

INCH-POUND

MIL-DTL-25579G
w/AMENDMENT 1
5 August 2010
SUPERSEDING
MIL-DTL-25579G
14 January 2010

DETAIL SPECIFICATION

HOSE ASSEMBLY, POLYTETRAFLUOROETHYLENE, HIGH TEMPERATURE, MEDIUM PRESSURE, GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification contains the requirements for medium pressure, high temperature, polytetrafluoroethylene (PTFE) hose assemblies, reinforced with a corrosion-resistant steel (CRES) wire braid for use in fuel, lubricating oil, water-alcohol, hydraulics and pneumatic systems within the limits specified herein.

1.2 Classification. The hose assemblies are classified as follows (see 6.1):

- a. Class 1 - ALL CRES fittings for all sizes, operating temperature ranging from -65°F to +450°F.
- b. Class 2 - Combination of aluminum alloy and CRES fittings for sizes 8 and larger, operating temperature ranging from -65°F to +275°F.

1.3 Application limitations.

1.3.1 Size -3/-4 reducer assembly. The size -3/-4 reducer assembly should not be used in aircraft hydraulic systems.

1.3.2 Pneumatic storage system. Pneumatic storage system application should not be used (see 6.1).

2. APPLICABLE DOCUMENTS

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

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, Attn: 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 <https://assist.daps.dla.mil>.

AMSC N/A

FSC 4720

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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-680	-	Degreasing Solvent
MIL-PRF-5606	-	Hydraulic Fluids, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-PRF-7808	-	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-A-8625	-	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-DTL-27267	-	Hose, Polytetrafluoroethylene, High Temperature, Medium Pressure
MIL-DTL-27272	-	Fittings, Polytetrafluoroethylene Hose, High Temperature, Medium Pressure, General Specification for
MIL-PRF-83282	-	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537
MIL-PRF-87257	-	Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile

DEPARTMENT OF DEFENSE STANDARDS

MS33786	-	Fitting Installation, Flared Tube and Hose, Swivel (ASG)
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(See supplement 1 for list of specification sheets.)

(Copies of these documents are available online at <https://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.

AEROSPACE INDUSTRIES ASSOCIATION (AIA)

NAS 1760	-	Fitting End, Flareless Acorn, Standard Dimensions for
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(Copies of this document is available online at <http://www.aia-aerospace.org/> or from the Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3901)

ASTM INTERNATIONAL

ASTM A262	-	Steels, Detecting Susceptibility to Intergranular Attack in Austenitic Stainless
ASTM A276	-	Standard Specification for Stainless Steel Bars and Shapes
ASTM A313/A313M	-	Standard Specification for Stainless Steel Spring Wire
ASTM A580/A580M	-	Steel, Wire, Stainless
ASTM D471	-	Rubber Property - Effect of Liquids

(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.)

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NCSL INTERNATIONAL

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

(Copies of this document is 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 this document is 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-AMS-QQ-A-200/8	-	Aluminum Alloy 6061, Bar, Rod, Shapes, Tube, and Wire, Extruded
SAE-AMS-QQ-A-225/4	-	Aluminum Alloy, 2014, Bar, Rod, Wire, and Special Shapes; Rolled Drawn, or Cold Finished
SAE-AMS-QQ-A-225/6	-	Aluminum Alloy, 2024, Bar, Rod, and Wire; Rolled, Drawn or Cold Finished
SAE-AMS-QQ-A-225/8	-	Aluminum Alloy Bar, Rod, Wire, and Special Shapes; Rolled, Drawn, or Cold Finished, 6061
SAE-AMS-WW-T-700/4	-	Tube, Aluminum Alloy, Drawn, Seamless, 5052
SAE-AMS-WW-T-700/6	-	Tube, Aluminum Alloy, Drawn, Seamless, 6061
SAE-AMS-A-22771	-	Aluminum Alloy Forgings, Heat Treated
SAE-AMS-2700	-	Passivation Treatment for Corrosion-Resistant Steel
SAE-AMS4127	-	Aluminum Alloy Forgings and Rolled or Forged Rings 1.0 Mg - 0.6 Si - 0.28 Cu - 0.20 Cr (6061-T6), Solution and Precipitation Heat Treated
SAE-AMS5557	-	Steel Tubing, Seamless and Welded, Corrosion and Heat Resistant, 18.5 Cr - 10.5 Ni - 0.40 Ti (SAE 30321) Hydraulic, Solution Heat Treated
SAE-AMS5565	-	Steel, Corrosion Resistant, Welded Tubing 19Cr - 9.5Ni (SAE 30304) Solution Heat Treated
SAE-AMS5566	-	Steel Tubing, Seamless or Welded, Corrosion Resistant, 19 Cr - 10 Ni (SAE 30304) High Pressure Hydraulic, Cold Drawn
SAE-AMS5567	-	Steel Tubing, Seamless or Welded, Corrosion Resistant 19 Cr - 10 Ni (SAE 30304) Hydraulic, Annealed
SAE-AMS5643	-	Steel Bars, Forgings, Tubing and Rings, Corrosion Resistant 16.5 Cr - 4.0 Ni - 0.30(Cb + Ta) - 4.0 Cu.
SAE-AMS5689	-	Steel Wire, Corrosion and Heat Resistant, 18 Cr - 9.5 Ni - 0.40 Ti (SAE 30321) Solution Heat Treated
SAE-AMS5743	-	Steel, Corrosion and Heat Resistant, Bars and Forgings 15.5 Cr - 4.5 Ni - 2.9 Mo - 0.10 Ni Solution Heat Treated, Sub-Zero Cooled, Equalized and Over-Tempered.
SAE-AMS5639	-	Steel, Corrosion Resistant, Bars, Wire, Forgings, Tubing, and Rings 19Cr - 9.5Ni, Solution Heat Treated
SAE-AMS5645	-	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings 18Cr - 10Ni - 0.40Ti (SAE 30321)
SAE-AMS5647	-	Steel, Corrosion Resistant, Bars, Wire, Forgings, Tubing, and Rings 19Cr - 10Ni, Solution Heat Treated
SAE-AMS5697	-	Steel, Corrosion Resistant, Wire 19Cr - 9.5Ni, Solution Heat Treated

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SAE-ARP908	- Torque Requirements, Installation and Qualification Test, Hose and Tube Fittings
SAE-AS611	- Polytetrafluoroethylene Hose Assembly, Cleaning Methods
SAE-AS1055	- Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings, and Similar System Components
SAE-AS1946	- Hose Assembly, Polytetrafluoroethylene, Metallic Reinforced, Up to 1500 psi and 450 Degrees F, Hydraulic and Pneumatic
SAE-AS2078	- Test Methods, Hose Assemblies, Polytetrafluoroethylene (PTFE)
SAE-AS4395	- Fitting End-Flared Tube Connection, Design Standard.
SAE-AS8879	- Screw Threads - UNJ Profile, Inch
SAE-AS33514	- Fitting End, Standard Dimensions for Flareless Tube Connection and Gasket Seal

(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 event of a conflict between the text of this document and the references cited herein (except for related specification sheets), 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 Specification sheets. The individual item requirements shall be as specified herein and also in accordance with the applicable specification sheet. In the event of a conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Hose assemblies furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list (QPL) before contract award (see 4.2 and 6.3).

3.2.1 Extension of qualification. Qualification of hose assemblies with end fittings of one type of interface (flared, flareless, or flange) shall be extended to include hose assemblies with end fittings of another type of interface only in accordance with the requirements specified in 4.5.1. However, qualification extension shall apply only to end fittings, of the same size and class, produced by the same manufacturer using the same processes, and utilizing identical hose attachment method and design as specified herein and in the applicable specification sheet.

3.3 Materials. Materials used shall be as specified herein. Materials used that are not specifically specified herein shall be of a quality that will enable the hose assembly to meet the requirements specified herein.

3.3.1 Recycled, recovered, and 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 Metals. All metals used herein shall conform to the requirements of table I. Metals used for end fittings (see 3.5.2) shall be a corrosion-resistant steel or an aluminum alloy that has been treated to resist corrosion due to fuels, salt spray, and atmospheric conditions encountered by the hose assembly during storage and normal service use.

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TABLE I. Requirements for metals.

Metal	Form	Specification	Type
Aluminum alloy	Bars	SAE-AMS-QQ-A-200/8	6061-T6
		SAE-AMS-QQ-A-225/8	6061-T651
	Forgings	SAE-AMS4127	6061-T6
		SAE-AMS-A-22771	7075-T73
	Seamless tubing	SAE-AMS-WW-T-700/4	5052, type I
		SAE-AMS-WW-T-700/6	6061-T6, type I
	Wire	SAE-AMS-QQ-A-225/8	6061
		SAE-AMS-QQ-A-225/4	2014
		SAE-AMS-QQ-A-225/6	2024
Corrosion-resistant steel	Bars & forgings	ASTM A276	Class 304, Condition A or B
			Class 304L, condition A
			Class 321, condition A
		SAE-AMS5639	SAE 30304; UNS S30400
		SAE-AMS5645	SAE 30321; UNS S32100
		SAE-AMS5647	304L; UNS S30403
		SAE-AMS5643	17-4PH
		SAE-AMS5743	AM-355
	Tubing	SAE-AMS5566	Type 1 or 2
		SAE-AMS5557	Type 1 or 2
		SAE-AMS5565	SAE 30304
		SAE-AMS5567	SAE 30304
	Wire	SAE-AMS5689	SAE 30321; UNS S32100
		SAE-AMS5697	SAE 30304; UNS S30400
		ASTM A313/A313M or ASTM A580/A580M	Type 302, 304, 305, or 321

3.4 Finish. The following requirements are applicable to permanent and field attachable fittings.

3.4.1 Aluminum parts. Unless otherwise specified, aluminum parts shall be finished in accordance with MIL-A-8625, type II, class 2. Flareless parts shall be dyed yellow while flared parts shall be dyed blue.

3.4.2 Corrosion-resistant steel parts. Unless otherwise specified, corrosion-resistant steel parts shall be passivated in accordance with SAE-AMS-2700. Following passivation, all parts shall be thoroughly rinsed in water and dried.

3.5 Design and construction. The hose assembly shall consist of a seamless polytetrafluoroethylene inner tube, reinforced with corrosion resistant steel reinforcement wires and coupled with corrosion resistant (stainless steel) end fittings (class 1) or aluminum alloy and corrosion resistant end fittings (class 2) suitable for the intended installation. If assemblies with field-attachable fittings are used, the fittings shall comply with MIL-DTL-27272, the hose shall comply with MIL-DTL-27267 and the assemblies shall comply with the requirements of this specification and MS8000 through MS8004, (see supplement I) as applicable. Assemblies with permanent fittings shall conform to this specification and MS8005 through MS8009, as applicable. Standard hose assemblies shall have flared fittings to mate with SAE-AS4395 and flareless fittings according to NAS 1760 or MS8000 series seal, to mate with SAE-AS33514 in accordance with MIL-DTL-25579/1. The hose assemblies shall withstand the strain and vibrations encountered during shipment, storage, installation, and service, within the limits specified herein.

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3.5.1 Inner tube. The inner tube shall be seamless extrusion of virgin polytetrafluoroethylene resin. The hose inner tube shall conform to all of the requirements in MIL-DTL-27267 for the bulk hose to be assembled with MIL-DTL-27272 hose connector fitting. For permanently attached fitting hose assemblies the hose should meet the requirements of MIL-DTL-27267.

3.5.1.1 Reinforcement. The reinforcement shall consist of corrosion resistant steel wires in accordance with the applicable specification listed in table I Hose under -16Z shall have a single layer of braid and hose -16Z and above shall have two layers of braid. The letter "Z" following the dash size signifies that a double layer of wire braid is mandatory. The wires shall be so arranged over the inner tube as to provide sufficient strength to insure conformance with the requirements herein. Broken or missing reinforcing wires shall be cause for rejection. Crossed-over wires shall not be cause for rejection.

3.5.2 Fittings. The end fittings for the hose assembly may be either field-attachable type in accordance with MIL-DTL-27272 or the permanent type. Materials shall be selected for the specific operating conditions as specified in 3.3. For class 2 hose assemblies (size -8 and larger), the socket, and the sleeve if used, shall be stainless steel and the nipple, nut, and elbow (if applicable) shall be aluminum alloy, see table I for fitting materials. Flared fittings shall mate with SAE-AS4395 and flareless fittings shall mate with SAE-AS33514 in accordance with applicable MS in accordance with MIL-DTL-25579/1. Flange fittings shall mate with the mounting pad as shown on MS33786. An alternate nut, functionally equivalent, may be used for NAS 1760 or MS8000 series seal application.

3.5.2.1 Fittings embrittlement resistance. All crimped or swaged end fitting sockets (collars) that are fabricated from 304 stainless steel shall be capable of passing the embrittlement test specified in ASTM A262, practice E, prior to assembly to the nipple or the swaging operation. Sockets fabricated from stabilized austenitic steel are acceptable without being subjected to the embrittlement test.

3.5.3 Screw threads. All coupling nut threads shall be in accordance with SAE-AS8879, category I. However, no more than a 10% increase in the thread tolerances specified in SAE-AS8879 shall be accepted for the coupling nut thread after the first connection (see 4.5.2).

3.5.4 Dimensions and weights. Except for length (see 3.5.5), the dimensions of the hose assembly and the weight of its components shall be as specified in table II and figure 1.

3.5.5 Length. Hose assembly shall be furnished in lengths as specified in the contract or purchase order (see 6.2), however, tolerances on the length of each hose assembly shall be as follows:

- a. ± 125 inch for lengths under 18 inches.
- b. ± 250 inch for lengths from 18 inches to 36 inches.
- c. ± 500 inch for lengths from 36 inches to 50 inches.
- d. $\pm 1\%$ for lengths over 50 inches.

3.5.6 Assembly passage-way inspection. The assembly, with attached fittings, shall be examined for any excessive restriction to the fitting passage by rolling a ball of the applicable diameter in table II, through the assembly. The ball shall pass freely through the assembly. The ball checks the ovality of the bend (tube) and the match-up of the tube and nipple or connection end and the weld/braze drop through (see 4.5.1).

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TABLE II. Dimensions, weights, and ball sizes. 1/ 2/ 3/

Size	Reference OD tubing inches (mm)	A dia. 4/ Minimum nipple diameter inches (mm)	Maximum hose weight (lb/ft)	Class 1 maximum fitting weight lbs (kg)	Class 2 maximum fitting weight lbs (kg)	Maximum hose OD inches (mm)	Ball diameter Straight to straight fittings (mm) 5/	Ball diameter at least one elbow (mm) 5/
-3/-4 6/	.188 (4.78)	.132 (3.35)	0.087	0.069 (.031)	--- 7/	.343 (8.71)	.072 (1.83)	.068 (1.73)
-4	.250 (6.35)	.132 (3.35)	0.087	0.094 (.042)	--- 7/	.343 (8.71)	.119 (3.02)	.112 (2.84)
-5	.313 (7.95)	.193 (4.90)	0.099	0.114 (.052)	--- 7/	.406 (10.31)	.174 (4.42)	.164 (4.17)
-6	.375 (9.53)	.256 (6.50)	0.123	0.139 (.063)	--- 7/	.469 (11.91)	.230 (5.84)	.218 (5.54)
-8	.500 (12.70)	.340 (8.64)	0.158	0.263 (.119)	0.121 (.055)	.585 (14.86)	.306 (7.77)	.289 (7.34)
-10	.625 (15.88)	.430 (10.92)	0.205	0.377 (.171)	0.173 (.078)	.687 (17.45)	.387 (9.83)	.366 (9.30)
-12	.750 (19.05)	.548 (13.92)	0.327	0.442 (.200)	0.203 (.092)	.812 (20.62)	.493 (12.52)	.466 (11.84)
-16Z 8/	1.000 (25.40)	.778 (19.76)	0.580	0.864 (.392)	0.387 (.175)	1.140 (28.96)	.700 17.78	.661 (16.79)
-20Z 8/	1.250 (31.75)	1.000 (25.40)	0.746	1.373 (.623)	0.661 (.300)	1.390 (35.31)	.900 (22.86)	.850 (21.59)
-24Z 8/	1.500 (38.10)	1.250 (31.75)	0.972	1.599 (.725)	0.948 (.430)	1.707 (43.36)	1.125 (28.58)	1.063 (27.00)

1/ Dimensions are in inches.

2/ Metric equivalents are given for information only.

3/ These ball sizes came from SAE-AS1946.

4/ Dimension A is the minimum dimension that may be reduced after hose to fitting assembly.

5/ Minimum specified inside diameter shall be verified by passing a spherical ball through the hose assembly.

6/ Swivel nut and cone seat of nipple size- 3/-4 shall mate with the size 3 fitting of SAE-AS4395 or SAE-AS33514. The remaining portion of the fitting shall mate with size 4 hose.

7/ Maximum weight for sizes -3/-4 through size 6 does not exist (see 1.2 for class 2).

8/ The letter "Z" is used to indicate that two layers of reinforcement are required for these sizes (see MIL-DTL-27267).

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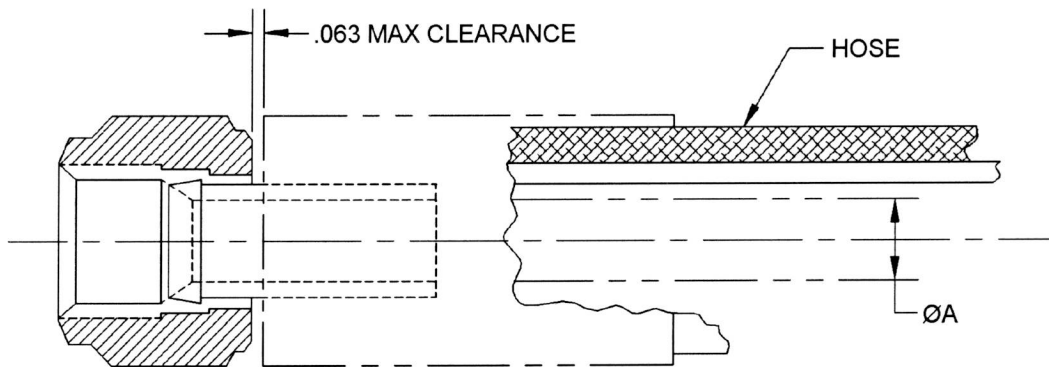


FIGURE 1. Hose assembly.

3.6 Performance.

3.6.1 Operating temperature and pressure. Class 1 shall operate in temperature ranging from -65°F to 450°F (-54°C to 232°C). Class 2 shall operate in temperature ranging from -65°F to 275°F (-54°C to 135°C). The operating pressure of the hose assembly shall not be greater than the applicable value specified in table III.

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TABLE III. Performance requirements and hose assembly sample lengths. 1/ 2/

Size	Length of samples for impulse test in.(mm) 3/	Length of samples for all other tests in.(mm) 3/	Maximum operating pressure per square inch psi (MPa)	Proof pressure psi (MPa) 4/ 5/	Minimum room temperature burst pressure psi (MPa)	Minimum high temperature burst pressure psi (MPa)	Minimum inside bend radius inches (mm)
-3/-4	14.0 (355.6)	18.0 (457.2)	1500 (10.34)	3000 (20.68)	12000 (82.74)	7000 (48.26)	2.00 (50.8)
-4	14.0 (355.6)	18.0 (457.2)	1500 (10.34)	3000 (20.68)	12000 (82.74)	7000 (48.26)	2.00 (50.8)
-5	16.0 (406.4)	18.0 (457.2)	1500 (10.34)	3000 (20.68)	10000 (68.95)	6500 (44.82)	2.00 (50.8)
-6	18.0 (457.2)	18.0 (457.2)	1500 (10.34)	3000 (20.68)	9000 (62.05)	6500 (44.82)	4.00 (101.6)
-8	21.0 (533.4)	18.0 (457.2)	1500 (10.34)	3000 (20.68)	8000 (55.16)	6000 (41.37)	4.63 (117.6)
-10	23.5 (596.9)	18.0 (457.2)	1500 (10.34)	3000 (20.68)	7000 (48.26)	5500 (37.92)	5.50 (139.7)
-12	27.5 (698.5)	18.0 (457.2)	1000 (6.89)	2000 (13.80)	5000 (34.47)	3500 (24.13)	6.50 (165.1)
-16Z	18.0 (457.2)	18.0 6/ (457.2)	1250 (8.62)	2500 (17.24)	5000 (34.47)	3500 (24.13)	7.38 (187.4)
-20Z	18.0 (457.2)	18.0 6/ (457.2)	1000 (6.89)	2000 (13.80)	4000 (27.58)	3000 (20.68)	11.00 (279.4)
-24Z	18.0 (457.2)	18.0 6/ (457.2)	1000 (6.89)	2000 (13.80)	4000 (27.58)	3000 (20.68)	14.00 (355.6)

1/ Dimensions are in inches.

2/ Metric equivalents are given for information only.

3/ The number of samples required for qualification testing as specified in 4.2.1.

4/ Assemblies with aluminum flange fittings shall be proof-pressure tested to the values listed under the proof pressure column as a minimum.

5/ Proof-pressure tolerances are +5%, -0%.

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

3.6.2 **Proof pressure.** When subjected to the applicable proof pressure specified in table III and tested in accordance with 4.5.2, the hose assembly shall not leak through the wall of the hose or around the end fittings. The fittings shall not exhibit any visual evidence of damage or permanent deformation.

3.6.3 **Leakage.** 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 4.5.3.

3.6.4 **Room temperature burst pressure.** When subjected to testing in accordance with 4.5.4, the hose assembly shall not leak or burst below the applicable room temperature burst pressure specified in table III. There shall be no leakage around the end fittings, and the end fittings shall not loosen or separate from the hose.

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3.6.5 High temperature burst pressure. When subjected to testing in accordance with 4.5.5, the hose assembly shall not leak or burst below the applicable high temperature burst pressure specified in table III. There shall be no leakage around the end fittings, and the end fittings shall not loosen or separate from the hose.

3.6.6 Hose conductivity. When subjected to testing in accordance with 4.5.6, using a test potential of 1,000 V dc, hose assembly sizes -3/-4 through 8 shall conduct a direct current of not less than 6 μ A. Assembly sizes 10 through 24Z shall conduct a direct current of not less than 12 μ A.

3.6.7 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 4.5.7.

3.6.8 Fuel resistance. When subjected to testing in accordance with 4.5.8, the hose assembly shall not leak or show any evidence of deterioration during and at the completion of the test.

3.6.9 Pneumatic effusion. When subjected to testing in accordance with 4.5.9, the measured effusion rate of the hose assembly shall not be greater than the values listed in table IV.

TABLE IV. Pneumatic effusion requirement. 1/

Size	-3/-4	-4	-5	-6	-8	-10	-12	-16Z	-20Z	-24Z
Effusion rate 2/ (cc/ft of hose)	4.0	4.0	5.0	5.0	5.0	5.0	6.0	8.0	8.0	8.0

1/ Max effusion rates

2/ Collected during the last 30 minutes of the test.

3.6.10 Pneumatic surge. When subjected to testing in accordance with 4.5.10, the hose assembly shall not leak through the hose wall or 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.

3.6.11 Stress degradation. This test is intended to verify that the hose inner tube has been sintered and quenched to the proper crystallinity to eliminate stress cracking or creep with subsequent leakage. The effusion rate of the hose assembly after stress degradation shall not be greater than the values listed in table V when tested in accordance with 4.5.11. Following the introduction of hot oil, the hose assembly shall not leak when subjected to the applicable proof pressure test specified in 4.5.2.

TABLE V. Effusion requirement after stress degradation test. 1/

Size	-3/-4	-4	-5	-6	-8	-10	-12	-16Z	-20Z	-24Z
Effusion rate (cc ³ /in/min)	8	8	8	8	4	2	2	2	2	2

1/ Max effusion rates.

3.6.12 Corrosion. When subjected to testing in accordance with 4.5.12, the hose assembly shall not leak or malfunction below the applicable room and high temperature pressures specified in table III. The fittings shall be in good mechanical working order and shall also be free of corrosion.

3.6.13 Over-tightening torque. There shall not be any leakage when the fitting (flared or flareless only) is subjected to testing in accordance with 4.5.13. After each disassembly, the nut shall swivel freely by hand.

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3.6.14 Elongation and contraction. When subjected to the applicable operating pressure specified in table III and tested in accordance with 4.5.14, the hose assembly shall not change length by more than +0.20 or -0.30 inch in 10 inches of length.

3.6.15 Volumetric expansion. The volumetric expansion, measured in cc/in of free length, shall not be greater than .028 inch (0.71 mm) for size 4 and .040 inch (1.02 mm) for size 5 when tested in accordance with 4.5.15.

3.6.16 Low temperature flexibility. When tested in accordance with 4.5.16 and subjected to the applicable bend radius specified in table III, the hose assembly shall not leak or exhibit any visible evidence of permanent deformation or damage.

3.6.17 Vacuum. The hose shall not collapse or show any evidence of defects when subjected to testing in accordance with 4.5.17. 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.

3.6.18 Pneumatic leakage. When subjected to testing in accordance with 4.5.18, a steady stream of bubbles shall not be seen from any area of the hose assembly.

3.6.19 Fire resistance. When fire resistance or fireproofing is required (see 6.2), the hose assembly shall not rupture or leak when subjected to testing in accordance with 4.5.19.

3.6.20 Cleanliness. Prior to shipping, the end fittings of the hose assembly 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, 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. All hose assemblies shall be cleaned in accordance with SAE-AS611, class O. During conformance inspection, hose assemblies with uncovered ends shall be rejected and considered as a failure. The interior of the assembly shall not contain any debris or foreign materials when examined in accordance with 4.5.20.

3.7 Identification of product.

3.7.1 Fittings. The fittings manufacturer's name or trademark shall be permanently marked on all end fittings.

3.7.2 Hose assemblies. Marking shall be on permanent band or bands securely attached on the hose. Bands shall not be wider than 1 inch (2.54 mm) and shall not impair the flexibility or the performance of the hose. The bands shall be designed as to remain tight on the hose to prevent relative movement and resultant chafing. Unless other wise specified, the marking on the band shall include the following information:

- a. Assembly manufactures Commercial and Government Entity (CAGE) code
- b. Part or Identifying Number (PIN) as specified in the applicable specification sheet.
- c. Operating Pressure (3000 psi) as applicable to table III.
- d. Operating temperature (450°F or 275°F) as applicable see paragraph 1.2.
- e. Pressure test symbol (PT).
- f. Date of hose assembly manufacture expressed as month and year (MM/YY).
- g. Hose manufacturers CAGE if different than the hose assembly manufacture.

3.8 Interchangeability. All hose assemblies having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

3.9 Workmanship. All surfaces shall be free from burrs. All sealing surfaces shall be smooth, except that annular tool marks shall not be greater than 100 microinches.

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)

4.1.1 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 tests and measuring equipment shall be in accordance with ISO 17025 and NCSL Z540.3 as applicable.

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

4.2.1 Samples for qualification. Test samples shall consist of the number of samples and lengths specified in table VII. If field-attachable fittings are used, the fittings shall comply with MIL-DTL-27272 and be used with MIL-DTL-27267 hose. Where permanent end fittings are used and more than one source of hose or hose liner are used, qualification tests shall be conducted on test samples constructed using hose liner from each source. Where permanent fittings using hose other than MIL-DTL-27267 hose, then hose liners and fittings from each source are used.

4.2.1.1 Specific gravity. The requirements of 4.5.18 (specific gravity in accordance with SAE-AS2078) shall be demonstrated by the tests.

4.2.1.2 Qualification test sequence. The test sequence used shall be as specified in table VII. See paragraph 3.5.1 for inner tube requirements.

4.2.1.3 Qualification samples. Qualification samples shall be representative of the product proposed to be furnished to this specification. Samples consisting of 16 hose assemblies of the same size and class, with lengths as specified in table VII or in the applicable test method, shall be subjected to qualification testing. Each sample shall consist of a PTFE lined, wire reinforced hose, qualified to MIL-DTL-27267, coupled with reusable fittings as specified 3.5.2.

- a. Reusable fittings. All assemblies with reusable fittings shall be assembled in accordance with the instructions specified in MIL-DTL-27272. When permanent fittings are used in the hose assemblies, two separate end fittings of the same type of interface, size, and class shall also be submitted for qualification testing (see table VII).
- b. Permanent fittings. Hose assemblies with permanent fittings shall be qualified with fittings from a specific manufacturer(s) and bulk hose from a specific manufacturer(s).
- c. Both reusable and permanent fittings. For assemblies with either permanent or reusable fittings, the assemblies shall be qualified with fittings from a specific manufacturer and hose from a specific manufacturer. If multiple hose sources and/or multiple fitting sources are involved, each combination must be qualified. Any subsequent changes of a hose or fitting manufacturer in a qualified assembly must be approved by the qualifying activity.

4.2.2 Additional samples for extension of qualification.

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4.2.2.1 Hose assemblies reusable. Qualification of hose assemblies with reusable end fittings may be extended, to include hose assemblies of the same size and class but with reusable end fittings of another type of interface (see applicable specification sheet), provided that the following additional samples are submitted for testing and approval:

Two hose assemblies, of the same size and class as those submitted in 4.2.1, with reusable end fittings for each additional type of interface are desired.

4.2.2.2 Hose assemblies permanent. Qualification of hose assemblies with permanent end fittings may be extended, to include hose assemblies of the same size and class but with permanent end fittings of another type of interface (see applicable specification sheet), provided that the following additional samples are submitted for testing and approval:

- a. Two hose assemblies, of the same size and class as those submitted in 4.2.1, with permanent end fittings for each additional type of interface are desired.
- b. Two separate permanent end fittings of the same type of interface, size, and class as submitted in item "a".

4.2.3 Qualification inspection routine. All hose assembly samples shall be subjected to qualification testing in accordance with table VI and in the sequence specified in table VII. However, the additional hose assembly samples specified in 4.2.2 and the separate permanent end fittings specified in 4.2.1 and in 4.2.2.2 shall be subjected to only the tests and sequences specified in table VII.

4.2.4 Acceptance of qualification data. For identical requirements and test procedures, using an identical fitting, qualification test data from MIL-DTL-27267 hose and from MIL-DTL-27272 fittings shall be accepted as qualification test data 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.

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

4.2.6 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.

4.2.6.1 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.

4.3.1 Individual tests. Inspection of the product for delivery; shall consist of subjecting each hose assembly 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 assemblies, selected to form an inspection sample (see 4.3.2.1), shall be subjected to the sampling tests specified in table VI.

4.3.2.1 Inspection sample. An inspection sample shall consist of hose assemblies, of one inner diameter size, randomly selected from the production lot without regard to quality. Eight samples from a lot size of 3,000 hose assemblies or one sample from each smaller lot size of 375 hose assemblies or smaller shall be subjected to the sampling tests.

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4.3.2.2 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.

TABLE VI. Inspection requirements.

Requirement	Requirement paragraph	Test method paragraph	Qualification inspection	Conformance inspection		
				Individual	Sampling	Periodic
Examination of product	3.5	4.5.1	X	X		
Proof pressure	3.6.2	4.5.2	X	X		
Leakage	3.6.3	4.5.3	X		X	
Room temperature burst pressure	3.6.4	4.5.4	X		X	
High temperature burst pressure	3.6.5	4.5.5	X			
Hose assembly conductivity	3.6.6	4.5.6	X			X
Impulse	3.6.7	4.5.7	X			X 1/
Fuel resistance	3.6.8	4.5.8	X			
Pneumatic effusion	3.6.9	4.5.9	X			
Pneumatic surge	3.6.10	4.5.10	X			
Stress degradation	3.6.11	4.5.11	X			X 2/
Corrosion	3.6.12	4.5.12	X			
Over-tightening torque	3.6.13	4.5.13	X			
Elongation & contraction	3.6.14	4.5.14	X		X	
Volumetric expansion	3.6.15	4.5.15	X			
Low temperature flexibility	3.6.16	4.5.16	X			
Vacuum	3.6.17	4.5.17	X			
Pneumatic leakage	3.6.18	4.5.18	X			
Fire resistance or fire proof	3.6.19	4.5.19	X			

1/ Only unaged samples shall be subjected to testing.

2/ Exposure to -67°F (-55°C) and subsequent testing may be omitted.

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 10,000 hose assemblies produced or two samples from every 2,500 hose assemblies. If there has been some production but the number of hose assemblies produced has not reached 2,500 for a specific size within three years, the manufacturer shall perform periodic control tests on two hose assemblies of that size unless documented approval has been obtained from the qualifying activity.

4.3.3.1 Periodic control test plan. Testing shall be as specified in table VI. Half of the samples shall be subjected to the stress degradation test followed by the hose conductivity test. The remaining half of the samples shall be subjected to the impulse test.

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TABLE VII. Qualification inspection sequence.

Required qualification test	Required test paragraph	Sample number													
		Fittings 1/ (permanent)	Assemblies (see table III).												
			1 2/	2	3	4	5	6 3/	7	8 2/	9	10 2/	11-16 3/	17-18 4/	
Examination of product	4.5.1	X	X	X	X	X	X	X	X	X	X	X	X	X	
Proof pressure	4.5.2		X	X	X	X	X	X	X	X	X	X	X	X	
Stress degradation	4.5.11								X	X					
Corrosion	4.5.12				X	X									
Over-tightening torque 5/	4.5.13	X													
Elongation & contraction	4.5.14			X								X			
Volumetric expansion	4.5.15			X							X	X			
Pneumatic leakage	4.5.18						X	X							
Hose conductivity	4.5.6										X				
Impulse	4.5.7												X		
Fuel resistance	4.5.8		X	X											
Pneumatic effusion	4.5.9						X	X							
Pneumatic surge	4.5.10						X	X							
Low temp flexibility	4.5.16		X							X		X			
Vacuum	4.5.17		X							X		X			
Proof pressure	4.5.2						X	X							
Leakage	4.5.3						X	X						X	
Room temp burst pressure	4.5.4				X		X							X	
High temp burst pressure	4.5.5					X		X							

1/ Two fittings of each type of interface are required only when qualification of assemblies using permanent fittings is desired (see 4.2.1 and 4.2.2.1).

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

3/ These samples shall have a 90°elbow fitting on one end and a straight fitting on the other end. If qualification is desired for both bent tube and forged elbow, then half of the samples shall use the other type. In this case, sample 6 may have either a bent tube or a forged configuration.

4/ These samples are required only when extension of qualification is desired for another type of interface (see 4.2.2.1).

5/ Not applicable to flange fittings.

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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 re-instituted 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 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.

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

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

4.5 Test methods. Test methods used shall be as specified in table VI. For qualification testing, the sequence of tests performed shall be in accordance with table VII. Room temperature shall be defined as 60 to 100°F (16°C to 38°C) unless otherwise specified. Class 2 hose assemblies shall be tested at 275°F (135°C) whenever a higher temperature is specified.

4.5.1 Examination of product. Each hose assembly shall be visually and physically examined for conformance to the configuration specified in the applicable specification sheet and the following requirements:

- a. Materials (see 3.3).
- b. Design and construction (see 3.5).
- c. Dimensions and weights (see 3.5.4).
- d. Cleanliness (see 3.6.20).
- e. Product identification (see 3.7).
- f. Interchangeability (see 3.8).
- g. Workmanship (see 3.9).
- h. Assembly passage-way inspection (see 3.5.6)

4.5.2 Proof pressure. Prior to testing, each hose assembly shall be examined to ensure that it is properly assembled. Samples shall then be subjected to testing in accordance with SAE-AS2078 using the applicable proof pressure as specified in table III. However, hose assemblies with aluminum flange fittings (class 2) shall be proof tested using the applicable operating pressure listed in table III. Test fluid shall be water; however, fluid in accordance with MIL-PRF-5606, MIL-PRF-83282, or MIL-PRF-87257 may be used during qualification testing. Conformance shall be as specified in 3.6.2.

4.5.3 Leakage. 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 3.6.3

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4.5.4 Room temperature burst pressure. Samples shall be subjected to testing in accordance with SAE-AS2078 using the applicable room temperature burst pressure specified in table III. Test fluid shall be water or fluid in accordance with MIL-PRF-5606, MIL-PRF-83282, or MIL-PRF-87257. Samples shall be continuously observed throughout 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 3.6.4.

4.5.5 High temperature burst pressure. Samples shall be subjected to testing in accordance with SAE-AS2078 using the applicable high temperature pressure specified in table III. Test fluid shall conform to MIL-PRF-7808, MIL-PRF-83282, or MIL-PRF-87257. 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 3.6.5.

4.5.6 Hose conductivity. The test sample shall be a 13-inch (330 mm) length of hose with a fitting attached at only one end. Testing shall be in accordance with the conductivity test for hose assembly specified in SAE-AS2078. Conformance shall be as specified in 3.6.6.

4.5.7 Impulse (see 3.6.7). Hose assemblies when subjected to impulse testing shall meet the requirements of 3.6.7, the following details shall apply:

- a. All test specimens, of length as specified in table III, shall be subjected to the proof pressure test (see 4.5.2) prior to impulse testing in accordance with SAE-AS2078.
- b. For qualification testing, 2 of the 6 samples shall be unaged while 2 samples shall be aged in air at $400^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($204^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$) for 168 hours. The remaining 2 samples shall be aged by immersion in fluid in accordance with MIL-PRF-7808 at $400^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($204^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$) for 168 hours.
 - (1) The assemblies shall then be subjected at room temperature to the proof pressure specified in table III for a minimum of 5 minutes.
 - (2) The hose assemblies shall then be pressurized to operating pressure and while maintaining this pressure at room temperature, the hose assemblies shall be immersed in a 3.5% +0.1% U.S.P. Grade NaCl solution by weight for 8 to 10 minutes, then allow to air dry for the remainder of 1 hour. This sequence of immersion and air drying shall be repeated no less than 50 times.
- c. Samples sizes 12 and smaller shall be connected to the rigid supports of the test apparatus and bent to the applicable radius specified in table III. Samples sizes -16Z and larger shall be installed straight; one end may be left free.
- d. The peak pressure used for samples shall be 100% of operating pressure specified in table III.

4.5.8 Fuel resistance (see 3.6.8). Samples shall be subjected to the fuel resistance test in accordance with SAE-AS2078 shall meet the requirements of 3.6.8.

4.5.9 Pneumatic effusion (see 3.6.9). Samples shall be subjected to the pneumatic effusion test in accordance with SAE-AS2078 shall meet the requirements of 3.6.9.

4.5.10 Pneumatic surge (see 3.6.10). Samples shall be subjected to the pneumatic surge test in accordance with SAE-AS2078 shall meet the requirements of 3.6.10.

4.5.11 Stress degradation (see 3.6.11). Hose assemblies when stress degradation tested shall meet the requirements of 3.6.11, the following details shall apply:

- a. Two hose assemblies of each size shall be subjected to this test. The hose assemblies shall be filled with high temperature test fluid in accordance with MIL-PRF-7808 or MIL-PRF-83282.
- b. The hose assemblies shall then be placed in an oven which shall be maintained at a temperature of $450^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($232^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$). Precautions shall be taken to assure that the hose assemblies do not come in contact with part of the oven that are at a higher temperature. A pressure equal to the rated operating pressure specified in table III shall be applied to the hose assemblies.

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- c. After a minimum of 20 hours at $450^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($232^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$), the pressure shall be gradually released and the assemblies shall be removed from the oven, drained and cooled to room temperature. The assemblies shall then be flushed with a quantity of new test fluid, equivalent in volume to at least twice the sample volume and drained.
- d. The hose assemblies shall then be filled with MIL-PRF-87257 fluid. A pressure equal to the rated operating pressure specified in table III shall be applied and held for a minimum of 2 hours at room temperature.
- e. The assemblies shall then be emptied and filled with oil or hydraulic fluid as specified in 4.5.11(a). The tests specified in 4.5.11 (b), (c), and (d) shall be repeated.
- f. The hose assemblies shall then be filled with ASTM reference fluid B (isooctane, 70%; toluene, 30%) in accordance with ASTM D471 and individually capped. While at room temperature, the assemblies shall be bent around a mandrel having a radius equal to the minimum bend radius as specified in table III. The assemblies shall be bent around the mandrel and straightened for 20 cycles. The assemblies shall be held by the fitting while the bending is being performed. The tests specified in 4.5.11 (a), (b), (c), and (d) shall be conducted for the third time.
- g. Within 4 hours after the final 2 hours pressurization period with ASTM reference fluid B, the assemblies shall be drained and flushed with fluid in accordance with MIL-PRF-680 and placed in an oven for 1 hour. The temperature of the oven shall be maintained at $160^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($71^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$).
- h. Within 8 hours after completion of the drying process, the hose assemblies shall be removed from the oven, cooled to room temperature, and then subjected to an air-under-water test. To conduct this test, the hose assemblies shall be installed in an apparatus similar to that shown on figure 2.

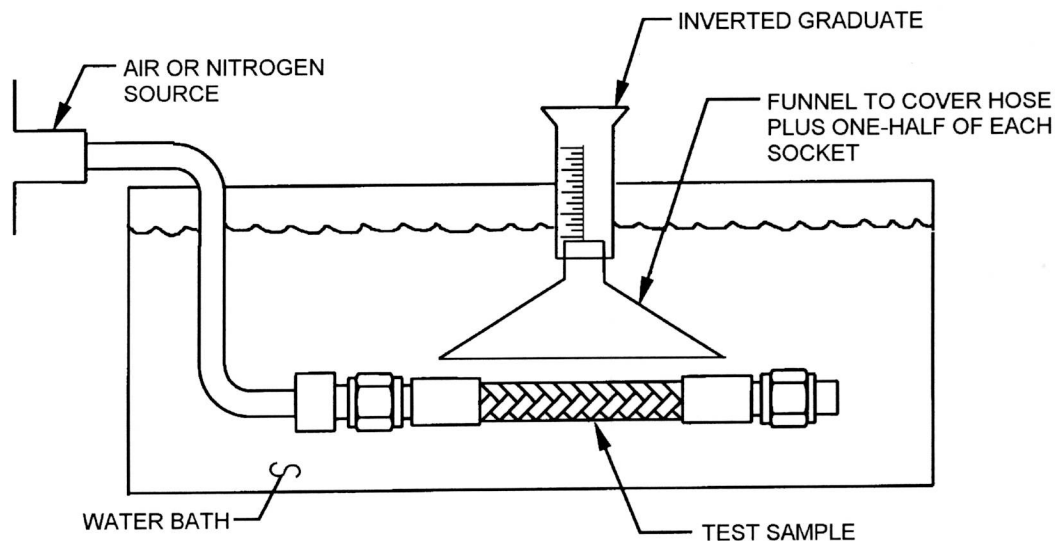


FIGURE 2. Test setup for pneumatic effusion tests.

- i. This test setup with the hose assembly installed shall be immersed in water containing no wetting agent. A pressure equivalent to the rated operating pressure, as specified in table III, shall be applied and the pressure shall be held for a minimum of 15 minutes to allow any entrapped air in the hose assembly to escape.
- j. The pressure shall be held for an additional 5 minute period. During this time effused gas shall be collected from the test sample which includes the juncture of the hose to the fitting, but not

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including the fitting nut. If after the 5 minute period of pressurization, the average rate of effusion through the hose assembly exceeds the values listed in table V, it shall be cause for rejection.

- k. At the completion of the tests specified in 4.5.11 (b) through (j), the hose assemblies shall be filled with oil and placed in a cold chamber for 8 hours while maintained at $-67^{\circ}\text{F} \pm 2^{\circ}\text{F}$ ($-55^{\circ}\text{C} \pm 1.1^{\circ}\text{C}$)
- l. After the 8 hour cold soak, the assemblies shall be subjected to a pressure equal to the operating pressure specified in table III. The pressure shall be held for a minimum of 5 minutes and then released. This shall be repeated for a total of 10 times with a minimum of 5 minutes between each pressure application and with the samples still in the $-67^{\circ}\text{F} \pm 2^{\circ}\text{F}$ ($-55^{\circ}\text{C} \pm 1.1^{\circ}\text{C}$) cold chamber.
- m. At the end of this time oil at a temperature of $450^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($232^{\circ}\text{F} \pm 5.5^{\circ}\text{C}$) shall be circulated through the hose assemblies.
- n. Within 15 seconds after introduction of the hot oil, the pressure shall be increased to the rated proof pressure specified in table III and held for 2 minutes. There shall be no evidence of leakage from the hose.

4.5.12 Corrosion (see 3.6.12). Hose assemblies when subjected to corrosion testing shall meet the requirements of 3.6.12, the following details shall apply:

- a. Samples, mounted in a vertical position and subjected to the applicable operating pressure (see table III), shall be immersed in a 2.5% solution of sodium chloride for five minutes.
- b. They shall then be air-dried at $140^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($60^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$) for 25 minutes.
- c. This cycling shall continue for at least 172 hours with the specified pressure maintained on the hose.
- d. Following the cycling, half of the samples shall be subjected to the room temperature burst pressure test (see 4.5.4) and the other half shall be subjected to the high temperature burst pressure test (see 4.5.5).

4.5.13 Over-tightening torque (see 3.6.13). Hose assemblies when subjected to over-tightening torque in accordance with SAE-ARP908 shall meet the requirements of 3.6.13. The following exception shall apply: The number of cycles used shall be 15.

4.5.14 Elongation and contraction (see 3.6.14). Hose assemblies when subjected to elongation and contraction testing in accordance with SAE-AS2078 shall meet the requirements of 3.6.14. The test fluid used shall be water or fluid in accordance with MIL-PRF-5606, MIL-PRF-83282, or MIL-PRF-87257.

4.5.15 Volumetric expansion sizes 4 and 5 only (see 3.6.15). Hose assemblies when subjected to volumetric expansion be in accordance with SAE-AS2078 shall meet the requirements of 3.6.15. The following exception shall apply: the operating pressure used shall be 1000 psi (7 Mpa).

4.5.16 Low temperature flexibility (see 3.6.16). Hose assemblies when subjected to low temperature flexibility testing in accordance with SAE-AS2078 shall meet the requirements of 3.6.16, the following exception shall apply: Samples, of length shall be as specified in table III.

4.5.17 Vacuum (see 3.6.17). Hose assemblies when subjected to vacuum testing in accordance with SAE-AS2078 shall meet the requirements of 3.6.17. The following details shall apply:

- a. Samples that were tested for low temperature flexibility (see 4.5.16) shall then be subjected to vacuum testing in accordance with SAE-AS2078.
- b. The applicable negative pressure used shall be as specified in table VIII and ball diameters shall be as specified in SAE-AS1946.

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TABLE VIII. Vacuum test conditions.

Size	Nominal inside diameter (in)	Negative pressure (in Hg)
-3/-4	0.188	28
-4	0.188	28
-5	0.250	28
-6	0.313	28
-8	0.406	28
-10	0.500	28
-12	0.625	20
-16Z	0.875	14
-20Z	1.125	10
-24Z	1.375	8

4.5.18 Pneumatic leakage (see 3.6.18). Hose assemblies when subjected to pneumatic leakage in accordance with SAE-AS2078 shall meet the requirements of 3.6.18.

4.5.19 Fire resistance (see 3.6.19). Hose assemblies when subjected to fire resistance testing in accordance with SAE-AS1055 type IIa, class A shall meet the requirements of 3.6.19.

4.5.20 Cleanliness (see 3.6.20). Both ends of the hose assembly shall be visually inspected to determine if caps or plugs are installed at the fittings. For hose assembly with straight fittings at both ends, remove the caps or plugs and place a light source at one end of the hose assembly. The interior of the hose shall be visually examined, without magnification, from the opposite end of the light source. Conformance shall be as specified in 3.6.20.

5. PACKAGING

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

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory).

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6.1 Intended use. The hose assembly covered by this specification is military unique to meet the requirements specified herein and in the applicable specification sheets. The hose qualified in accordance with MIL-DTL-27267 for field attachable fitting assemblies should be mated with either reusable fittings qualified in accordance with MIL-DTL-27272 or with permanent fittings to meet the requirements specified herein and in the applicable specification sheet. This hose assembly is a hydraulic or pneumatic conductor for a fluid at the operating pressure, specified in table III, even under extreme temperature conditions ranging from -65°F to 450°F (275°F for class 2). The hose assembly 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 hose wall. However, hose assembly used in hydraulic and pneumatic systems should not exceed the temperature limit of 400°F. Furthermore, it is recommended that this hose assembly should not be used in pneumatic storage system applications and in any applications that exceed the operating temperature range and pressure specified herein. Hose assembly sizes -20Z and -24Z should not be used in systems where the peak pressures are greater than 1000 psi (7MPa). Hose assembly size -3/-4 is not intended for use in aircraft hydraulic systems.

6.1.1 Fire resistance. When fire proofing or fire resistance is desired, it is critical that the hose assembly meets the requirements specified in 3.6.19 when tested in accordance with 4.5.19.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. PIN that includes the length required (see 3.5.5 and the applicable specification sheet).
- c. Whether fire resistance or fireproofing is required (see 3.6.19 and 4.5.19).
- d. 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 QPL No.25579 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Land and Maritime, P.O. Box 3990, ATTN: DSCC-VQ, Columbus, Ohio 43218-3990 or emailed to vqp.chief@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.daps.dla.mil>.

6.3.1 Provisions governing qualification (SD-6). Copies of "Provisions Governing Qualification" are available online at <https://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.

6.4 Subject term (key word) listing.

Fire resistance
Fuel resistance
Hydraulic systems
Lubricating oil
Pneumatic systems
Water-alcohol

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6.5 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).

6.6 Guidance on use of alternative parts with less hazardous or nonhazardous materials. This specification provides for a number of alternative plating materials via the PIN. Users should select the PIN with the least hazardous material that meets the form, fit and function requirements of their application.

6.7 Amendment notations. The margins of this specification are marked with a vertical line to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

CONCLUDING MATERIAL

Custodians:

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

Preparing activity:

DLA - CC

(Project 4720-2010-008)

Review activities:

Army - AR, AT, EA, MI
Navy - MC, SA, SH
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 <https://assist.daps.dla.mil>.