

INCH-POUND

MIL-PRF-28523C  
11 September 1997  
SUPERSEDING  
MIL-H-28523B(NAVY)  
9 January 1990

## PERFORMANCE SPECIFICATION

### HOSE ASSEMBLY, RUBBER, HYDRAULIC AND PNEUMATIC, JETTING (400 PSI WORKING PRESSURE)

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

#### 1. SCOPE

1.1 Scope. This specification covers rubber hose assemblies for hydraulic and pneumatic jetting in pile driving, rock drilling, and air compressor use. Hose covered by this specification will be of one type.

1.2 Classification. Hose covered by this specification will be the inside diameter sizes listed in 3.7 as specified (see 6.2).

#### 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.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer (Code 15E2), Naval Construction Battalion Center, 1000 23rd Avenue, Port Hueneme, CA 93043-4301, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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2.2 Government documents.

2.2.1 Standard. The following standard forms a part of this document to the extent specified herein. Unless otherwise specified, the issue of this document is that 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).

STANDARD

FEDERAL

FED-STD-H28 - Screw-Thread Standards for.

(Unless otherwise indicated, copies of the above standard are available from Defense Automated Printing Service, Attn: DoDSSP, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

ANSI-Z1.4 - Sampling Procedures and Tables for Inspection by Attributes.

(Application for copies should be addressed to the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.)

ASTM

ASTM D 380 - Testing Rubber Hose.  
ASTM D 412 - Tension Testing of Vulcanized Rubber.  
ASTM D 413 - Rubber Property - Adhesion to Flexible Substrate.  
ASTM D 471 - Rubber Property - Effect of Liquids.  
ASTM D 518 - Rubber Deterioration - Surface Cracking.  
ASTM D 573 - Rubber Deterioration in Air Oven.  
ASTM D 1149 - Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimens).  
ASTM D 1193 - Reagent Water.

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

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2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document will take 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), a sample shall be subjected to first article inspection in accordance with 4.2.

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. 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 of used or rebuilt products is allowed under this specification.

3.2.1 Inner tube. The rubber compound used for the inner tube shall be resistant to water and oil. The inner tube shall have a smooth bore, free of pitting, dirt, and mandrel lubricants. Thickness shall be not less than 0.093 inches (2 millimetre (mm)).

3.2.2 Reinforcement. The reinforcement shall consist of sufficient plies to meet the requirements of this specification and be suitable for the purpose intended. Where used, the layers of reinforcement shall be free from mechanical defects and shall be applied on a bias of 45 degrees with edges lapped not less than 0.50-inch (13 mm).

3.2.3 Cover. The cover shall consist of an oil-, ozone-, and abrasion-resistant compound to meet the requirements of this specification.

3.3 Construction. Hose assemblies shall consist of tube, reinforcement, and cover as described in 3.2.1, 3.2.2, and 3.2.3 with the reinforcement plies suitably impregnated with rubber to achieve a continuous rubber band from the tube through the reinforcement to the outer cover. Hose assemblies shall be fitted with swivel connections as described in 3.4.

3.4 Hose end fittings. The ends of the hose shall be fitted with interlocking type female couplings, as specified in contract or order (see 6.2). Couplings shall be a quick release type. The wing nut shall have NH hose threads to hold the steel adapter spud against the ground seat. The spud shall have internal NPT threads on one end and external NH threads with a mating ground joint seat on the other end.

A 4-bolt clamp with four fingers shall be used to hold the shank to the hose. Threads shall be in accordance with FED-STD-H28.

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3.5 Physical requirements. The hose and hose assembly shall conform to the requirements specified in table I and the following paragraphs when tested as specified in 4.7.

TABLE I. Performance requirements.

Hydrostatic test pressures (minimum)	
Proof pressure (psi)	800 (5 516 kilopascal (kPa))
Burst pressure (psi)	1600 (11 032 kPa)
Tensile strength of rubber compound (before aging) (minimum)	
Tube, psi	850 (5 861 kPa)
Cover, psi	1000 (6 895 kPa)
Elongation (minimum)	
Tube (percent)	175
Cover (percent)	200
Adhesion (minimum)	
Between plies and between rubber	12 (83 kPa)

3.5.1 Resistance to water.

3.5.1.1 Swelling. The increase in the volume of the tube shall be not greater than 20 percent when tested as described in 4.7.4.

3.5.2 Resistance to oil. The tensile strength of the tube and cover shall be not less than 700 pounds per square inch (psi) (4 826 kPa) when tested as specified in 4.7.7.

3.5.3 Accelerated aging. The tensile strength of the tube and cover after the accelerated aging process described in 4.7.5 shall be not less than 80 percent of the tensile strength indicated before the aging process, and ultimate elongation shall be not less than 50 percent of the values specified in table I.

3.5.4 Ozone resistance. The cover compound of the hose shall show no visible cracking under 2X magnification after exposure to ozone as specified in 4.7.8.

3.6 Identification marking. Each length of hose shall be marked on the cover in two places, approximately 4 feet (1 219 mm) from the ends. The marking shall be in letters not less than 0.125-inch (3 mm) high and shall include: (a) the manufacturer's name or trademark, (b) the maximum working pressure (e.g., working pressure 400 psi (2 758 kPa)), and (c) the quarter of the calendar year and the year of manufacture.

3.7 Dimensions. The inside diameter of the hose shall be 2.00 inches or 3.00 inches  $\pm$  0.062-inch (51 mm or 76 mm  $\pm$  2 mm), as specified (see 6.2). Unless otherwise specified (see 6.2), the hose length shall be 50 feet (15 240 mm). The length of the hose shall be measured from the ends of the hose, not from the ends of the couplings. A tolerance of not greater than  $\pm$  1 percent shall be permitted in the length of the hose.

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3.8 Workmanship. The finished hose assembly shall be free of any defect that may affect its appearance and serviceability.

#### 4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. The first article inspection shall be performed on one sample hose length when a first article is required (see 3.1 and 6.2). This inspection shall include the examination of 4.6, and the tests of 4.7. 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 Conformance inspection. The conformance inspection shall include the examination of 4.6 and the tests of 4.7. This inspection shall be performed on the samples selected in accordance with 4.7.

4.4 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

4.5 Sampling. Sampling and inspection procedures shall be in accordance with ANSI-Z1.4. The unit of product shall be one hose and hose assembly. All hose and hose assemblies of the same type and size offered for delivery at one time shall be considered a lot for the purpose of inspection.

4.5.1 Sampling for examination. Guidance for inspection level and an Acceptable Quality Level (AQL) is provided in 6.4.1.

4.5.2 Sampling for test. Guidance for inspection level and an AQL is provided in 6.4.2.

4.6 Examination. Each of the sample hose lengths shall be examined for compliance with the requirements specified in section 3 of this document. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirement or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.7 Tests. Sample hose sections selected shall be subjected to the applicable tests specified in table II and 4.7.1 through 4.7.8.

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TABLE II. Test method references.

	Requirement paragraph	ASTM Test Method Standard	Reference paragraph
Hose size (inside diameter)	3.7	ASTM D 380	
Hose length	3.7	ASTM D 380	
Tube and cover thickness	3.2.1 and 3.2.3	ASTM D 380	
Proof pressure	3.5 and table I	ASTM D 380	4.7.1
Burst pressure	3.5 and table I	ASTM D 380	4.7.2
Tensile strength and elongation	3.5 and table I	ASTM D 412	4.7.3
Swelling	3.5.1.1	ASTM D 471	4.7.4
Accelerated aging	3.5.3	ASTM D 573	4.7.5
Adhesion	3.5 and table I	ASTM D 413	4.7.6
Oil immersion	3.5.2	ASTM D 471	4.7.7
Ozone	3.5.4	ASTM D 1149	4.7.8

4.7.1 Hydrostatic proof test, coupled assemblies. Samples selected after couplings have been reattached shall be subjected to the hydrostatic proof test pressure specified in table I in accordance with ASTM D 380. Water shall be used as the test media. Leakage or other evidence of defects shall be cause for rejection.

4.7.2 Burst test. Hose samples selected shall be subjected to the hydrostatic straight bursting test of ASTM D 380. Water shall be used as the test media. Any suitable coupling other than those specified in 3.4 may be used for this test. Failure of the hose at a pressure below the minimum burst pressure specified in table I shall be cause for rejection of the lot.

4.7.3 Initial tensile properties. Initial tensile strength and ultimate elongation shall be determined by the procedure given in ASTM D 412, using specimens cut with die C of ASTM D 412.

4.7.4 Volume change after immersion. The change in volume of samples of the tube, after immersion for  $22 \pm 0.25$  hours at a temperature of  $73 \pm 4$  degrees Fahrenheit ( $^{\circ}\text{F}$ ) ( $23 \pm 2$  degrees Celsius ( $^{\circ}\text{C}$ )) in type IV reagent water of ASTM D 1193 shall be determined in accordance with ASTM D 471. The change in volume shall be reported as a percent of the original volume.

4.7.5 Accelerated aging test. Hose samples selected shall be subjected to accelerated aging in accordance with ASTM D 573, except that the time of aging shall be  $70 \pm 0.50$  hours at  $212 \pm 4$   $^{\circ}\text{F}$  ( $100 \pm 2$   $^{\circ}\text{C}$ ). After aging, the tensile strength shall be not less than 80 percent of the values specified in table I, and the ultimate elongation shall be not less than 50 percent of the values specified in table I. The die for cutting the specimen shall be C of ASTM D 412.

4.7.6 Adhesion. For hose assemblies selected, prepare ring specimens as described in ASTM D 380. The adhesion shall be determined in accordance with the machine method of ASTM D 473.

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The rate of travel of the power-actuated grip shall be 1-inch (25 mm) per minute. Nonconformance to the requirements of table I shall constitute failure of this test.

4.7.7 Oil immersion. The tensile strength of the tube and cover, after immersion in oil No. 1, shall be determined in accordance with ASTM D 471, using specimens cut with die C of ASTM D 412. Tensile strength shall be based on the original cross-sectional area for the specimen.

4.7.8 Ozone resistance test. Specimens of the cover, prepared as described in Procedure A of ASTM D 518, shall be mounted in a 20 percent elongated position and tested in accordance with ASTM D 1149. After conditioning for 24 hours in an ozone-free atmosphere, the mounted specimen shall be exposed for 72 hours at  $104 \pm 2$  °F ( $40 \pm 1$  °C) to an atmosphere containing 50 parts per hundred million of ozone. Visible cracking under 2X magnification at the end of such test shall be cause for rejection.

## 5. PACKAGING

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

## 6. NOTES

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

6.1 Intended use. The hose covered by this specification is intended for pile driving, grading, surface stripping, hydraulic mining, air compressor use, and other applications requiring high pressure water service and air service.

6.2 Acquisition requirements. Acquisition documents will specify the following:

- a. Title, number, and date of this specification.
- b. Size of hose required (see 1.2 and 3.7).
- c. 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).
- d. When first article is required for inspection and approval (see 3.1, 4.2, and 6.5).
- e. When couplings are required (see 3.4).
- f. If hose length will be other than 50 feet (15 240.00 mm) (see 3.7).
- g. Packaging requirements (see 5.1).

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6.3 Recommended working pressure. Recommended working pressure for the hose covered by this specification is 400 psi (2 758 kPa).

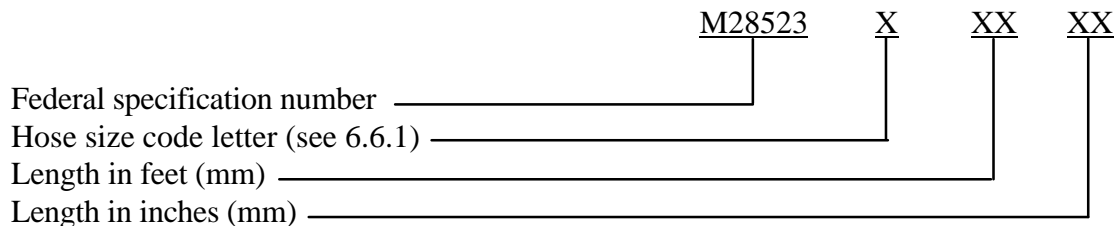
6.4 Sampling procedures.

6.4.1 Sampling for examination. Examination of the hose will be based on inspection level II and an Acceptable Quality Level (AQL) of 2.5 percent defective for major defects and 4.0 percent defective for minor defects (see 4.5.1).

6.4.2 Sampling for tests. Tests of the hose will be based on inspection level S-3 with an AQL of 4.0 percent defective. A representative sample 3-foot (914 mm) in length will be cut from lengths selected from each lot. The contractor will reattach couplings to the remaining length from which the 3-foot (914 mm) length was cut. After the couplings have been reattached, the remaining length of the hose will be used to conduct the hydrostatic proof pressure test specified in 4.7.1. When the remaining length has passed the hydrostatic proof test, it will be accepted as a full length of hose. One-half (18 inches (457 mm)) of the 3-foot (914 mm) sample will be used for the burst test; the remainder will be used for the other tests listed in table II (see 4.7.2).

6.5 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2. The first article should consist of one hose or hose assembly. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.6 Part or Identification Number (PINs). The specification number, class, type, and size are combined to form PINs for hose assemblies are established as follows:



6.6.1 Hose size. Hose size is designated by one code letter (see table III).

TABLE III. Hose size code letter.

Hose size code letter	A	B
Hose inside diameter (inches (mm))	2.0 (51 mm)	3.0 (76 mm)



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6.7 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.

4720-00-274-8286

6.8 Supersession data. This specification replaces Military Specification MIL-H-28523B(NAVY) dated 9 January 1990.

6.9 Subject term (key word) listing.

Air compressor  
Air service  
High pressure  
Pile driving  
Rock drilling  
Water service

Custodian:  
Navy - YD1

Preparing Activity:  
Navy - YD1

Review Activities:  
Navy - SH  
DLA - CS

(Project 4720-0167)

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
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NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

### I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER  
MIL-PRF-28523C

2. DOCUMENT DATE (YYMMDD)  
970911

### 3. DOCUMENT TITLE

HOSE ASSEMBLY, RUBBER, HYDRAULIC AND PNEUMATIC, JETTING (400 PSI WORKING PRESSURE)

### 4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

### 5. REASON FOR RECOMMENDATION

### 6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*

b. ORGANIZATION

c. ADDRESS *(Include Zip Code)*

d. TELEPHONE *(Include Area Code)*  
(1) Commercial  
(2) AUTOVON  
*(if applicable)*

7. DATE SUBMITTED  
(YYMMDD)

### 8. PREPARING ACTIVITY

a. NAME  
ROBERT J. BRICKEY

b. TELEPHONE *Include Area Code)*  
(1) Commercial 805-982-5593  
(2) AUTOVON 551-5593

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