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

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4.2 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government qualifying activity (see 6.4) on sample units produced with equipment and procedures used in production.

4.2.1 Samples for qualification. Samples for qualification shall be representative of the products proposed to be furnished to this specification. Samples, consisting of 16 hose assemblies of each size and of the lengths specified in table II, shall be subjected to qualification testing. Each sample shall be a PTFE hose reinforced with braided CRES wires, as specified herein, and assembled with end fittings. In addition, one 12-inch length of braided hose without end fittings and two 14-inch lengths of tubing shall also be subjected to qualification testing.

4.2.2 Fittings used in qualification samples. For each size, manufacturers shall test 16 hose assemblies, with reusable class 1 fittings, qualified to MIL-DTL-27272. All samples shall be subjected to qualification testing in accordance with table V and in the sequence specified in table VI.

4.2.3 Acceptance of qualification data. For identical requirements and test procedures, using an identical fitting, qualification test data from the manufacturer of MIL-DTL-27267 hose shall be accepted as qualification test data for MIL-DTL-27272 and for MIL-DTL-25579 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.

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

4.2.5 Retention of qualification. To retain qualification, the manufacturer shall submit a report at 12-month intervals to the qualifying activity. The qualifying activity shall establish the initial reporting date. Each report shall contain a summary of the results obtained from both the sampling tests and the periodic control tests performed during the 12-month interval. The number of lots and the quantities of assemblies that have passed and failed shall be included. All reworked lots shall also be accounted for and identified.

4.2.5.1 Nonconformance of qualification. If the summary of test results indicates nonconformance with the requirements specified herein but corrective measures acceptable to the qualifying activity have not been taken, action may be taken to remove the failing product from the QPL.

4.2.5.2 Periodic qualification report. 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 manufacturer 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 requirement specified herein. Testing shall be in accordance with the procurement standard. No sampling or periodic testing is required for a specific size if there has been no production for that size in the reporting period. If there has been no production for a period of three years or longer at any location, sampling tests (two items for each sampling test) shall be completed with items from the first production lot when production is resumed for the applicable size at the applicable location.

4.2.5.3 Sampling and periodic tests- limited production. In the case where there has been limited production, and the specification limit for the applicable Sampling or Periodic Control Tests has not been reached within a three year period since the last Sampling or Periodic test, the required Sampling or Periodic Control Tests shall be performed using the small lot test sample quantities as specified in the procurement specification within 30 calendar days of the end of the three year period.

4.3 Conformance inspection.

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4.3.1 Individual tests. Inspection of the product for delivery shall consist of subjecting each hose length to the individual tests specified in table VI. Any item failing to meet the requirements of the individual tests shall be immediately removed from the lot.

4.3.2 Sampling tests. Hose lengths, randomly selected from a production lot (see 4.5.2.1) to form an inspection sample (see 4.5.2.2), shall be subjected to the sampling tests specified in table V.

4.3.2.1 Production lot. A production lot shall consist of all hose, in 750-foot increments, of one size manufactured on the same production line(s) by means of the same production techniques, materials, controls and design during the same continuous production run.

TABLE V. Inspection requirements.

Requirement	Requirement paragraph	Test method paragraph	Qualification inspection	Conformance inspection		
				Individual	Sampling	Periodic
Examination of product	---	4.6.1	X	X		
Tube roll & tube proof pressure	3.5.2.1	4.6.2.1	X	X		
Tensile strength	3.5.2.2	4.6.2.2	X			X <u>1/</u>
Elongation	3.5.2.3	4.6.2.2	X			X <u>1/</u>
Specific gravity	3.5.2.4	4.6.2.3	X			X <u>1/</u>
Tube conductivity	3.5.2.5	4.6.2.4	X			X <u>1/</u>
Braid flare	3.5.3.1	4.6.3.1	X			
Proof pressure	3.5.3.2	4.6.3.2	X	X		
Elongation & contraction	3.5.3.3	4.6.3.3	X		X	
Impulse	3.5.3.4	4.6.3.4	X			X <u>2/</u>
Stress degradation	3.5.3.5	4.6.3.5	X			X <u>3/</u>
Room temperature burst pressure	3.5.3.6	4.6.3.6	X		X	
High temperature burst pressure	3.5.3.7	4.6.3.7	X			
Low temperature flexibility	3.5.3.8	4.6.3.8	X			
Vacuum	3.5.3.9	4.6.3.9	X			
Volumetric expansion	3.5.3.10	4.6.3.10	X			
Leakage	3.5.3.11	4.6.3.11	X		X	
Fuel resistance	3.5.3.12	4.6.3.12	X			
Corrosion	3.5.3.13	4.6.3.13	X			
Pneumatic leakage	3.5.3.14	4.6.3.14	X			
Pneumatic effusion	3.5.3.15	4.6.3.15	X			
Pneumatic surge	3.5.3.16	4.6.3.16	X			

1/ Testing is not required if data is available from tube samples taken from the same continuous production run.

2/ Only unaged samples shall be subjected to testing.

3/ Exposure to -65°F and subsequent testing may be omitted.

TABLE VI. Qualification inspection sequence.

Required qualification test	Required test paragraph	Sample number											
		Tubes	Hose	Assemblies									
		1-2	3	4 <u>1/</u>	5	6	7	8 <u>1/</u>	9	10 <u>1/</u>	11	12-13	14-19
Examination of product	4.6.1	X	X	X	X	X	X	X	X	X	X	X	X
Tube roll & proof pressure	4.6.2.1	X											
Tensile strength	4.6.2.2	X											
Elongation	4.6.2.2	X											
Specific gravity	4.6.2.3	X											
Tube conductivity	4.6.2.4	X											
Braid flair	4.6.3.1		X										
Proof pressure	4.6.3.2			X	X	X	X	X	X	X	X	X	X
Elongation & contraction	4.6.3.3				X	X							
Impulse	4.6.3.4												X
Volumetric expansion	4.6.3.10						X	X					
Leakage	4.6.3.11								X		X		
Fuel resistance	4.6.3.12								X	X			
Stress degradation	4.6.3.5						X	X					
Corrosion	4.6.3.13				X	X							
Room temp burst pressure	4.6.3.6					X	X						
High temp burst pressure	4.6.3.7				X						X		
Low temp flexibility	4.6.3.8			X				X		X			
Vacuum	4.6.3.9			X				X		X			
Pneumatic leakage	4.6.3.14											X	
Pneumatic effusion	4.6.3.15											X	
Pneumatic surge	4.6.3.16											X	

1/ These samples shall be 30 inches in length for sizes 16Z, 20Z and 24Z.

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4.3.2.2 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 of bulk hose produced in a continuous run, one sample shall be subjected to the sampling tests.

4.3.2.3 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.

4.3.3 Periodic control tests. For each size manufactured under essentially the same conditions, periodic control testing shall be performed on either eight samples from every 20,000 feet of bulk hose produced or two samples from every 5,000 feet. If there has been some production but the total number of footage produced has not reached 5,000 feet for a specific size within three years, the manufacturer shall perform periodic control tests on two samples of that size unless documented approval has been obtained from the qualifying activity.

4.3.3.1 Periodic control test plan. Testing shall be in accordance with table V. Half of the samples shall be subjected to the impulse test while the remaining half shall be subjected to the stress degradation test.

4.3.3.2 Nonconformance of periodic control tests. 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 have 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.

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

4.3.6 Acceptance of conformance inspection data. For identical requirements and test procedures, using an identical fitting, conformance inspection data from MIL-DTL-25579 or MIL-DTL-27272 may be accepted as conformance inspection data for MIL-DTL-27267, providing that documented approval has been obtained from the qualifying activity. When conformance inspection data from MIL-DTL-25579 or MIL-DTL-27272 is to be accepted as conformance inspection data for MIL-DTL-27267, one hose assembly shall be considered to be the equivalent of two feet of bulk hose.

4.4 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. The establishment and the maintenance of a calibration system to control the accuracy of all test and measuring equipment shall be in accordance with ANSI/NCSL Z540-1 or equivalent.

4.5 Inspection conditions. Unless otherwise specified, all required inspections shall be performed in accordance with the test conditions specified in 4.6.

4.6 Test methods. Test methods used shall be as specified in table V. No alternative methods shall be used unless documented approval has been obtained from the preparing activity. For qualification testing, the sequence of tests performed shall be in accordance with table VI. For all inspections required herein, only class 1 fittings conforming to either MIL-DTL-27272 or as defined in MIL-DTL-25579 shall be used. Unless otherwise specified room temperature shall be defined as 60 to 90°F.

4.6.1 Examination of product. Each hose or each hose assembly shall be visually and physically examined for conformance to the following requirements:

- a. Components (see 3.2).
- b. Reinforcement (see 3.4.2).
- c. Dimensions (see 3.4.4).
- d. Cleanliness (see 3.5.3.17).
- e. Product identification (see 3.6).
- f. Workmanship (see 3.7).

4.6.2 Tube tests.

4.6.2.1 Tube roll and tube proof pressure. Each length of tubing shall be subjected to a tube roll and a tube proof pressure test in accordance with SAE AS2078, using a proof pressure specified for a 1500 psi hose. Conformance shall be as specified in 3.5.2.1.

4.6.2.2 Tensile strength and elongation. The tube shall be subjected to both the tensile strength and the elongation tests in accordance with SAE AS2078. Conformance for tensile strength shall be as specified in 3.5.2.2. Conformance for elongation shall be as specified in 3.5.2.3.

4.6.2.3 Specific gravity. The apparent specific gravity of the tube shall be determined in accordance with ASTM D792 while the relative specific gravity of the tube shall be determined in accordance with SAE ARP1153. If test samples are obtained from a braided hose, the braid impressions shall be removed prior to testing. Conformance shall be as specified in 3.5.2.4.

4.6.2.4 Tube conductivity. A 14-inch length of tube shall be subjected to testing in accordance with SAE AS2078, Electrical Conductivity test procedure under "Tests on PTFE Inner Tubes". When test samples are obtained from a braided hose, the braiding shall be removed prior to testing. Conformance shall be as specified in 3.5.2.5.

4.6.3 Hose and assembly tests.

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4.6.3.1 Braid flare. A length of hose, no longer than 12 inches, shall be sized by expanding the flared-out end over a plug. The diameter of the plug shall be as specified in the "Expansion diameter" column of table VII. The plug shall be inserted into the flared-out end of the hose to a depth of 0.187 inch and then removed. After this sizing operation, the sample shall then be inserted through a ring with the bottom of the flare extending 6 inches above the top of the ring. The inside diameter of the ring shall be as specified in the "Maximum flare diameter - Ring inside diameter" column of table VII. From this position, the sample shall be allowed to pass, by its own weight, through the ring. Conformance shall be as specified in 3.5.3.1.

TABLE VII. Braid flare dimensional requirement.

Size	Hose nominal inside diameter (in)	Expansion diameter (in)	Maximum flare diameter - ring inside diameter (in)
4	0.188	0.230	0.500
5	0.250	0.300	0.560
6	0.313	0.370	0.625
8	0.406	0.475	0.750
10	0.500	0.585	0.875
12	0.625	0.720	1.000
16Z	0.875	0.995	1.400
20Z	1.125	1.270	1.700
24Z	1.375	1.545	1.950

4.6.3.2 Proof pressure. Prior to testing, the hose assembly shall be examined to ensure that it is properly assembled. The test sample shall then be subjected to testing in accordance with SAE AS2078 using the applicable proof pressure specified in table II of this specification. The test fluid used shall be water; or, fluid conforming to MIL-PRF-5606 or MIL-PRF-83282 may be used for qualification testing. Conformance shall be as specified in 3.5.3.2.

4.6.3.3 Elongation and contraction. Samples shall be subjected to testing in accordance with SAE AS2078. Test fluid shall be water or fluid conforming to MIL-PRF-5606 or MIL-PRF-83282. Conformance shall be as specified in 3.5.3.3.

4.6.3.4 Impulse. All test samples, of length as specified in table II, shall be subjected to the proof pressure test (see 4.6.3.2) prior to testing in accordance with SAE AS2078. For qualification testing, 2 of the 6 samples shall be unaged while 2 samples shall be aged in air at $400 \pm 10^{\circ}\text{F}$ for 168 hours. The remaining 2 shall be aged by immersion in fluid conforming to MIL-PRF-7808 at $400 \pm 10^{\circ}\text{F}$ for 168 hours. Samples sizes 12 and smaller shall be connected to the rigid supports of the test apparatus and bent to the applicable bend radius specified in table II. Samples sizes 16Z and larger shall be installed straight, one end may be left free. The peak pressure used for samples sizes 4 through 16Z shall be 125% of the operating pressure specified in table II. For sizes 20Z and 24Z, the peak pressure shall be equal to but not greater than the operating pressure. Conformance shall be as specified in 3.5.3.4.

4.6.3.5 Stress degradation. Samples shall be subjected to testing in accordance with SAE AS2078 except that the assembly shall be flushed with fluid conforming to MIL-PRF-680 or ASTM D471, reference fuel B, after the third cycle and prior to the drying process. At the completion of the effusion test, the hose assemblies shall be placed in a cold chamber for 8 hours while the temperature is maintained at $-65 \pm 2^{\circ}\text{F}$. After 8 hours, fluid conforming to MIL-PRF-7808 and at $400 \pm 10^{\circ}\text{F}$ shall be circulated through the samples. Within 15 seconds after the introduction of the hot fluid, the pressure shall be increased to the applicable proof pressure specified in table II and held for at least 2 minutes. Conformance shall be as specified in 3.5.3.5.

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4.6.3.6 Room temperature burst pressure. Samples shall be subjected to testing in accordance with SAE AS2078 using the applicable room temperature specified in table II. The test fluid shall be MIL-PRF-5606 or fluid conforming to MIL-PRF-83282 or water. Samples shall be continuously observed for the duration of the test. The type of failure and the pressure at which failure occurred shall be recorded. Conformance shall be as specified in 3.5.3.6.

4.6.3.7 High temperature burst pressure. Samples shall be subjected to testing in accordance with SAE AS2078 using the applicable high temperature pressure specified in table II. The test fluid shall be fluid conforming to MIL-PRF-83282. Samples shall be continuously observed for the duration of the test. The type of failure and the pressure at which failure occurred shall be recorded. Conformance shall be as specified in 3.5.3.7.

4.6.3.8 Low temperature flexibility. The following test specimens shall be subjected to testing in accordance with SAE AS2078: one unaged sample that was subjected to the proof pressure test (see 4.6.3.2), one sample that was subjected to the stress degradation test (see 4.6.3.5), and one sample that was subjected to the fuel resistance test (see 4.6.3.12). Conformance shall be as specified in 3.5.3.8.

4.6.3.9 Vacuum. The three samples that were subjected to the low temperature flexibility (see 4.6.3.8) shall be emptied then subjected to testing in accordance with SAE AS2078. The applicable ball diameter and negative pressure used for this test shall be as specified in table VIII. Conformance shall be as specified in 3.5.3.9.

TABLE VIII. Vacuum test conditions.

Size	Nominal ID (in)	Ball diameter (in)	Negative pressure (in Hg)
4	0.188	0.125 - 0.132	28
5	0.250	0.187 - 0.193	28
6	0.313	0.250 - 0.255	28
8	0.406	0.332 - 0.337	28
10	0.500	0.421 - 0.426	28
12	0.625	0.531 - 0.538	20
16Z	0.875	0.770 - 0.778	14
20Z	1.125	0.996 - 1.004	10
24Z	1.375	1.246 - 1.252	8

4.6.3.10 Volumetric expansion. One sample of size 4 and one sample of size 5 shall be tested in accordance with SAE AS2078 except that the operating pressure used shall be at 1000 psi. Conformance shall be as specified in 3.5.3.10.

4.6.3.11 Leakage. Samples shall be tested in accordance with SAE AS2078. Test fluid shall be water or fluid conforming to MIL-PRF-5606 or MIL-PRF-83282. Leakage shall be determined by wrapping a white paper towel tightly around the braids. Conformance shall be as specified in 3.5.3.11.

4.6.3.12 Fuel resistance. Samples shall be subjected to testing in accordance with SAE AS2078. Conformance shall be as specified in 3.5.3.12.

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4.6.3.13 Corrosion. Samples, mounted in a vertical position and subjected to the applicable operating pressure specified in table II, shall be immersed for 5 minutes in a 2.5% NaCl solution, by weight. They shall then be air-dried at $140 \pm 10^{\circ}\text{F}$ for 25 minutes. Continue this cycling for at least 172 hours while maintaining the specified pressure. Half of the samples shall then be subjected to the room temperature burst pressure test (see 4.6.3.6) while the remaining half shall be subjected to the high temperature burst pressure test (see 4.6.3.7). Conformance shall be as specified in 3.5.3.13.

4.6.3.14 Pneumatic leakage. Testing shall be in accordance with SAE AS2078. Conformance shall be as specified in 3.5.3.14.

4.6.3.15 Pneumatic effusion. Testing shall be in accordance with SAE AS2078. Conformance shall be as specified in 3.5.3.15.

4.6.3.16 Pneumatic surge. Testing shall be in accordance with SAE AS2078. Conformance shall be as specified in 3.5.3.16.

4.6.3.17 Cleanliness. Both ends of the hose length shall be visually inspected to determine if caps or plugs are installed. Conformance shall be as specified in 3.5.3.17.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department'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 which may be helpful, but is not mandatory.)

6.1 Intended use. The hose covered by this specification is military unique when assembled with fittings qualified to MIL-DTL-27272 as the assembly qualified to MIL-DTL-25579. The resulting assembly may be qualified to the requirements of MIL-DTL-25579. This hose assembly has the capability to maintain its operating pressure, as specified in table II, even under extreme temperature conditions ranging from -65°F to 450°F . It is intended for use in high-temperature fuel, lubricating oil, water-alcohol, chemical-fluid, hydraulic and pneumatic systems that allow some gaseous effusion through the wall of the hose.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2 and 2.3).
- c. Packaging requirements (see 5.1).
- d. PIN (see 6.3) and length of hose required (see table IX).

TABLE X. 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	

CONCLUDING MATERIAL

Custodians:

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

Preparing activity:
 DLA - CC

(Project 4720-0183-000)

Review activities:

Army - AR, AT, EA, MI
 Navy - MC, SA, SH
 Air Force - 71