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MILITARY SPECIFICATION

HOSE AND HOSE ASSEMBLIES, RUBBER: FUEL AND OIL

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

1. SCOPE

1.1 Scope. This specification covers two types of fuel and oil hose, and hose assemblies for military engine installations and other uses (see 6.1).

1.2 Classification. Hose and hose assemblies shall be of the following types and nominal inside diameter (I.D.) sizes (in inches), as specified (see 6.2):

Type I	- Single fabric braid reinforcement.
Type III	- Single fabric and single wire braid reinforcement covered with synthetic-rubber-impregnated fabric braid, medium pressure and high temperature resistant.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

AMSC N/A FSC 4720

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS
FEDERAL

FF-B-575	- Bolts, Hexagon and Square.
QQ-P-416	- Plating, Cadmium (Electrodeposited).
TT-S-735	- Standard Test Fluids: Hydrocarbon.

MILITARY

MIL-L-2104	- Lubricating Oil, Internal Combustion Engine, Tactical Service.
MIL-H-5606	- Hydraulic Fluid, Petroleum Base: Aircraft, Missile, and Ordnance.
MIL-F-13927	- Fungus Resistance Test; Automotive Components.
MIL-L-21260	- Lubricating Oil, Internal Combustion Engine, Preservative and Break-in.
MIL-C-81562	- Coatings, Cadmium, Tin-Cadmium and Zinc (Mechanically Deposited).

STANDARDS
FEDERAL

FED-STD-H28/2	- Screw-Thread Standards for Federal Services Section 2 Unified Inch Screw Threads - UN and UNR Thread Forms.
FED-STD-601	- Rubber: Sampling and Testing.

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MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-1523	- Age Controls of Age-Sensitive Elastomeric Materiel (for Aerospace Applications).
MIL-STD-45662	- Calibration Systems Requirements.

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise speciifed, the issues shall be those in effect on the date of the solicitation.

FEDERAL SUPPLY CODE FOR MANUFACTURERS

Cataloging Handbook H4-1

(Application for copies should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, D.C. 20402)

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B633 - Electrodeposited Coatings of Zinc on Iron and Steel, Specification for.

(Application for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA, 19103.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The hose and hose assemblies furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein and has been listed on or approved for listing on the applicable qualified products list (QPL) (see 4.4 and 6.3).

3.2 Materials. Materials shall be as specified herein and in referenced specifications, standards, and drawings. Materials shall be free from defects which adversely affect performance or serviceability of the finished product (see 4.8.1 and 6.5).

3.2.1 Hose outer cover (see 4.8.1).

3.2.1.1 Type I hose. The type I hose outer cover shall be compounded from polychloroprene.

3.2.1.2 Type III hose. The type III hose outer cover shall consist of oil resistant, rubber impregnated fabric.

3.2.2 Hose reinforcement (see 4.8.1).

3.2.2.1 Type I hose. Reinforcement of type I hose shall consist of a single braid of cotton or other nonmetallic reinforcing material or plies of woven fabric of such strength as to meet the requirements of this specification.

3.2.2.2 Type III hose. Reinforcement of type III hose shall consist of an inner ply of fabric braid and an outer ply of single wire braid of such combined strength as to meet the requirements of this specification.

3.2.3 Inner tube. The inner tube shall be fabricated from synthetic, oil resistant rubber polymer (see 4.8.1).

3.3 Construction.

3.3.1 Hose. Hose shall be constructed of a seamless, smooth bore tube of flexible material, a reinforcement, and an outer cover (see 4.8.2).

3.3.2 Hose assemblies. Hose assemblies shall consist of hose with fittings assembled on each end (see 4.8.2).

3.3.3 Hose assembly fittings. Unless otherwise specified on the applicable drawing, one fitting in each hose assembly shall be of the male type and one of the female type. The female type shall incorporate a swivel. Dimensions and materials of fittings shall conform to the applicable drawing (see 4.8.1 and 4.8.2).

3.3.3.1 Steel fittings. Steel fittings, except stainless when furnished, shall be zinc plated in accordance with ASTM B633; type II, class 2 of MIL-C-81562; or cadmium plated in accordance with type II, class 3 of QQ-P-416; or as otherwise specified on the applicable drawing. Electroplaters of cadmium plated fittings must meet Federal, state and local requirements for waste treatment of cadmium effluents (see 4.8.1 and 4.8.2).

3.3.4 Dimensions (see 4.8.1 and 4.8.2).

3.3.4.1 Inner tube thickness. The average thickness of a buffed and unbuffed tube shall be not less than 0.040 inch (see 4.8.2).

3.3.4.2 Length (see 4.8.2).

3.3.4.2.1 Bulk length. Unless otherwise specified (see 6.2), hose shall be furnished in random lengths up to 500 feet. At least 80 percent of the lengths furnished shall be 40 feet or more in length; minimum length shall be 3 feet.

3.3.4.2.2 Cut length. When specified (see 6.2), hose shall be furnished in cut lengths with a tolerance of plus or minus one percent for lengths of 3 feet or greater and plus or minus 0.25 inch for lengths of less than 3 feet.

3.3.4.2.3 Hose assemblies. Lengths of hose assemblies shall be as specified on the applicable drawings, or in the procurement documents.

3.3.4.3 Diameters. Inside and outside diameters shall conform to tables I and II, as applicable, for the type and size specified (see 4.8.2).

TABLE I. Inside and outside diameters (type I).

Nominal size, I.D. (inches)	Inside diameter (inches)		Outside diameter (inches)	
	Minimum	Maximum	Minimum	Maximum
1/8	0.109	0.141	0.328	0.375
3/16	0.172	0.203	0.406	0.468
1/4	0.234	0.266	0.469	0.531
5/16	0.296	0.328	0.531	0.593
3/8	0.359	0.391	0.594	0.656
1/2	0.469	0.531	0.750	0.812
5/8	0.593	0.656	0.937	1.000
3/4	0.718	0.781	1.062	1.125

TABLE II. Inside and outside diameters (type III).

Nominal size, I.D. (inches)	Inside diameter (inches)		Outside diameter (inches)	
	Minimum	Maximum	Minimum	Maximum
3/16	0.188	0.216	0.472	0.510
1/4	0.250	0.281	0.535	0.573
5/16	0.313	0.344	0.597	0.635
13/32	0.406	0.437	0.714	0.760
1/2	0.500	0.539	0.808	0.854
5/8	0.625	0.667	0.933	0.979
7/8	0.875	0.917	1.175	1.237
1 1/8	1.125	1.172	1.456	1.518
1 3/8	1.375	1.422	1.691	1.753
1 13/16	1.812	1.859	2.096	2.190

3.3.4.4 Concentricity. The inside diameter and the outside diameter shall be concentric within 0.030 inch total indicator reading on 1/8 and 3/16 inch hose and within 0.040 inch total indicator reading on sizes greater than 3/16 inch (see 4.8.2).

3.3.5 Bend radius. The hose shall be capable of being bent without collapse or damage to an inside bend radius as specified in table III (see 4.8.2).

TABLE III. Bend radius (hose assembly installation).

Nominal size, I.D. (inches)	Type I	Type III
1/8	1.75	1/
3/16	2.00	0.75
1/4	2.25	1.00
5/16	2.75	1.25
3/8	3.00	1/
13/32	1/	1.75
1/2	3.75	2.25
5/8	4.75	2.75
3/4	5.50	1/
7/8	1/	3.50
1 1/8	1/	4.50
1 3/8	1/	7.50
1 13/16	1/	14.00

1/ Hose type not available in this size.

3.3.6 Fittings.

3.3.6.1 Screw threads. Screw threads of fittings shall be in accordance with FED-STD-H28/2 for the size specified. Classes of fits for threads shall be in accordance with best commercial practice (see 4.8.2).

3.3.6.2 Wrench flats. Nominal distance across wrench flats (hexagon or other) shall be in multiples of 1/16 inch. Tolerance shall not exceed the tolerance across flats for the semifinished hexagon nut nearest the fitting wrench flat size, as specified in FF-B-575 (see 4.8.2).

3.3.6.3 Swivel fittings. Swivel fittings shall swivel freely with hand torque (see 4.8.2).

3.4 Performance. The following requirements shall be applicable to hose and hose assemblies of type I and type III except as differentiated herein. The term sample shall hereafter refer to either hoses or hose assemblies of both the types.

3.4.1 Length change (see 4.8.3.1).

3.4.1.1 Type I. When tested in accordance with 4.8.3.1, the test samples shall change no more than plus or minus 5 percent from its original free length. For hose assemblies, the free length shall be the length between the fittings.

3.4.1.2 Type III. After being subjected to the applicable working pressure of table IV, the test sample length increase shall be not greater than 6 percent for all sizes.

TABLE IV. Pressure requirements.

Nominal hose size (I.D.) (inch)	Burst pressure		Proof pressure		Working pressure	
	Type I (psi)	Type III (psi)	Type I (psi)	Type III (psi)	Type I (psi)	Type III (psi)
1/8	2000	1/	1000	1/	500	1/
3/16	1700	6000	850	3000	425	1500
1/4	1250	6000	625	3000	300	1500
5/16	1100	4000	550	2000	275	1000
3/8	1000	1/	500	1/	250	1/
13/32	1/	4000	1/	2000	1/	1000
1/2	750	3500	375	1750	200	875
5/8	700	3000	350	1500	175	750
3/4	500	1/	250	1/	125	1/
7/8	1/	1500	1/	750	1/	375
1 1/8	1/	1250	1/	625	1/	300
1 3/8	1/	1000	1/	500	1/	250
1 13/16	1/	750	1/	375	1/	200

1/ Hose type not available in this size

3.4.2 Proof pressure. When tested in accordance with 4.8.3.2, the test samples shall withstand the proof pressure up to and including that specified in table IV without leakage.

3.4.3 Burst pressure. When tested in accordance with 4.8.3.3, the test samples shall not burst at any pressure up to that specified in table IV. There shall be no leakage around the fittings of test samples below the specified minimum burst pressure.

3.4.4 Low temperature flexibility. The test samples shall show no evidence of breaks when subjected to the low temperature flexibility test specified in 4.8.3.4.

3.4.5 Ozone resistance. The covers of type I hose shall show no evidence of cracks or breaks when subjected to the ozone resistance test specified in 4.8.3.5.

3.4.6 Vacuum collapse resistance. The decrease in the outside diameter of type I hose shall be not greater than 15 percent when subjected to the vacuum collapse resistance test specified in 4.8.3.6.

3.4.7 Oil resistance. When tested in accordance with 4.8.3.7, the test samples of tube and type I cover shall be within the limits for volume change specified in table V.

TABLE V. Allowable volume change.

Condition	Tube		Cover
	Percent		Percent
	Decrease	Increase	Increase
After oil immersion			
Type I	5	25	100
Type III	0	30	---
After fuel immersion	--	60	110

3.4.8 Fuel resistance. When tested in accordance with 4.8.3.8, the test samples and the type I covers of the samples shall be within the limits of volume change specified in table V.

3.4.9 Vibration resistance. The test samples, when subjected to the vibration resistance test specified in 4.8.3.9, shall not leak nor shall show any evidence of damage.

3.4.10 Fungi resistance. The test samples when subjected to the fungi resistance test specified in 4.8.3.10, shall show no evidence of damage affecting performance.

3.4.11 Hot oil circulation. The samples of type III shall exhibit no leaks, ruptures, or cracks, internally or externally when subjected to the hot oil circulation test specified in 4.8.3.11.

3.4.12 Marking. The outer cover of bulk hose or hose in hose assemblies shall be marked with a water resistant, gasoline resistant, and oil-resistant, continuous yellow stripe. The information "MIL-H-13444", type, size, date of manufacture in quarter of year and year, the manufacturer's code as designated in the Federal Supply Code for Manufacturers, Cataloging Handbook H4-1 shall be legibly marked on, or broken into, the stripe. In addition the type I hose shall be marked with the capital letters "OZ". The marking shall be repeated at intervals of not mroe than 12 inches along the hose. Hose assemblies shall have an attached tag marked legibly with the following (see 4.8.2):

NATIONAL STOCK NUMBER
Date of Assembly
MIL-H-13444

3.4.13 Age. The age of bulk hose and hose assemblies covered by this specification and furnished for use by the Government shall not exceed the limits established in MIL-STD-1523 (see 4.8.1).

3.4.14 Workmanship. Workmanship shall be such as to produce hose and hose assemblies free from defects such as cracks, cuts, breaks, blisters, looseness, exposed braid, as well as restricted hole through end fittings or damaged or burred end fitting screw threads. Surface irregularities such as mold marks, laps, or air bubbles, as distinguished from cracks or cuts, shall not be cause for rejection (see 4.8.2).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform or witness any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Inspection equipment. Unless otherwise specified in the contract (see 6.2), the contractor is responsible for the provision and maintenance of all inspection equipment necessary to assure that supplies and services conform to contract requirements. Inspection equipment must be capable of repetitive measurements to an accuracy of 10 percent of the measurement tolerance. Calibration of inspection equipment shall be in accordance with MIL-STD-45662.

4.2 Classification of inspection:

a. Qualification inspection (see 4.4).

b. Quality conformance inspections (see 4.5).
   1. Examination (see 4.5.2).
   2. Acceptance tests (see 4.5.3).

c. Control tests (see 4.6).

4.3 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be conducted under the following conditions:

a. Air temperature 23 $\pm$ 10°C
b. Barometric pressure 725 + 50mm Hg
   - 75
c. Relative humidity 50 $\pm$ 30 percent

4.4 Qualification inspection. Hose and hose assemblies submitted for qualification inspection shall be inspected as specified in table VI (see 3.1, 3.1.1 and 6.3).

TABLE VI. Classification of inspections.

Title	Requirement	Inspection	Qualification	Quality conformance		Control
				Examination	Acceptance	
Materials	3.2 thru 3.2.3	4.8.1	X			
Defects (see table VII)	3.3 thru 3.3.6.3, 3.4.12 thru 3.4.14	4.8.2	X	X		
Length change	3.4.1	4.8.3.1	X		X	X
Proof pressure	3.4.2	4.8.3.2	X		X	
Burst pressure	3.4.3	4.8.3.3	X			X
Low temperature flexibility	3.4.4	4.8.3.4	X			X
Ozone resistance	3.4.5	4.8.3.5	X			
Vacuum collapse resistance	3.4.6	4.8.3.6	X		X	X
Oil resistance	3.4.7	4.8.3.7	X			
Fuel resistance	3.4.8	4.8.3.8	X			
Vibration resistance	3.4.9	4.8.3.9	X			
Fungi resistance	3.4.10	4.8.3.10	X			
Hot oil circulation	3.4.11	4.8.3.11	X			

4.4.1 Samples for qualification. The qualification samples (see 3.1) shall consist of 40 feet of bulk hose when qualifying hose only, or 10 feet of bulk hose with 12 assemblies (free length of 18 inches) and 12 assemblies (free length of 12 inches) when qualifying assemblies only. The samples shall be representative of the units proposed to be furnished to the Government. Qualification testing shall be conducted by the contractor at a place approved by the Government.

4.5 Quality conformance inspection.

4.5.1 Sampling.

4.5.1.1 Lot formation. An inspection lot shall consist of all hose or hose assemblies of one type and part number, from an identifiable production period, from one manufacturer, submitted at one time for acceptance.

4.5.1.2 Sampling for examination. Samples for quality conformance examination shall be selected in accordance with general inspection level II of MIL-STD-105.

4.5.1.3 Sampling for testing. Samples for quality conformance testing shall be selected in accordance with level S3 of MIL-STD-105. The sample unit shall be one completely fabricated hose or hose assembly.

4.5.2 Examination.

4.5.2.1 Acceptable quality level. Each sample selected in accordance with 4.5.1.2 shall be examined to determine conformance to the following acceptable quality levels (AQL) on the basis of percent defective.

Classification	AQL
Major	1.0
Minor	2.5

4.5.2.2 Classification of defects. For examination purposes, defects shall be classified as listed in table VII.

TABLE VII. Classification of defects.

Category	Defect	Hose	Hose assembly	Method of examination
Critical	None			
Major	AQL 1.0% Defective			
101	Construction, improper (see 3.3.1 and 3.3.2).	X	X	Visual
102	Hose assembly fittings, damaged, defective (see 3.3.3).		X	Visual
103	Plating, nonconformance (see 3.3.3.1).		X	Visual
104	Inner tube thickness, nonconformance (see 3.3.4.1).	X	X	SIE 1/
105	Length, nonconformance (see 3.3.4.2 through 3.3.4.2.3).	X	X	SIE
106	Diameters, nonconformance (see 3.3.4.3).	X	X	SIE
107	Concentricity, nonconformance (see 3.3.4.4).	X	X	SIE
108	Bend radius, nonconformance (see 3.3.5).	X	X	SIE
109	Screw threads of fittings, damaged, burred, or nonconformance to size specified (see 3.3.6.1).		X	Visual and SIE
110	Swivel fittings, not swivel freely with hand torque (see 3.3.6.3).		X	Visual
111	Age, nonconformance (see 3.4.13).	X	X	SIE
112	Reinforcement, exposed (see 3.4.14).	X	X	Visual
Minor	AQL 2.5% Defective			
201	Hose assembly fittings, improper angle or depth of seat (see 3.3.3).		X	Visual
202	Bulk hose length, not within percent specified or less than minimum (see 3.3.4.2.1).	X		SIE
203	Cut length, nonconformity to tolerance (see 3.3.4.2.2).	X		SIE

TABLE VII. Classification of defects.

Category	Defect	Hose	Hose assembly	Method of examination
Minor	AQL 2.5% Defective			
204	Distance across wrench flats, exceeds specified tolerance (see 3.3.6.2).		X	SIE
205	Marking of hose or hose assembly, missing, illegible, incomplete, or not at specified intervals or color, or hose assembly not tag marked as specified (see 3.4.12).	X	X	Visual
206	Workmanship, faulty (see 3.4.14).	X	X	Visual

1/ SIE = Standard Inspection Equipment.

4.5.3 Acceptance tests. The samples selected in accordance with 4.5.1.3 shall be subjected to the acceptance tests specified in table VI.

4.6 Control tests. Control tests shall be conducted on one bulk hose sample and one hose assembly sample selected from approximately 10 000 feet of hose consecutively produced, except that not more than two samples in any 30 day period shall be required. Each sample shall have sufficient hose length to conduct the tests. The bulk hose sample shall be subjected to the tests specified in table VI. Hose assembly sample shall be subjected only to the test specified in 4.8.3.3.

4.7 Failure. Failure of any bulk hose sample or any hose assembly sample to pass any of the specified acceptance or control tests shall be cause for the Government to refuse acceptance of the production quantity represented, until action taken by the contractor to correct defects and prevent recurrence has been approved by the Government.

4.8 Methods of inspection.

4.8.1 Materials. Conformance to 3.2 through 3.2.3 shall be determined by inspection of contractor records providing proof or certification that design, construction, processing, and materials conform to requirements. Applicable records shall include drawings, specifications, design data, receiving inspection records, processing and quality control standards, vendor catalogs and certifications, industry standards, test reports, and rating data.

4.8.2 Defects. Conformance to 3.3 through 3.3.6.3 shall be determined by examination for the defects listed in table VII. Examination shall be visual, tactile, or by measurement with standard inspection equipment.

4.8.3 Performance. Except where otherwise specified herein, tests shall be made in an ambient air temperature of 80 ± 9 degrees Fahrenheit (°F) on unaged specimens.

4.8.3.1 Length change. To determine conformance to 3.4.1, the free hose length of the test specimen shall be determined while a hydrostatic pressure of 10 psi is applied internally to the hose. Hydrostatic pressure shall then be increased at a uniform rate of approximately 1000 psi per minute until the internal hose pressure reaches the working pressure specified in table IV. The free hose length shall again be measured. The change in length shall be calculated as percentage of original length.

4.8.3.2 Proof pressure. To determine conformance to 3.4.2, hydrostatic pressure shall be applied to hose or hose assemblies in accordance with the proof pressure test specified in method 10211 of FED-STD-601, except that the test fluid may be water, engine oil conforming to MIL-L-2104, or hydraulic oil conforming to MIL-H-5606.

4.8.3.3 Burst pressure. To determine conformance to 3.4.3, hose and hose assemblies shall be subjected to the burst test in conformance with method 10011 of FED-STD-601. Samples subjected to burst pressure testing shall be subsequently destroyed. The hose shall be cut into sections not longer than five inches and the fittings shall be crushed. The destruction of the test samples shall be certified in writing either by the Government representative and one responsible company official or by two responsible company officials if a Government representative cannot be present.

4.8.3.4 Low temperature flexibility. To determine conformance to 3.4.4, three 18-inch long hose and/or hose assemblies shall be selected from the type(s) of hose being qualified. One of the three specimens shall be air aged for 168 hours at 158 ± 2°F, one shall aged in accordance with figure 1 using hydraulic oil conforming to MIL-H-5606 at a temperature of 212 ± 2°F, for a period of 70 hours, and the third specimen shall remain untreated. After conditioning, the specimens shall be further conditioned for 70 ± 1 hours at a temperature of minus 67 ± 6°F for type I hose and at a temperature of minus 55 ± 2°F for type III hose. At the end of this period, and while still at the specified temperature, all three specimens shall be bent through 180° from the centerline over a mandrel with a diameter as specified in table VIII. The specimens shall then be bent through 360° in the opposite direction over the same size mandrel. Bending rate shall be 21 ± 2° per second. After bending, the specimens shall be examined to determine conformance. The entire bending operation shall be completed within 45 seconds.

TABLE VIII. Mandrel diameter.

Hose size (inches)	Paragraph 4.8.3.4 Paragraph 4.8.3.11	Paragraph 4.8.3.5	Paragraph 4.8.3.6
1/8	3.5	2.45	NA
3/16	4.0	2.80	2.00
1/4	4.5	3.15	2.25
5/16	5.5	3.85	2.75
3/8	6.0	4.20	NA
13/32	7.0	NA	4.62
1/2	7.5	5.25	5.50
5/8	9.5	6.65	6.50
3/4	11.0	7.70	NA
7/8	12.0	NA	7.38
1 1/8	15.0	NA	9.00
1 3/8	16.0	NA	11.00
1 13/16	20.0	NA	17.00

4.8.3.5 Ozone resistance. To determine conformance to 3.4.5, a piece of 30-inch long hose shall be wrapped around a mandrel having a diameter as specified in table VIII and secured at both ends. The specimen shall be conditioned for 45 minutes in air at room temperature and then, while still on the mandrel, shall be placed in a chamber containing air mixed with an ozone concentration of 50 ± 5 millipascals (mPa). The air temperature in the chamber during the test shall be 100 ± 5°F. The specimen shall be exposed to the mixture of air and ozone for 168 hours. To determine conformance, the cover of the specimen shall subsequently be examined under 7-power magnification.

4.8.3.6 Vacuum collapse resistance. To determine conformance to 3.4.6, a piece of 36 inch long hose shall be wrapped around a mandrel having a diameter as specified in table VIII. While bent around the mandrel, hose less than 1/2-inch nominal size shall be subjected to an internal vacuum equivalent to 20 inches of mercury; hose 1/2 inch and larger shall be subjected to an internal vacuum equivalent to 10 inches of mercury. While vacuum is being applied, two readings space 90° apart shall be taken on the outside diameter of the hose. The readings shall subsequently be averaged and the decrease calculated as a percentage of the original outside diameter.

4.8.3.7 Oil resistance. To determine conformance to 3.4.7, a specimen of the tube and a specimen of the cover shall be subjected to the test specified in method 6211 of FED-STD-601 except that immersion shall be conducted for 70 hours at a temperature of 212 ± 5°F. Test liquid shall conform to medium No. 3 specified in method 6001 of FED-STD-601.

4.8.3.8 Fuel resistance. To determine conformance to 3.4.8, a specimen of the tube and a specimen of the cover shall be tested as sepcified in method 6211 of FED-STD-601 except that the specimens shall be immersed for 48 hours at a temperature of 80 ± 10°F. The test liquid shall conform to type II of TT-S-735.

4.8.3.9 Vibration resistance. To determine conformance to 3.4.9, six hose assemblies with a free hose length of not less than 12 inches shall be selected for testing. Each specimen shall be arranged to provide an initial slack of 3/8 inch and an offset of 1 1/2 inches at an angle of 90° to the direction of stroke. The specimens shall then be vibrated thorugh an amplitude of 11/32 inch (total excursion of 11/16 inch) at a rate of 1800 ± 10 cycles per minute for 200 hours. During the vibration period, test fluid conforming to grade 10 of MIL-L-2104 shall be circulated through each specimen at a pressure of 45 psi and at a temperature of 250 ± 5°F. At the end of the vibration period the specimens shall be examined for evidence of leakage or other failure.

4.8.3.10 Fungi resistance. To determine conformance to 3.4.10, the specimen shall be subjected to the class 3 fungi resistance test of MIL-F-13927, except that the test shall be continuous for 90 days.

4.8.3.11 Hot oil circulation. To determine conformance to 3.4.11, two untested type III hose assemblies shall be selected. Oil conforming to grade 3 of MIL-L-21260 at a temperature of 300 ± 5°F, and at a pressure of 175 ± 25 psi shall be continuously circulated through the hose assemblies for 240 ± 1 hours in an ambient temperature of 75 ± 10°F. After the circulation test, specimens shall be bent around the applicable mandrel specified in table VIII with hose at a temperature of 75 ± 10°F. While bent around the specified mandrel, the specimens shall proof-tested in accordance with 4.8.3.2. Specimens shall then be examined for internal or external leaks, ruptures, or cracks.

5. PACKAGING

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking for the desired level shall be in accordance with the applicable packaging standard or packaging data sheet specified by the contracting authority (see 6.2).

6. NOTES

6.1 Intended use. Hose and hose assemblies covered by this specification are intended for use as fuel and oil lines carrying fuel, oil or diesel fuel in military vehicles and for other military applications at temperatures ranging from minus 65° to plus 250°F for type I and from minus 55° to plus 300°F for type III.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type and size of hose required (see 1.2).
c. If length of hose shall be other than as specified (see 3.3.4.2.1).
d. If hose shall be furnished in cut, rather than random, lengths (see 3.3.4.2.2).
e. If responsibility for inspection shall be other than as specified (see 4.1).
f. If responsibility for inspection equipment shall be other than as specified (see 4.1.1).

g. If inspection conditions shall be other than as specified (see 4.3).
h. Selection of applicable level of preservation, packaging, and packing (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List (QPL) whether or not such products have actually been so listed by that date. The attention of suppliers is called to this requirement, 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. The activity responsible for the Qualified Products List is Commanding General, US Army Tank-Automotive Command, Warren, Michigan, 48397-5000 and information pertaining to qualification of products may be obtained from that activity.

6.4 Extended qualification. Qualification by test of type I or type III hose of 1/4 inch size submitted by a manufacturer will establish qualification for his same type or types of hose from 1/8 inch to 1/2 inch size; qualification by test of type I hose of 3/4 inch size or of 7/8 inch size type III hose submitted by a manufacturer, will establish qualification for the same type or types of hose greater than 3/4 inch or 7/8 inch, as applicable (see 4.4 and 6.3).

6.5 Recycled materials. The use of recycled materials which meet the requirements of the applicable material specifications without jeopardizing the intended use of the item shall be encouraged (see 3.2).

6.6 Supersession data. Type I hose shall be used in lieu of the cancelled type II hose.

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

Custodians:
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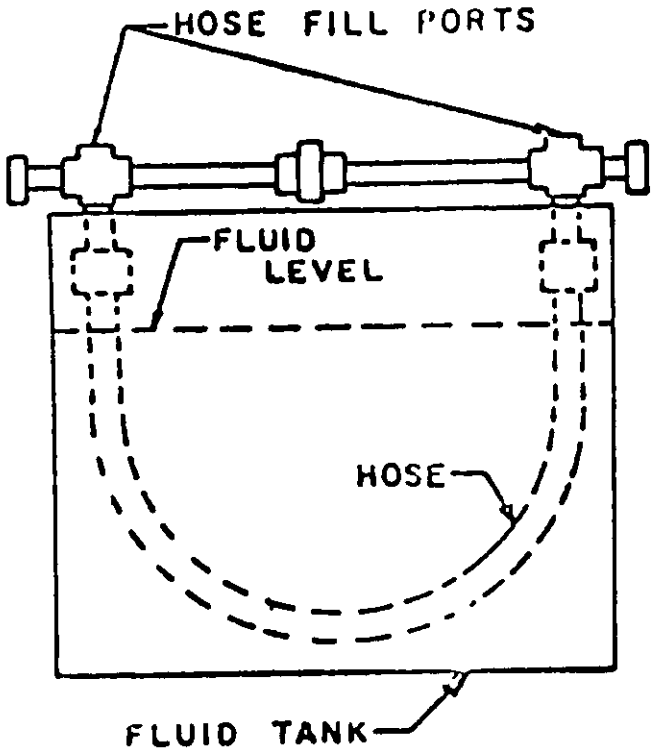

FIGURE I. Specimen conditioning fluid tank

NOTE: Type I hose specimen is immersed in test fluid up to but not including hose end couplings. Hose specimen is then filled internally. Type III hose shall receive internal conditioning only.

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5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
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