

INCH-POUND

MIL-DTL-27272C
25 September 2003
SUPERSEDING
MIL-F-27272B
20 August 1991

DETAIL SPECIFICATION

FITTINGS, POLYTETRAFLUOROETHYLENE HOSE,
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 covers the requirements for fittings for medium-pressure and high-temperature applications with polytetrafluoroethylene (PTFE) hose conforming to MIL-DTL-27267 and MIL-DTL-25579 (see 3.1 and 6.1).

1.2 Classification. Fittings are of the following classes (see 6.1).

- | | | |
|---------|---|--|
| Class 1 | - | Corrosion-resistant steel (CRES) (fluid operating temperature from -65 to 450°F) |
| Class 2 | - | Combination of aluminum and CRES (fluid operating temperature from -65 to 275°F) |

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).

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@dsc.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.

AMSC N/A
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.
SPECIFICATIONS

FSC 4730

MIL-DTL-27272C

DEPARTMENT OF DEFENSE

MIL-PRF-680	-	Degreasing Solvent
MIL-PRF-5606	-	Hydraulic Fluid, Petroleum Base; Aircraft, Missile and Ordnance
MIL-S-7742	-	Screw Threads, Standard, Optimum Selected Series: General Speciation For
MIL-PRF-7808	-	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-A-8625	-	Anodic Coatings for Aluminum and Aluminum Alloys
MIL-DTL-25579	-	Hose Assembly, Polytetrafluoroethylene, High Temperature, Medium Pressure
MIL-DTL-25579/1	-	Fitting End Design Standard for Application of NAS 1760 and Radius Globe-Nose to Flareless Hose Assembly Fittings
MS27053	-	Adapter Assembly, Flared, Straight, Tube to Hose – with Swivel Nut
MIL-DTL-27267	-	Hose, Polytetrafluoroethylene, 450°F, Medium Pressure
MS33786	-	Fitting, Installation, Flared Tube and Hose, Swivel (ASG)
MIL-PRF-46010	-	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting
MIL-PRF-83282	-	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537

(See Supplement 1 for list of specification sheets.)

(Unless otherwise indicated, copies of the above specifications and standards are available 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 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).

AEROSPACE INDUSTRIES ASSOCIATION

NAS 1760	-	Fitting End, Flareless Acorn, Standard Dimensions For (DoD adopted)
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(Applications for copies should be addressed to Aerospace Industries Association of America, 1250 Eye Street, N.W., Suite 1200, Washington, DC 20005-3924.)

AMERICAN WELDING SOCIETY

AWS C3.4	-	Specification for Torch Brazing (DoD adopted)
AWS C3.5	-	Specification for Induction Brazing (DoD adopted)
AWS C3.6	-	Specification for Furnace Brazing (DoD adopted)
AWS C3.7	-	Specification for Aluminum Brazing (DoD adopted)

(Application for copies should be addressed to American Welding Society; 550, N.W. LeJeune Road; Miami, FL 33136.)

ASTM INTERNATIONAL (ASTM)

MIL-DTL-27272C

- | | | |
|------------|---|---|
| ASTM D471 | - | Rubber Property-Effect of Liquids (DoD adopted) |
| ASTM E1742 | - | Radiographic Examination (DoD adopted) |

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

NATIONAL CONFERENCE OF STANDARDS LABORATORIES (NCSL)

- | | | |
|------------------|---|--|
| ANSI/NCSL Z540-1 | - | General Requirements for Calibration Laboratories and Measuring and Test Equipment (DoD adopted) |
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(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 AMS-QQ-P-35 | - | Passivation Treatments for Corrosion-Resistant Steel (DoD adopted) |
| SAE ARP908 | - | Hose and Tube Fitting, Installation and Qualification Test Torque Requirements (DoD adopted) |
| SAE AS1701 | - | Lubricant, Solid Film (DoD adopted) |
| SAE AS2078 | - | Test Methods, Hose Assemblies, Polytetrafluoroethylene (PTFE) (DoD adopted) |
| SAE AMS-STD-2219 | - | Fusion Welding for Aerospace Applications (DoD adopted) |
| SAE AMS 2672 | - | Brazing Aluminum Torch or Aluminum (DoD adopted) |
| SAE AMS 2673 | - | Brazing, Aluminum and Aluminum Alloys Molten Flux (Dip) |
| SAE AS4395 | - | Fitting End - Flared Tube Connection, Design Standard (DoD adopted) |
| SAE AS5272 | - | Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting Procurement Specification |
| SAE AS33514 | - | Fitting End, Standard Dimensions for Flareless Tube Connection and Gasket Seal (DoD adopted) |

(Application for copies should be addressed to SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 Order of precedence. In the 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 in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Fittings 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 4.4 and 6.3).

MIL-DTL-27272C

3.3 Materials. Fittings shall be fabricated from materials specified in MIL-DTL-25579 and on the applicable specification sheets. Class 1 fittings shall be all CRES. Class 2 fittings shall be a combination of aluminum and CRES (see 4.6.1.).

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

3.3.2 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 cost.

3.4 Finish.

3.4.1 Corrosion-resistant steel fittings. Corrosion resistant parts shall be passivated in accordance with SAE AMS-QQ-P-35 for the specific material (see 4.6.1).

3.4.2 Aluminum fittings. Aluminum fittings shall be finished in accordance with MIL-A-8625 as specified on the applicable specification sheet (see 4.6.1).

3.4.3 Brazing. Fittings manufactured by torch brazing in accordance with AWS C3.4, or induction brazing in accordance with AWS C3.5, or furnace brazing in accordance with AWS C3.6, or aluminum brazing in accordance with AWS C3.7, or aluminum brazing in accordance with SAE AMS 2672, or fusion welding for aerospace applications in accordance with SAE AMS-STD-2219 or dip brazing in accordance with SAE AMS 2673 or mechanical operations in accordance with applicable MS, shall be proof tested in accordance with 4.6.3. Radiographed parts in accordance with ASTM E1742.

3.5 Design and construction.

3.5.1 Fitting end mateability. Fittings shall mate with fitting ends conforming to MS33786, SAE AS4395, SAE AS33514, as specified on the applicable specification sheets. Flared fittings shall mate with SAE AS4395 and flareless fittings shall mate with SAE AS33514 (see MIL-DTL-25579/1 to apply NAS 1760) and flange fittings shall mate with MS33786 per applicable MS (see 4.6.1).

3.5.2 Hose compatibility. Fittings shall be compatible with hose which conforms to MIL-DTL-27267; when assembled, assemblies shall conform to MIL-DTL-25579 (see 4.5.1 and 4.6.1).

3.5.3 Threads. Threads shall be as specified on MIL-S-7742 and applicable specification sheet (see 4.6.1).

3.5.4 Lubricant. Class 1 nipple fitting threads shall be lubricated using dry film lubricant conforming to SAE AS1701 or AS5272 or MIL-PRF-46010. The coating thickness shall be a minimum of .0002 inch and no greater than .0030 inch, and shall not impede engagement of the applicable parts (see 4.6.1).

3.5.5 Surface roughness. Surface roughness shall be as specified in the applicable specification sheet (see 4.6.1).

3.6 Performance.

3.6.1 Fitting assembly torque. Fittings shall not leak, fail, deform, gall, or bind when assembled and torqued to the value specified in table I for class 1 fittings (see 4.6.2.).

MIL-DTL-27272C

TABLE I. Assembly torque values for class 1 fittings.

Size	Assembly torque
	Class 1 fittings (pound-inch \pm 1%)
-3/-4	120
-4	180
-5	240
-6	300
-8	540
-10	840
-12	1,020
-16Z	1,680
20Z	2,760
-24Z	3,900

3.6.2 Lubricant wear. Following application of the lubricant, class 1 fittings shall be capable of being assembled six times and disassembled five times to the assembly torque values as specified in table I (see 4.6.2).

3.6.3 Over-tightening torque. Fittings shall be capable of being assembled and disassembled using SAE AS4395 and SAE AS33514 mating adapters 15 times to the over-tightening torque specified in SAE ARP908. Afterward proof pressure as specified in 4.6.4. After disassembly, the fittings shall show no evidence of permanent deformation and the swivel nuts shall be free to turn by hand. SAE AS4395 and AS33514 are the mating parts, not the fittings (see 4.6.13.).

3.6.4 Proof pressure. Fittings shall not leak, deform, move relative to the hose, separate from the hose, or burst at any pressure up to the proof pressure specified in table II (see 4.6.4).

3.6.5 Leakage pressure. Fittings shall not leak, deform, move relative to the hose, separate from the hose, or burst at any pressure up to 70 percent of the room-temperature burst pressure specified in table II (see 4.6.5).

TABLE II. Fitting performance requirements and hose assembly test sample lengths.

Fitting size	Length of samples for impulse test (inches)	Length of samples for other tests (inches)	Operating pressure (psi)	Proof pressure (psi min)	Burst pressure, room temp. (60 - 90°F) (psi min)	Burst pressure, high temp (psi min)	Minimum inside bend radius (inches)
-3/-4	14	18	1,500	3,000	12,000	7,000	2.00
-4	14	18	1,500	3,000	12,000	7,000	2.00
-5	16	18	1,500	3,000	10,000	6,500	2.00
-6	18	18	1,500	3,000	9,000	6,500	4.00
-8	21	18	1,500	3,000	8,000	6,000	4.60
-10	23.5	18	1,500	3,000	7,000	5,500	5.50
-12	27.5	18	1,000	2,000	5,000	3,500	6.50
-16Z	18	18	1,250	2,500	5,000	3,500	7.40
-20Z	18	18	1,000	2,000	4,000	3,000	11.00
-24Z	18	18	1,000	2,000	4,000	3,000	14.00

MIL-DTL-27272C

3.6.6 High-temperature burst pressure. Fittings shall not leak, burst, or separate from the hose at any pressure up to the applicable high temperature (450°F for class 1 fittings, 275°F for class 2 fittings) burst pressure specified in table II (see 4.6.10).

3.6.7 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 4.6.7. Following the introduction of hot oil, the hose assembly shall not leak when subjected to the applicable proof pressure test specified in 4.6.4.

TABLE III. Effusion requirement after stress degradation test.

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

3.6.8 Room-temperature burst pressure. Fittings shall not leak, burst or separate from the hose at any pressure up to the applicable room-temperature burst pressure specified in table II (see 4.6.6).

3.6.9 Impulse. Fittings of sizes -3/4 fitting or hose through -16Z shall withstand not less than 100,000 impulse cycles at a rate of 70 pulses per minute at 125 percent of the operating pressure specified in table II without leakage, deformation, or separation from a hose. Fittings of sizes -20Z and -24Z shall withstand not less than 100,000 impulse cycles at a rate of 70 pulses per minute at 100 percent of the operating pressure specified in table II without leakage, deformation, or separation from a hose (see 4.6.9).

3.6.10 Fuel resistance. Fittings shall not leak after immersion in hydrocarbon-based fuel (see 4.6.11).

3.6.11 Corrosion. The fittings shall function satisfactorily at the completion of 172 hours of cycling in accordance with 4.6.12. After exposure to 2.5 percent sodium chloride solution, fittings shall not leak or separate from the hose at any pressure less than the burst pressures (room-temperature and high-temperature) specified in table II, and shall show no evidence of pitting corrosion or stress corrosion that may adversely affect the life of the fitting (see 4.6.12.).

3.6.12 Pneumatic surge. The fitting shall not leak when operated at repeated pneumatic pressure cycles from zero pressure to the applicable operating pressure specified in table II (see 4.6.8).

3.7 Identification of product. Fittings shall be marked for identification in accordance with the applicable specification sheet (see 4.6.1).

3.8 Workmanship. Fittings shall be free from cracks, laps, seams, burrs, and longitudinal and spiral tool marks that may detrimentally affect their intended use (see 4.6.1).

4. VERIFICATION

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

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

MIL-DTL-27272C

4.1.1 Disposition of test specimens. Test specimens that have been subjected to qualification or periodic tests shall not be delivered on a contract or purchase order.

4.2 Qualification inspection. Qualification inspection shall be performed on units produced with equipment and procedures used in production.

4.2.1 Samples for qualification. Samples, consisting of 16 hose assemblies of the lengths specified in table II assembled from 32 fittings of each size as specified herein and polytetrafluoroethylene hose conforming to MIL-DTL-27267, shall be subjected to qualification testing as specified in table IV and in the sequence shown. Straight-type flared fittings conforming to MS27053 shall be used for each hose assembly, except as noted in table IV. The 16 hose assemblies shall be assembled using hose from a minimum of two manufacturers.

4.2.1.1 Fittings. In addition, four fittings of each size, two flared and two flareless, to be subjected to the over-tightening torque test (4.6.13) specified in table IV.

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

4.2.3 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.

4.2.3.1 Nonconformance of qualification. If the manufacturer states that the 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.

4.2.3.2 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.

4.3 Conformance inspection. Inspection of product for delivery shall consist of sampling tests.

4.3.1 Sampling tests. Sampling tests shall consist of the tests specified in table V performed in the order shown. These tests shall be performed on a production lot basis. Random samples from the production lot, without regard to quality, shall be selected in the inspection sample quantity specified in table VI to form an inspection sample. If one or more defects are found in the inspection sample, then the production lot shall be inspected for the particular defect and the defects removed. A second inspection sample shall be selected from the production lot and all sampling tests again performed. If one or more defective items are found in the second inspection sample, the production lot shall be rejected and shall not be supplied to this specification.

TABLE IV. Qualification inspection sequence. ^{1/}

Qualification test and test sequence	Test paragraph	Sample number										
		Fittings	Assemblies									
		1-4 ^{2/}	5	6 ^{4/}	7	8	9	10	11	12	13-18 ^{3/}	19-20 ^{2/}
Examination of product	4.6.1	X	X	X	X	X	X	X	X	X	X	X
Lubricant wear ^{2/}	4.6.2		X	X	X	X	X	X	X	X	X	
Joint integrity proof test	4.6.3	X	X	X	X	X	X	X	X	X	X	X
Proof pressure	4.6.4		X	X	X	X	X	X	X	X	X	X
Leakage	4.6.5		X	X								X
Fuel resistance	4.6.11		X	X								
Corrosion	4.6.12				X					X		
Over-tightening torque	4.6.13	X										
Stress degradation	4.6.7				X	X						
Pneumatic surge	4.6.8					X			X			
Impulse	4.6.9										X	
High-temp burst pressure	4.6.10			X	X							
Room-temp burst pressure	4.6.6		X							X		X

^{1/} Applicable to class 1 and class 2 fittings. It is permissible to put class 1 on one end and class 2 on the other of the hose assembly.

^{2/} Two of the fittings shall be flared and the remaining two shall be flareless.

^{3/} Samples 13 and 14 shall have an MS27057 90° elbow fitting at one end (if size is applicable).

^{4/} These samples shall be with flareless fittings.

MIL-DTL-27272C

TABLE V. Quality conformance inspection table.

Title	Requirement	Inspection	Sampling tests	Periodic
Examination of product	3.3, 3.4, 3.5, 3.7, and 3.8	4.6.1	X	-
Proof pressure	3.6.4	4.6.4	-	X
Leakage pressure	3.6.5	4.6.5	-	X
Room-temperature burst pressure	3.6.8	4.6.6	-	X
Over-tightening torque <u>1/</u>	3.6.3	4.6.13	-	X

1/ Over-tightening torque test is applied to class 1 and class 2.

TABLE VI. Inspection sample. 1/

Production lot size	Accept on zero sample size
1 to 8	All
9 to 90	8
91 to 150	12
151 to 280	19
281 to 500	21
501 to 1,200	27
1,201 to 3,200	35
3,201 to 10,000	38
10,001 to 35,000	46

1/ A production lot shall consist of the quantity of fittings of one size and type manufactured on the same production line by means of the same production techniques, materials, and controls during the same production run.

4.3.2 Periodic tests.

4.3.2.1 Periodic tests. Periodic tests shall consist of the tests specified in table V in the order shown except for over-tightening torque which is done individually. Proof pressure test, leakage test, and room-temperature burst pressure test shall be performed on six fittings (three assemblies) for each size at least once per year, regardless of the total number of fittings produced. The only exception is when there has been no production during the past year for a particular size, then no periodic testing is needed for that particular size. At least three of the six fittings shall be of the greatest bend angle produced during the period. The six fittings selected shall be as representative as possible of those produced during the period in terms of the fitting materials (example: all steel fittings, combination steel and aluminum fittings, etc.) and joint configurations (one piece, brazed joint, welded joint, mechanical joints, etc.).

MIL-DTL-27272C

4.3.2.2 Over-tightening torque test for periodic. The over-tightening torque test shall consist of the test specified in table V. This test shall be performed on two fittings at least once per year regardless of the total number of fittings produced. The only exception is when there has been no production during the past year, then this test is not to be performed. The fittings may be of any bend angle and joint configuration. The two fittings selected shall be as representative as possible of the metals used for the threaded parts if the parts have been produced from more than one type of metal (examples: aluminum threads, steel threads) and the joint configurations shall be as representative as possible such as (one piece, brazed joint, welded joint, mechanical joints, etc.).

4.3.2.3 Nonconformance. If a fitting fails to pass either periodic test, the manufacturer shall immediately notify the qualifying activity and cognizant inspection activity of such failure and take corrective action of the materials or processes, or both, as warranted, and on all units of product that can be corrected and that were manufactured under essentially the same conditions, with essentially the same materials and processes and that were considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After that corrective action has been taken, the periodic test shall be repeated on additional fittings (all inspections, or the inspection that the original sample failed, at the option of the qualifying activity). Periodic tests may be re-instituted; however, final acceptance shall be withheld until the periodic tests have shown that the corrective action was successful. In the event of failure after inspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.3.2.4 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 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 maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI/NCSS Z540-1 or equivalent.

4.5 Inspection conditions. All inspections shall be conducted in accordance with the test conditions specified herein. Room temperature shall be 60 to 90°F.

4.5.1 Hose assemblies for fitting inspections. The hose assemblies used for fitting inspections shall be assembled using hose conforming to MIL-DTL-27267 of the applicable size and become MIL-DTL-25579 hose assembly. An assembly shall include a nominal length of hose conforming to MIL-DTL-27267 with one fitting installed at each end. The lengths shall be as specified in table II.

4.6 Test methods.

4.6.1 Examination of product. Fittings and their related records shall be visually examined to determine conformance to this specification and the applicable specification sheet with respect to materials, finish, dimensions, interfaces (mateability and hose compatibility), identification marking, and workmanship (see 3.3, 3.4, 3.5, 3.7, and 3.8).

MIL-DTL-27272C

4.6.2 Lubricant wear. Fittings shall be assembled to the hose six times and disassembled five times using the following procedure. New ends of hose shall be used for each assembly cycle (see 3.6.2).

- a. The hose shall be cut to the nominal length specified in table II using a cutoff wheel. Each end shall be cut square taking care to minimize braid flare-out.
- b. The sockets at each hose end shall be inserted back-to-back over the wire braid of the hose using a threading motion. The threaded end of the sockets shall be positioned at the extreme end of the hose.
- c. The nipple hex nut shall be held firmly and the hose pushed onto the nipple. The hose shall be oscillated around the nipple to separate the wire braid from the tube. The hose shall be started onto the nipple carefully to prevent damage to the end of the tube. The hose shall then be removed from the nipple.
- d. The sleeve shall be inserted between the hose braid and tube and positioned by pushing it firmly against a flat surface until the cutoff end of the tube bottoms against the inside shoulder of the sleeve.
- e. The hose shall be inserted onto the nipple with a steady force and a slight rotation of the hose until the sleeve bottoms against the nipple chamber. The hose shall be removed while rotating slightly, and a check made to ensure that the tube is still bottomed against the sleeve shoulder. The hose and sleeve shall be pushed again onto the nipple until the sleeve bottoms against the nipple chamber. The socket shall be threaded onto the nipple using hand force. The threaded portion of class 2 nipples shall be lubricated with an SAE-30 weight lubricant. No additional lubricant is required for class 1 fittings.
- f. Using the proper size torque wrench, the socket and nipple shall be tightened until the gap specified on figure 1 is obtained. Final torque shall not exceed the applicable value specified in table I for the size of the fitting being used. The final torque value shall be recorded.

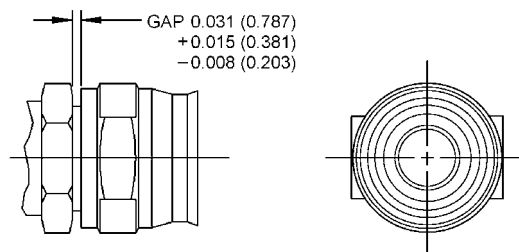


FIGURE 1. Gap measurement.

- g. With the proper size wrench, the nipple shall be loosened and removed from the socket and hose.

MIL-DTL-27272C

- h. The socket shall be removed from the hose by holding the hose behind the socket and firmly tapping the threaded end flat against a table or bench. The socket shall be threaded back off the end of the hose. The socket is forced further "onto" the hose so that the sleeve can be removed.
- i. The sleeve shall be removed by gripping it lightly with pliers across the outer diameter, or by inserting the nipple slightly into the end of the sleeve and gently prying it out without damaging the metal seal area of the sleeve. The socket shall then be slid off the hose.
- j. After each disassembly, the fitting components shall be cleaned with air pressure to remove dirt or other foreign matter and inspected. Upon disassembly, there shall be no evidence of galling or binding of assembled components and the swivel nut shall be free to turn by hand.

4.6.3 Joint integrity proof pressure. Fitting assemblies or subassemblies having brazed, welded, or mechanically attached joints shall be subjected to the applicable proof pressure specified in table II. One of the test samples shall be capped and the proof pressure applied through the other end for a minimum of 30 seconds or a maximum of 5 minutes. The test fluid shall be water. Any evidence of failure at any of these joints shall be cause for rejection (see 3.4.3).

4.6.4 Proof pressure. Prior to testing, each hose assembly shall be examined to ensure that it is properly assembled. The hose assembly shall then be subjected to the proof pressure test in accordance with SAE AS2078 using the applicable proof pressure specified in table II. Hose assemblies with aluminum flange fittings (class 2) shall be proof tested using the applicable operating pressure listed in table II. The test fluid shall be water; however, fluid conforming to either MIL-PRF-5606 or MIL-PRF-83282 may be used during qualification testing. The fitting shall show no evidence of leakage, burst, separation from the hose, or permanent deformation (see 3.6.4).

4.6.5 Leakage. The hose assembly shall be subjected to the leakage test in accordance with SAE AS2078. The test fluid shall be water or fluid conforming to either MIL-PRF-5606 or MIL-PRF-83282. The fittings shall show no evidence of leakage or permanent deformation (see 3.6.5).

4.6.6 Room-temperature burst pressure. The hose assembly shall be subjected to the burst test in accordance with SAE AS2078 using the applicable room-temperature burst pressure specified in table II. The test fluid shall be water or fluid conforming to either MIL-PRF-5606 or MIL-PRF-83282. The fitting shall not leak, burst, or separate from the hose (see 3.6.8).

4.6.7 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 3.6.7.

4.6.8 Pneumatic surge. The hose assembly shall be subject to the pneumatic surge testing in accordance with SAE AS2078. The applicable operating pressure shall be as specified in table II and the applicable proof pressure shall be as specified in table II. The fittings shall show no evidence of leakage or separation from the hose following this test (see 3.6.12).

MIL-DTL-27272C

4.6.9 Impulse. All test samples, of length as specified in table II, shall be subjected to the proof pressure test prior to testing in accordance with SAE AS2078 (see 4.6.4). 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 3.6.9.

4.6.10 High-temperature burst pressure. The hose assembly shall be subjected to the high-temperature burst pressure test in accordance with SAE AS2078. The test fluid shall be either MIL-PRF-7808 or MIL-PRF-83282. The ambient and fluid temperature shall be $450 \pm 10^\circ\text{F}$ for class 1 fittings. The applicable high-temperature burst pressure shall be as specified in table II. The fittings shall not leak, burst, or separate from the hose at a pressure less than the specified high-temperature burst pressure (see 3.6.6).

4.6.11 Fuel resistance. The hose assembly shall be subjected to testing in accordance with SAE AS2078. The test fluid shall be fuel conforming to ASTM D471 (see Reference Fuel B). The applicable operating pressure shall be as shown in table II. The fittings shall show no evidence of leakage or separation from the hose (see 3.6.10).

4.6.12 Corrosion. Two hose assemblies shall be mounted in a vertical position and immersed in a 2.5% solution of sodium chloride (NaCl) for 5 minutes. The samples shall then be air dried at 140°F for 25 minutes. This cycling shall be continued for 172 hours with the hose pressurized to normal applicable operating pressure of table II. Following the cycling, one hose assembly shall be subjected to the room-temperature burst pressure test of 4.6.6 and the other shall be subjected to the high-temperature burst pressure test of 4.6.10. The fittings shall show no evidence of leakage or separation from the hose up to the respective burst pressures, or any pitting corrosion or stress corrosion that may adversely affect the life of the fitting (see 3.6.11).

4.6.13 Over-tightening torque. The over-tightening torque test shall be conducted in accordance with SAE ARP908. Two flared-type fittings shall be assembled on an SAE AS4395 fitting end of steel construction. The threads of the SAE AS4395 fittings shall be lubricated with fluid conforming to MIL-PRF-5606 or MIL-PRF-83282 prior to this test. The fittings shall be tightened to the applicable over-tightening torque values specified in SAE ARP908 and then loosened. This sequence shall be repeated 15 times. After this sequence, there shall be no evidence of failure or deformation of the fittings, and the swivel nuts shall be free to turn by hand, following disassembly. This test shall also be applied to two flareless-type fittings by assembling them on an SAE AS33514 fitting end of steel construction. The test sequence and torque values for the flareless fittings are the same as specified above for the flared-type fittings (see 3.6.3).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When 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 Systems Command. Packaging data retrieval is available from the managing Military Department or Defense Agency automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

MIL-DTL-27272C

6. NOTES

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

6.1 Intended use. The fittings covered by this specification are military unique because they must be reusable; able to operate satisfactorily in high-temperature fuel, lubricating oil, and water-alcohol systems and in hydraulic and pneumatic systems in an environment ranging from -65 to +450°F (class 1 fittings) and to 275°F (class 2 fittings) at the operating pressures specified in table II; and capable of being mated with polytetrafluoroethylene hose conforming to MIL-DTL-27267 to form hose assemblies conforming to MIL-DTL-25579. High-pressure pneumatic storage system applications are not recommended.

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 2.2.1 and 2.3).
- c. Packaging requirements (see 5.1).
- d. Size, class, PIN (specified in the applicable specification sheet) and quantity of fittings to be acquired (see 1.2 and 3.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products that are, at the time of award of contract, qualified for inclusion in Qualified Products List No. QPL-27272, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the qualifying activity, Defense Supply Center, Columbus (DSCC-VQP), 3990 East Broad Street, Columbus, Ohio 43216-5000).

6.3.1 Requalification. If a fitting design is modified in any way, the modified fitting must be subjected to and pass the same qualification tests as the original design (see 4.2.3).

6.3.2 Qualification by similarity. Qualification testing will be performed on straight-type flared fittings conforming to MS27053, 90-degree elbow flared fittings conforming to MS27057 and MS27060, and flareless fittings conforming to MS27381. A manufacturer who has successfully completed these qualification testing requirements will also be considered qualified to supply other types of fittings covered by this specification in that same size. Other combinations may be acceptable based on the part that the manufacturer is seeking to qualify and documented approval being obtained from the qualifying activity. Such qualification will be based on certification of similarity provided by the manufacturer. In the event that a manufacturer does not manufacture fittings conforming to the above types, the manufacturer will accomplish qualification testing on the style and size of fittings to be supplied and the similarity certification will not apply.

MIL-DTL-27272C

6.4 Subject term (key word) listing.

Adapter
 Aluminum
 Brazed
 Corrosion-resisting steel
 Elbow
 Field attachable
 Flanged
 Flareless
 Flared
 Flexible
 Hydraulic connectors
 Pneumatic

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

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

TABLE VII. 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 4730-0868-000)

Review activities:

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