INCH-POUND

MIL-DTL-20176H
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16 July 2015
SUPERSEDING
MIL-DTL-20176H
1 October 2014

DETAIL SPECIFICATION

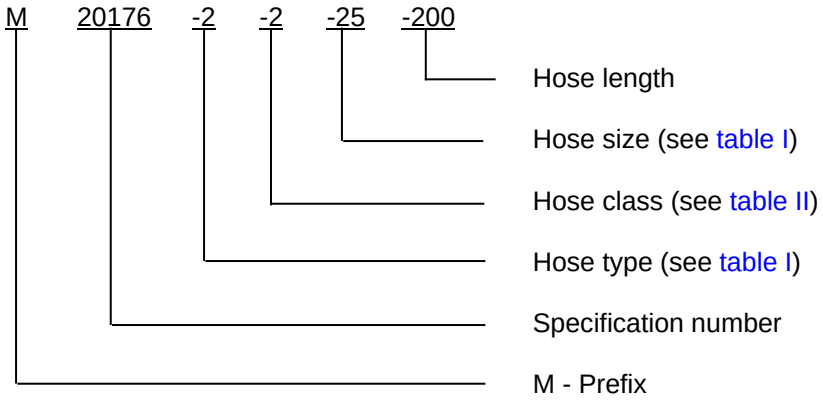
HOSE AND HOSE ASSEMBLY, RUBBER, SMOOTH BORE, LIGHT-WEIGHT SEWAGE DISCHARGE AND OILY WASTE DISCHARGE

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

1. SCOPE

1.1 Scope. This specification covers hose and hose assembly, rubber, smooth bore, light-weight sewage discharge and oily waste discharge, 1.50, 2.50, and 4.00 inch ID's.

1.2 Part or Identifying Number (PIN) for hose. The hose PIN consists of the letter M, specification number, number for hose type, number for hose class, two numbers for hose size code, and length in feet.

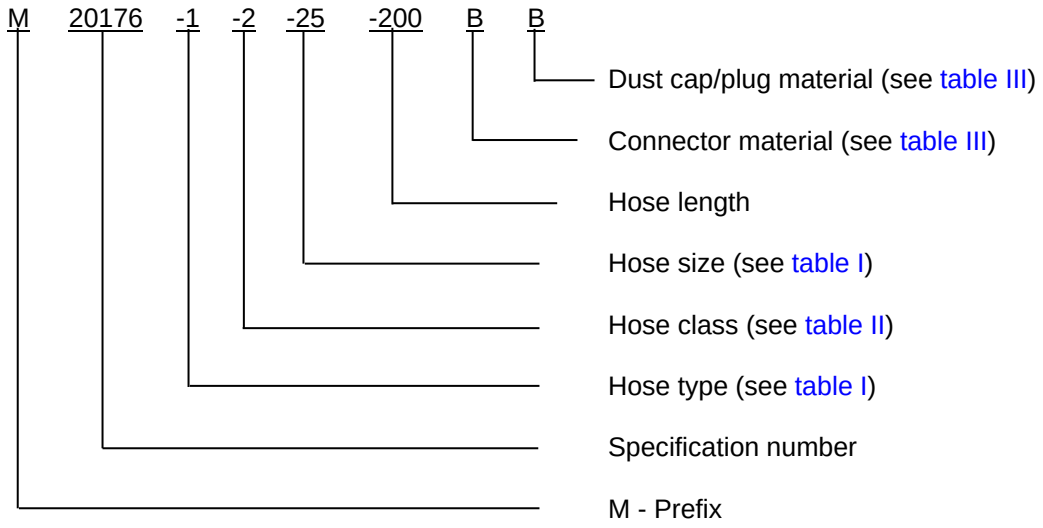


PIN example: M20176-2-2-25-200 is for an oily waste hose, collapsible, 2.5 inches nominal ID, 200 feet long.

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.dla.mil.

AMSC N/A FSC 4720

1.3 Hose assembly PIN: The hose assembly PIN consists of the letter M, specification number, number for hose class, two numbers for hose size code, length in feet, letter for connector material, and a letter for dust cap material if required.



PIN example: M20176-1-2-25-200 is for sewage waste hose, collapsible, 2.5 inches nominal ID, 200 feet long, with brass connectors and brass dust cap and plug.

1.4 Classification.

1.4.1 Hose types and sizes. Sewage hose and oily waste will be of the following types and sizes, see table I.

TABLE I. Hose type and size designators.

Sewage hose designator type I		
Type I designator	Hose size designator	Nominal inside diameter (ID)
1	15	1.5 inches (38.10 mm).
1	25	2.5 inches (63.50 mm)
1	40	4.0 inches (101.60 mm)
Oily waste hose designator type II		
Type II designator	Hose size designator	Nominal inside diameter (ID)
2	25	2.5 inches (63.50 mm)

1.4.2 Hose classes. Sewage hose and oily waste hose will be of the classes show on table II.

TABLE II. Hose class designators.

Class designator	
1	Non-collapsible
2	Collapsible

1.6 Hose coupling material. Hose coupling material is designated by one-code letter and hose couplings with dust cap and dust plug shall be two-code letters, see table III.

TABLE III. Hose coupling material code letter.

Hose coupling material code letter	Hose coupling material
A	Aluminum
B	Brass
Hose coupling and dust cap/dust plug material code letters	Hose coupling and dust cap/dust plug material
AA	Aluminum
BB	Brass

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 or 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 or 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 cited in the solicitation or contract.

SPECIFICATION

FEDERAL SPECIFICATIONS

A-A-52506 - Clamps, Hose.
A-A-59326/2 - Coupling Half, Male by Hose Shank, Type II
A-A-59326/6 - Coupling Half, Female by Hose Shank, Type VI
A-A-59326/10 - Coupling Half, Cap, Dust, Type IX
A-A-59326/11 - Coupling Half, Plug, Dust, Type X

(Copies of these documents are available online at http://quicksearch.dla.mil.)

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.

ASTM INTERNATIONAL

ASTM B26/B26M	-	Standard Specification for Aluminum-Alloy Sand Castings.
ASTM B271/B271M	-	Standard Specification for Copper-Base Alloy Centrifugal Castings
ASTM D380	-	Standard Test Methods for Rubber Hose.
ASTM D412	-	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
ASTM D413	-	Standard Test Methods for Rubber Property-Adhesion to Flexible Substrate.
ASTM D471	-	Standard Test Method for Rubber Property-Effect of Liquids.
ASTM D573	-	Standard Test Method for Rubber-Deterioration in an Air Oven.
ASTM D1149	-	Standard Test Methods for Rubber Deterioration-Cracking in an Ozone Controlled Environment.
ASTM E1282	-	Standard Guide for Specifying the Chemical Compositions and Selecting Sampling Practices and Quantitative Analysis Methods for Metal and Alloys.

(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.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

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

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

NCSL INTERNATIONAL

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

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

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 First article. When specified (see 6.2), samples shall be subjected to first article inspection in accordance with 4.3.

3.2. Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use.

3.2.1 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased 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.

3.2.2 Recovered materials. The term “recovered materials” means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. Unless otherwise specified, none of the above shall be interpreted to mean that the use or used or rebuilt products is allowed under this specification.

3.3 Construction.

3.3.1 Principal parts. Hose shall consist of the following:

a. An inner rubber tube (see 3.3.2).
b. An outer cover (see 3.3.2).
c. Ply or plies of reinforcement material (see 3.3.3.1).
d. A helix or helixes of round steel wire (class 1 only) (see 3.3.3.2).
e. End fittings (see 3.3.4).

3.3.2 Rubber components. Rubber used in the inner tube, outer cover, and friction material shall meet the physical properties of table IV and 3.6.4.

TABLE IV. Physical properties. 1/

Physical properties	Tube and cover	Reinforcement plies	Test requirements paragraph
Initial properties.			
Tensile strength, pounds per square inch (psi) (kilopascal (kPa)).	1400 (9653 kPa)	--	4.6.7.1
Ultimate elongation percent minimum.	300	--	4.6.7.1
Adhesion, pounds (lb) (kilogram (kg) per inch (millimeter (mm)) of width, minimum.	12 (83 kg)	12 (83 kg)	4.6.7.5
Properties after immersion in test fluid.			
Tensile strength, psi (kPa) minimum.	1000 (6895 kPa)	--	4.6.7.2
Ultimate elongation, percent minimum.	150	--	4.6.7.2
Volume increase, percent maximum.	100	100	4.6.7.4
Adhesion, lb (kg) per inch (mm) of width, minimum.	9 (62 kg)	9 (62 kg)	4.6.7.6
Properties after accelerated aging.			
Tensile strength, psi (kPa) minimum.	1200 (8274 kPa)	--	4.6.7.3
Ultimate elongation, percent minimum.	200	--	4.6.7.3
Ozone resistance, hose cover.	No cracking		4.6.8

1/ Metric equivalents are given for information only.

3.3.3 Reinforcement.

3.3.3.1 Fiber reinforcement. The fiber reinforcement shall consist of ply or plies of braided, knit, spiraled yarn, or plies of woven fabric.

3.3.3.2 Wire reinforcement (class 1 only). The reinforcing wire shall have the physical and dimensional properties required to enable the hose to conform to 3.6.3 and 3.6.5.

3.3.4 Hose assemblies. When a hose assembly is specified in the PIN see 1.3 and 1.6, the ends shall be fitted with a male and female coupling as specified in 3.7.1. The coupling shall be secured with clamps specified in 3.7.3. When caps and plugs are specified see 1.6, they will be furnished in accordance with 3.7.2.

3.3.4.1 Cut ends of wire reinforcement . The cut ends of wire reinforcement shall be recessed or other adequate means provided to ensure that the hose assembly will remain free from sharp or projected wires in normal use.

3.4 Dimensional and unit weight properties. Dimensions for and unit weight of hose shall conform to the requirements of table V when tested as specified in 4.6.1.

TABLE V. Dimension and weight properties. 1/ 2/

Size ID	1.50-inch (38 mm)	2.50-inch (64 mm)	4.00-inch (102 mm)
Tolerance, inch (mm), ID	± 0.047 (± 1 mm)	± 0.062 (± 2 mm)	± 0.062 (± 2 mm)
Tube thickness, inch (mm), min	0.094 (2 mm)	0.094 (2 mm)	0.094 (2 mm)
Cover thickness, inch (mm), min	0.078 (2 mm)	0.078 (2 mm)	0.078 (2 mm)
Unit weight, pounds per foot (kg-m), maximum	1.5 (0.7 kg-m)	2.5 (1 kg-m)	4.5 (2 kg-m)

1/ Dimensions are in inches.
2/ Metric equivalents are given for information only.

3.5 Length. Fittings shall be considered additions to hose length, and not part of the length of hose.

3.5.1 Tolerance. A tolerance of ± 1 percent in length shall be permitted when hoses are measured as specified in 4.6.1.

3.6 Physical properties.

3.6.1 Dimensional stability. When tested in accordance with 4.6.3, the hose shall not change in length more than 10 percent or change in outside diameter (OD) more than 18 percent. The twist shall be not more than 3 degrees per foot while the hose is under the proof pressure. The hose shall retain no more than 5 percent change in length or 3 percent change in OD after release of the pressure.

3.6.2 Tensile pull load. The hose assembly shall be capable of withstanding a tensile pull of not less than the loads shown in table VI for the applicable size when tested in accordance with 4.6.5.

TABLE VI. Physical properties of hose assemblies at temperatures of 70°F ± 4°F (21 degrees Celsius (°C) ± 2°C. 1/ 2/

Size of hose (ID) inches (mm)	Test loads		Flexibility bend radius (min) inch (mm)	Pressure psig	
	Tensile pull load lb (kg)	Crush resistance lb (kg)			
1.5 (38.10 mm)	1,500 (680 kg)	225 (102 kg)	5.0 (127 mm)	150 (1034 kPa (gage)) 300 (2068 kPa (gage)) 600 (4137 kPa (gage))	Working Proof Burst
2.5 (63.50 mm)	2,000 (907 kg)	325 (147 kg)	6.0 (152 mm)	150 (1034 kPa (gage)) 300 (2068 kPa (gage)) 600 (4137 kPa (gage))	Working Proof Burst
4.0 (101.60 mm)	2,750 (1 247 kg)	325 (147 kg)	9.0 (229 mm)	100 (689 kPa (gage)) 200 (1379 kPa (gage)) 400 (2758 kPa (gage))	Working Proof Burst

1/ Dimensions are in inches.
2/ Metric equivalents are given for information only.

3.6.3 Flexibility.

3.6.3.1 Class 1. A length of hose with no internal pressure applied shall be subjected to the tests of 4.6.6.1. Hose shall not kink or flatten when subjected to the minimum bend radius given in table VI.

3.6.3.2 Class 2. Hose shall be flexible enough to coil a 50-foot (15 240 mm) hose length into a diameter of not greater than 3.25 feet (991 mm) (see 4.6.6.2).

3.6.4 Low temperature bend. Specimens of the tube and cover shall not crack when tested as specified in 4.6.7.7.

3.6.5 Crush resistance, (class 1 only). When hose sections are tested as specified in 4.6.9 to the loads in table VI for the appropriate size, the following details shall apply:

a. For the 1.5 2.5 and 4-inch (38 mm, 64 mm, and 102 mm) sizes the OD shall be not less than 85 percent of the original OD.
d. Following release of the load, the smallest OD shall be not less than 97percent of the original OD (see 4.6.9).

3.6.6 Hydrostatic proof pressure. When tested as specified in 4.6.2 at the appropriate proof pressure (see table VI), the hose assemblies shall not leak nor show any imperfections in either the hose or the fittings. There shall be no indication of slippage or pullout of the fitting from the hose.

3.6.7 Burst pressure. When tested as specified in 4.6.4, each size hose or hose assembly shall have no failure of hose under the applicable minimum burst pressure shown in table VI.

3.7 Fittings.

3.7.1 Quick-disconnect cam-locking couplings. Unless otherwise specified (see 6.2), hose shall be fitted with brass or aluminum quick-disconnect cam-locking male and female couplings.

3.7.1.1 Brass male and female couplings. Brass male and female couplings shall be made of material conforming to ASTM B271/B271M, alloy C83600 or C92200.

3.7.1.2 Aluminum male and female couplings. Aluminum male and female couplings shall be made of material is specified (see 6.2), couplings shall be made of hard-coated anodized aluminum conforming to ASTM B26/B26, alloy 365.0, temper T6 (see 4.6.10).

3.7.1.3 Male couplings. Male couplings shall conform to A-A-59326/2, type II.

3.7.1.4 Female couplings. Female couplings shall conform to A-A-59326/6, type VI.

3.7.2 Coupling dust plugs. When specified (see 6.2), the couplings shall be provided with dust plugs and dust caps.

3.7.2.1 Brass dust caps and dust plugs. Brass dust caps and dust plugs shall be made of material conforming to ASTM B271/B271M, alloy C83600 or C92200.

3.7.2.2 Aluminum dust caps and dust plugs. Aluminum dust caps and dust plugs shall be made of material conforming to ASTM B 26/B26, alloy 356.0, temper T6 (see 4.6.10).

3.7.2.3 Male coupling dust plugs. Male couplings shall be provided with A-A-59326/10, type IX dust caps.

3.7.2.4 Female coupling dust plugs. Female couplings shall be provided with A-A-59326/11, type X dust plugs.

3.7.3 Clamps. Clamps shall be made of corrosion-resistant steel and shall conform to A-A-52506. The clamps shall be capable of holding couplings in place on the hose without slippage or leaking when subjected to the hydrostatic proof test specified in 4.6.5, and the tensile pull load test specified in 4.6.5.

3.7.3.1 2.5 and 4 inch (ID) clamps. Two 0.75-inch (19 mm) clamps shall be provided for each coupling on the 2.5- and 4-inch (64 and 102 mm) ID hose.

3.7.3.2 1.5 inch (ID) hose. For the 1.5-inch (38 mm) ID hose, either one 0.75-inch (19 mm) clamp or two 0.50-inch (13 mm) clamps shall be provided.

3.8 Marking. Each length of hose shall be marked with a color that contrasts with the color of the hose cover. The marking shall consist of:

The manufacturer's name or trademark.
The quarter and year of manufacture.
The symbol MIL-DTL-20176.
The maximum allowable working pressure followed by the designation "MAWP" and the word "SEWAGE" for type I hose, and the words "OILY WASTE" for type II hose.

3.8.1 Hose marking. Hose shall be marked continuously or at regular intervals of not greater than 10 feet (3 048 mm). The following details shall apply:

a. All letters and numbers shall be not less than 0.25-inch (6 mm) for size 1.5 (38 mm) hose, and 0.75-inch (19 mm) for sizes 2.5 and 4.0 (64 and 102 mm).
b. The designations "SEWAGE" and "OILY WASTE" which shall have letters not less than 1-inch (25 mm).

3.9 Workmanship. Hose and hose assemblies shall be manufactured and processed in such a manner as to be uniform in quality and shall be free from foreign material and other defects that will affect life, serviceability, strength, assembly or durability. Workmanship shall be such as to enable the hose and hose assemblies to meet the applicable performance requirements of this specification.

4. VERIFICATION

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

a. First article inspection (see 4.3).
b. Conformance inspection (see 4.4).

4.2 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained or identified by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ISO 17025 and NCSL Z540.3 as applicable.

4.3 First article inspection. The first article inspection shall be performed on one sample hose length or hose assembly when a first article is required (see 3.1, 6.2, and 6.3). This inspection shall include the inspections methods of 4.6 and table VII. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.3.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 4. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.3.2 Lot records. Manufacturers shall keep lot records for 3 years minimum. Manufacturers shall monitor for compliance to the prescribed procedures, and observe that satisfactory manufacturing conditions and records on lots are maintained for these hose assemblies. The records, including as a minimum, an attributes summary of all quality conformance inspections conducted on each lot, shall be available to review by customers at all times.

4.3.3 First article inspection. First article inspection shall be performed at a laboratory acceptable to the procuring activity on sample units produced with equipment and procedures used in production.

4.3.4 Samples for first article. Samples for first article shall be representative of the products proposed to be furnished to this specification. Sampling for hose and hose assemblies shall be in accordance with table VII.

4.3.5 Failures. All samples shall meet all of the contract requirements. Failure of a sample unit to pass any test shall be cause for rejection of the entire lot and refusal to grant first article approval.

4.3.6 Waivers or deviations to specification requirements. All waivers or deviations to specification requirements shall be coordinated through the preparing activity; DLA Land and Maritime, Attn: VAI, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Fluidflow@dla.mil.

4.3.7 Disposition of samples. First article samples shall be furnished to the Government as directed by the contracting officer (see 6.2).

TABLE VII. First article inspection.

Inspections	Requirement paragraph	Inspection paragraph	Sample
Examination	3.3.1, 3.4, 3.5, 3.8, and 3.9	4.6.1	All
Configuration (hose assembly only)	3.3.4	4.6.1	All
Inside diameter	3.4	4.6.1.1	Finished production hose
Tube and cover thicknesses	3.4	4.6.1.2	4-foot (1219 mm) length of hose
Unit weight	3.4	4.6.1.3	Not a sample
Hydrostatic proof pressure	3.6.6	4.6.2	100% hose assemblies
Dimensional stability	3.6.1	4.6.3	100% hose assemblies
Burst pressure	3.6.7	4.6.4	One hose section 32 inches (813 mm) in length
Tensile pull load	3.6.2	4.6.5	One hose assembly section not less than 12 inches (305 mm)
Flexibility	3.6.3	4.6.6	
Type 1	3.6.3.1	4.6.6.1	A length of hose
Type 2	3.6.3.2	4.6.6.2	50 foot hose assembly
Properties of rubber components	3.3.2	4.6.7	Longitudinal specimens prepared from the hose section obtained in accordance with 4.6.1.2,
Tensile strength	3.3.2	4.6.7.1	dumbbell test specimens
Ultimate elongation	3.3.2	4.6.7.1	dumbbell test specimens
Adhesion	3.3.2	4.6.7.5	3 Strip or ring specimens
Physical properties after immersion	3.3.2	4.6.7.2	
Tensile strength	3.3.2	4.6.7.2	dumbbell test specimens
Ultimate elongation	3.3.2	4.6.7.2	dumbbell test specimens
Adhesion	3.3.2	4.6.7.6	3 Strip or ring specimens
Physical properties after oven aging	3.3.2	4.6.7.3	
Tensile strength	3.3.2	4.6.7.3	dumbbell test specimens
Ultimate elongation	3.3.2	4.6.7.3	dumbbell test specimens
Volume change after immersion	3.3.2	4.6.7.4	6x6 samples of the tube, cover, and friction material
Initial adhesion (tube and cover)	3.3.2	4.6.7.5	3 Strip or ring specimens 8 inches in length
Adhesion after immersion	3.3.2	4.6.7.6	3 Strip or ring specimens 8 inches in length
Low-temperature bend	3.6.4	4.6.7.7	Buffed specimens of tube and cover
Ozone resistance	3.3.2	4.6.8	Rubber cover samples
Crush resistance (class 1 only)	3.6.5	4.6.9	12 inch long hose section
Chemical composition (couplings)	3.7.1	4.6.10	Male and female couplings and aluminum dust cap and dust plugs (2-ounce samples)

4.4 Conformance inspection. For manufacturers that have successfully passed first article inspections and are continuously producing hose assemblies to this specification, on going inspections shall consist of individual inspections (see table VIII) and periodic inspections (see 4.4.3). If first article is waived due to prior successful first article inspection, the individual inspections and periodic inspections shall be the manufactures in house inspection procedures.

4.4.1. Individual inspection. Individual inspection shall consist of the inspections specified in table VIII in the order shown. Individual inspections shall be implemented on a continual basis throughout the production of hose assemblies.

TABLE VIII. Individual inspections.

Inspections	Requirement paragraph	Inspection paragraph	Number of samples
Visual inspection	3.3.1, 3.4, 3.5, 3.8, and 3.9	4.6.1	100%
Configuration (hose assembly only)	3.3.4	4.5	100%
Length	3.5	4.5	100%
Hydrostatic proof pressure	3.6.6	4.6.5	100%

4.4.2. Individual inspections. Individual inspection tests specified in table VIII shall be performed on a production lot basis.

4.4.2.1 Nonconformance individual inspections. If one or more defects are found in the inspection lot, then the production lot shall be screened for that particular defect and defects removed. An inspection lot shall be selected from the production lot and all individual tests (see table VIII) shall be performed. If one or more defects are found in the second inspection lot, the production lot shall be rejected and shall not be supplied to this specification. Test data of part performance shall be made available to the contracting agency upon request.

4.4.3 Periodic inspection. Periodic inspections shall consist of the inspections specified in table VII and shall be made on test samples which have been subjected to and passed the individual inspections (see table VIII).

4.4.4 Periodic inspection samples.

4.4.4.1 Lot. A lot shall consist of hose assemblies manufactured under essentially the same conditions and submitted for inspection at substantially the same time.

4.4.4.2 Lot samples. For each lot of five hundred hose assemblies or fraction thereof produced, one hose assembly sample shall be fabricated from random samples of the bulk hose and end fittings using production processes and procedures.

4.4.5 Non conformance periodic inspections. In the event a failure should occur during periodic inspection tests, specified in table VII, then the production lot shall be screened for that particular defect and defects removed. An inspection lot shall be selected from the production lot and all sampling and periodic tests shall be performed. If one or more defects are found in the second inspection lot, the production lot shall be rejected and shall not be supplied to this specification. Test data of part performance shall be made available to the contracting agency upon request.

4.5 Examination. Each of the sample hose lengths shall be examined for compliance with the requirements in section 3 of this document. This element of inspection shall encompass all visual examinations and dimensional measurements.

4.6 Inspection methods.

4.6.1 Examination. Each of the sample hose lengths shall be examined for compliance with the requirements 3.3.1, 3.4, 3.5, 3.8, and 3.9.

4.6.1.1 Inside diameter. Hose selected shall have the ID measured in accordance with ASTM D380 and shall meet the requirements of 3.4.

4.6.1.2 Tube and cover thicknesses. The thicknesses for the tube and cover thicknesses shall be determined by the procedure given in ASTM D380, except that only buffed specimens shall be measured. The following details shall apply:

a. A 4-foot (1219 mm) length of hose identical to the hose submitted for the lot, except that it shall be without helix wire, shall be submitted.
b. The thicknesses of the tube and cover shall be measured on specimens removed from each end of the hose section to determine conformance to 3.4.
c. The respective values found for the tube thickness shall not be averaged, but shall be regarded as independent measurements, each of which should meet the requirement. The respective values for the cover thicknesses shall be treated in the same manner.

4.6.1.3 Unit weight. The unit weight of hose samples selected shall be determined by weighing the hoses without couplings. The reading shall be accurate to the closet lb (kg). The weight of each hose shall be divided by its length to determine conformance to 3.4. The entire lot shall be rejected if any sample hose fails to meet the requirement for unit weight.

4.6.2 Hydrostatic proof pressure. Each hose assembly in the lot shall be subjected to the proof pressures specified in table VI, in accordance with ASTM D380. The proof pressure shall be held for 5 minutes and the hose and fittings examined for leakage or other indication of weakness. Nonconformance to 3.6.6 shall constitute failure of this test.

4.6.3 Dimensional stability. The effect of the proof test pressure on the length, OD, and twist of all sample hoses using water as the test fluid shall be determined as specified in 4.6.2 and ASTM D380. The following details shall apply:

a. Before starting the test, a 10 psig (69 kPa (gage)) hydrostatic pressure shall be established in the hose, and the length, OD, and zero index for twist shall be measured (see ASTM D380).
b. At the end of the 5-minute period of 4.6.5 and while the pressure is maintained, the length, OD, and twist of the hose shall be measured for the determination of dimensional stability while the hose is under proof pressure.
c. The pressure shall then be reduced to zero psig and the hose left in this condition for 5 minutes.
d. At the end of this period, the diameter and length of the hose shall be measured.
e. Nonconformance to 3.6.1 shall constitute failure of this test.

4.6.4 Burst pressure. One hose section not less than 32 inches (813 mm) in length shall be submitted for the burst pressure test. The burst pressure of this section in the straight condition shall then be determined in accordance with ASTM D380. The hose shall not burst at a pressure less than specified in table VI. Nonconformance to 3.6.7 shall constitute failure of this test.

4.6.5 Tensile pull load. One hose assembly shall be tested for tensile pull load, the following details shall apply:

a. The hose section shall not be less than 12 inches (305 mm) in length.
b. The section of hose shall be equipped with couplings and clamps (see 3.7.1 and 3.7.3).
c. The assembly shall be subjected to the tensile pull loads specified in table VI for the appropriate size for a period of not less than 5 minutes without damage or slippage of couplings.
d. Nonconformance to 3.6.2 shall constitute failure of this test.

4.6.6 Flexibility.

4.6.6.1 Class 1. A length of hose selected from the lot shall be laid out on a surface and forced into a curve drawn with a radius as specified in table VI. The curved section shall attain the curvature without kinking or flattening. Nonconformance to 3.6.3.1 shall constitute failure of this test.

4.6.6.2 Class 2. A 50-foot (15 240 mm) hose assembly selected from the lot shall be wound without a reel into a tight coil having 3.25-foot (991 mm) diameter at a temperature of 60°F ± 10°F (16°C ± 6°C) (see 3.6.3.2).

4.6.7 Properties of rubber components. The properties of rubber components, except the swelling in testing oil of the friction rubber on the reinforcing fabric, shall be determined on longitudinal specimens prepared from the hose section obtained in accordance with 4.6.1.2, the following details shall apply:

a. After separating and buffing smooth the tube and cover, samples shall be permitted to rest not less than 30 minutes before preparing test specimens.
b. The swelling in testing oil of the friction rubber shall be determined using a vulcanized sample of the rubber friction used to impregnate the fabric reinforcement.
c. The sample shall be 6 by 6 inches (152 by 152 mm) by 0.08 ± 0.01-inch (2 ± 0.3 mm), and shall be of the same composition and an equivalent cure as the friction used in the hose.
d. Nonconformance to the requirements of table IV shall constitute failure of the tests.

4.6.7.1 Tensile strength and ultimate elongation. Initial tensile strength and ultimate elongation shall be determined by ASTM D412 using specimens cut with die C (dumbbell test specimens).

4.6.7.2 Physical properties after immersion. Tensile strength and ultimate elongation shall be determined after being subject to ASTM IRM903 oil for 70 hours at 212°F ± 4°F (100°C ± 2°C) in accordance with the method specified in ASTM D471. The change in tensile strength shall be based on the original cross-section area of the sample.

4.6.7.3 Physical properties after oven aging. The tensile strength and ultimate elongation after oven aging shall be determined in accordance with ASTM D573, using a minimum of 3 specimens dumbbell shaped in accordance with ASTM D412, except that the aging period shall be 70 ± 0.25 hours at 212°F ± 4°F (100°C ± 2°C).

4.6.7.4 Volume change after immersion. The change in volume in percent of the original volume after immersion shall be determined on samples of the tube, cover, and friction material. Sample shall be immersed in ASTM IRM903 oil for 70 ± 0.25 hours at 212°F ± 4°F (100°C ± 2°C) in accordance with the method specified in ASTM D471.

4.6.7.5 Initial adhesion. The adhesion of the tube and cover to the reinforcement, and of the lies of reinforcement to each other, shall be determined, the following details shall apply:

a. Strip or ring specimens shall be prepared in accordance with ASTM D380, except that the specimen shall be not less than 8 inches (203 mm) in length. For determining adhesion between plies of reinforcement, the plies to be separated must be at opposing angles. Three specimens of each interface shall be tested.
b. The adhesion of the tube and cover to the reinforcement, and of the plies of reinforcement to each other, shall be determined in accordance with Machine Method of ASTM D413 and shall meet the requirement of 3.3.2.

4.6.7.6 Adhesion after immersion. The adhesion of the tube and cover to the reinforcement, and of the lies of reinforcement to each other, shall be determined after immersion of test specimens in accordance with 4.6.7.5, the following details shall apply:

b. Samples shall be immersed in ASTM Reference Fuel B of ASTM D471 for 70 ± 0.25 hours at 75°F ± 4°F (24°C ± 2°C).
c. The test procedure for adhesion shall be the Machine Method of ASTM D413 except that the wet specimen shall be tested within 0.25 hours after it is removed from the fluid.

4.6.7.7 Low-temperature bend test. Buffed specimens of tube and cover shall be subjected to the low-temperature bend test specified in ASTM D380. The test specimens shall be held at -20°F ± 2°F (-29°C ± 1°C) for 72 hours prior to flexing. Evidence of cracking of the test specimens shall be cause for rejection.

4.6.8 Resistance to ozone. The rubber cover shall be tested for resistance to ozone, the following details shall apply:

a. Rubber cover samples shall be selected in accordance with 4.6.1.2.
b. Samples shall be tested for ozone resistance in accordance with ASTM D1149 method B procedure B2.

c. Looped samples, after conditioning for 24 hours in an ozone-free atmosphere, shall be exposed for 70 ± 0.25 hours at 104°F ± 2°F (40°C ± 1°C) to an atmosphere containing 100 parts per hundred million of ozone.
d. Any signs of cracking shall be cause for rejection.

4.6.9 Crush resistance (class 1 only). The hose shall be tested for crush resistance, the following detail shall apply:

a. One hose section not less than 12 inches (305 mm) in length shall be submitted for the crush test.
b. Crush resistance shall be determined by centering the 12-inch (305 mm) length of hose between 3-inch (76 mm) wide, parallel metal plates in such a way that a 3-inch (76 mm) length of hose is being compressed.
c. The plates shall be brought together at a rate of 2 inches (51 mm) per minute until the applicable crush resistance force specified in table VI has been applied.
d. The distance between plates shall be measured and expressed as a percent of the original OD.
e. The load shall be released and the minimum OD of the hose at the center of the compressed area shall be measured and expressed in percent of the original. Nonconformance to 3.6.5 shall be cause for rejection of the lot.

4.6.10 Chemical composition. Couplings shall be tested for their chemical composition, the following details shall apply:

a. Couplings used for the tensile pull test (see 4.6.5) shall be used to determine the chemical composition.
b. Couplings, both male and female, shall be drilled to obtain 2-ounce (62 gram) sample of chips or drillings from each.
c. The chemical composition of each unit shall be determined in accordance with ASTM E1282.
d. Failure to comply with the applicable composition specified in 3.7.1 shall be cause for rejection of the lot.

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 or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point packaging activities within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Service or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. Hose and hose assemblies covered by this specification are intended as a means of transferring ship sewage and oil waste to receiving facilities as follows:

a. Surface ship sewage from collection, holding and transfer systems to shore or barge receiving facilities -4-inch (102 mm) "SEWAGE" hose.

b. Submarine sewage from sanitary tanks to shore, tender or barge receiving facilities - 2.5-inch (64 mm) “SEWAGE” hose.
c. Surface ship and submarine oily waste from bilges to shore, barge, or tender receiving facilities - 2.5-inch (64 mm) “OILY WASTE” hose.
d. Smaller surface vessel or barge sewage from sanitary tanks to shore or tender receiving facilities -1.5-inch (38 mm) “SEWAGE” hose.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a Title, number, and date of this specification.
b. Type and size of hose required (see 1.2) or type and size of hose assembly (see 1.3)
c. When first article is required for inspection and approval (see 3.1, 4.3, and 6.3).
d. Packaging requirements (see 5.1).

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. PIN see 1.2.
c. Quantity required.
d. When first article is required for inspection or waived.
e. Lot records if required (see 4.3.2).
f. Name and address of the first article inspection test facility to which first article samples (if required) are to be forwarded (see 4.3.4) and the name and address of the Government activity responsible for conducting the first article inspection program (see 4.3.7 and 6.3).
g. Packaging requirements (see 5.1).

6.3 First article. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first article samples. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.3.1 Defense Logistics Agency (DLA) waiver of first article test. A waiver of a first article testing will only be considered by DLA when the contractor has delivered the same item within the last three years, has no unfavorable quality history, has not changed processes, or changed any subcontractors. DLA will not accept first article testing results outside the stated requirements.

6.4 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 National Stock Numbers (NSNs). The following is a list of NSNs assigned which correspond to this federal specification. The list may not be indicative of all possible NSNs associated with the federal specification.

4720-01-146-5889
4720-01-153-1423
4720-01-153-8351
4740-01-235-5997

6.7 Subject term (key word) listing.

Adhesion
Burst pressure
Couplings
Crush resistance
Hydrostatic proof pressure
Ozone
Reinforcement
Tensile pull

6.8 Amendment notations. The margins of this specification are marked with vertical lines 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 - CR4
Navy - YD
DLA - CC

Preparing Activity:
DLA - CC

(Project 4720-2015-008)

Review Activities:
Navy - SH

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.dla.mil.