

MIL-H-17666A(SHIPS)

14 November 1966

SUPERSEDING

MIL-H-17666(SHIPS)

22 June 1953

See 6.3

MILITARY SPECIFICATION
HOSE, METAL, CORRUGATED BRONZE,
HIGH PRESSURE AIR SERVICE

1. SCOPE

1.1 This specification covers flexible bronze base and couplings of the corrugated type for high pressure air service (up to 3300 p. s. i.).

2. APPLICABLE DOCUMENTS

2.1 The following document of the issue in effect on date of invitation for bids or request for proposal, forms a part of the specification to the extent specified herein.

SPECIFICATION

FEDERAL

QQ-B-637 - Brass, Naval: Rod, Wire, Shapes, Forgings and Flat Products with Finished Edges, Bar (Flat Wire and Strip).

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

2.2 Other publications. - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN IRON AND STEEL INSTITUTE (AISI)
Steel Products Manual

(Application for copies should be addressed to the American Iron and Steel Institute, 350 Fifth Avenue, New York, New York 10011.)

NATIONAL BUREAU OF STANDARDS
Handbook H28 - Screw-Thread Standards for Federal Services

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20360.)

OFFICIAL CLASSIFICATION COMMITTEE
Uniform Freight Classification Ratings, Rules and Regulations

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York, N. Y. 10016.)

3. REQUIREMENTS

3.1 Preproduction sample. - Prior to beginning production a sample shall be tested as specified in 4.2 (see 6.2).

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3.2 Materials. -

3.2.1 The pressure carrier shall be of bronze (approximately 85 percent copper, 15 percent zinc) of such composition that it will not season crack when subjected to the test specified in 4.2.4.

3.2.2 The wire in the braid reinforcement shall be high tensile strength corrosion-resisting steel of AISI type 304, 347 or 321.

3.2.3 The protective outer cover shall be of commercial bronze interlocked type metal hose of unpacked construction.

3.2.4 Couplings shall be of Naval rolled brass in accordance with QQ-B-637, half hard grade or other material equal or better, as approved by the Naval Ship Engineering Center.

3.3 Hose shall be identified and ordered by the size (which corresponds to the nominal clear inside diameter of the inner pressure carrier). Hose and couplings shall be 3/8 inch size, suitable for use with compressed air up to 3300 pounds per square inch (p. s. i.) working pressure. The hose complete with couplings shall be capable of withstanding a pressure of 10,000 p. s. i. without failure.

3.4 Construction. - Hose shall consist of a corrugated pressure carrier, braided reinforcement and an outer casing of metal interlocked hose, complete with couplings on each end.

3.4.1 Pressure carrier. - The pressure carrier shall be close pitch, corrugated, double wall (two ply) seamless construction, either helical or annular with one ply nested within the other.

3.4.2 Braided cover. - The braided cover shall fit snugly over the pressure carrier and shall be firmly secured in place by the end couplings. The braided cover shall be two layers of wire braid.

3.4.3 Protective outer covering. - The protective outer covering shall be made of unpacked flexible metal tubing of the interlocked design. The ends of the protective outer covering shall be securely fastened and sealed into the couplings and shall be so designed that flexing in service will not cause it to loosen or break away from its bond in the coupling.

3.5 Lengths. - Unless otherwise specified in the contract or order, each length shall be not less than 8-1/2 feet including couplings. Lengths shall contain no welded or brazed joints.

3.6 Couplings. - Unless otherwise specified in the contract or order, each length of hose shall be fitted with couplings securely fastened thereto without the use of heat. Each end shall terminate in a male pipe thread in accordance with the National Taper Pipe Thread Standard of Handbook H28. Unless otherwise specified in the contract or order, the size of the pipe thread (i. p. s.) shall be the same as that of the hose (hose inside diameter). Special care shall be given to the method of sealing the hose end in the coupling.

3.7 The hose shall be capable of operating satisfactorily when bent to a diameter of 30 inches and when subjected to 3300 p. s. i. air.

3.8 Marking. - Each coupling shall be permanently marked with the manufacturer's name or trade-mark, the size and the designed working pressure. Marking shall be done in such a manner as not to injure the coupling in any way nor adversely affect its performance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Preproduction inspection. - Preproduction inspection shall consist of the examination and tests specified in 4.2.1. Inspection shall be conducted at the manufacturer's facilities or at a commercial

laboratory approved by the procuring activity. Any production prior to the satisfactory completion of the preproduction inspection shall be at the contractors risk.

4.2.1 Sampling for preproduction inspection. - The following samples shall be examined and tested:

- (a) Two sections of hose with end couplings attached, the length to be not less than 9 feet exclusive of couplings, for the physical tests specified in 4.2.3.
- (b) One length of hose with end couplings attached, the length to be not less than 4 feet exclusive of couplings, for the burst test specified in 4.2.2.
- (c) One short length of hose of a full section, including the pressure carrier and protective outer cover for the immersion test specified in 4.2.4 and for the examination specified in 4.4.

4.2.2 Burst test. - The 4-foot length shall be subjected to the burst test as specified in 4.5.1 and the pressure at which failure occurs shall be determined. This pressure shall be not less than 10,000 p. s. i.

4.2.3 Physical tests. - Each of the 9 foot long sections submitted in accordance with 4.2.1 (a) for testing shall have one end fixed to a bend diameter of 30 inches, 5 cycles of 6000 p. s. i. hydrostatic pressure and 10 cycles of 3000 p. s. i. air pressure shall then be applied, each pressure application lasting for not less than 10 minutes. After determining these lengths to be satisfactory under these conditions, they shall be subjected to flexing tests on a flexing device assembled by the laboratory. Flexible test shall not exceed 30 cycles per minute. After each 1000 cycles of flexure, the hose shall be subjected to an air test of 3000 p. s. i. for not less than 5 minutes duration in order to determine tightness. After a total of 6000 flexing cycles, an air test of 3000 p. s. i. shall be applied to each sample length for not less than 10 minutes duration in addition to the 6000 p. s. i. hydrostatic test to determine its tightness. Upon the determination of the satisfactoriness of both samples up to this point, one sample length shall be withdrawn from the flexing test and shall be subjected to a hydrostatic test to determine the pressure at which failure occurs. This pressure shall be not less than 10,000 p. s. i. The other sample shall be continued on the flexing test with periodic hydrostatic and air tests to determine the number of cycles until failure occurs, which shall be not less than 50,000 cycles. A record shall be maintained of the tightening of couplings required during the tests to maintain tightness.

4.2.4 Immersion test. - A short length of full section of the pressure carrier from sample in 4.2.1 (c) shall be subjected to the following immersion test without showing evidence of season cracking. The specimen shall be immersed in an aqueous mercurous nitrate solution containing 100 g. of mercurous nitrate and 13 m of nitric acid (specific gravity 1.42) per liter for 15 minutes.

4.3 Quality conformance inspection. -

4.3.1 Sampling for quality conformance inspection. -

4.3.1.1 Lot. - For the purposes of sampling, a lot shall consist of all hose offered for delivery at one time.

4.3.1.2 Sampling for examination and tests. - A random sample of hose lengths shall be selected from each lot in accordance with table I for the examination and tests specified in 4.4 and 4.5. If any sample fails in the examination or in any test the lot represented by the sample shall be subject to rejection.

Table I - Sampling for examination and tests

Lot size	Number of sample hose lengths
8 or less	All
9 to 15	8
16 to 25	10
26 to 40	13
41 to 65	16
66 to 110	20
111 to 180	25
181 to 300	35

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4.3.1.3 Sampling for burst tests. - In addition to the samples specified in 4.3.1.2, a length of hose, with couplings attached, not less than 4 feet in length, exclusive of couplings, shall be furnished for the burst test specified in 4.5.1.

4.4 Examination. - Sample hose shall be examined to determine conformance with the requirements of this specification not involving tests.

4.5 Tests. -

4.5.1 Burst test. - The 4-foot length required by 4.2.2 and 4.3.1.3 shall be subjected to a hydrostatic (water) pressure of 6000 p. s. i. and examined for leaks or other signs of weakness. The pressure shall then be raised gradually until 10,000 is reached and held for 5 minutes. The hose and coupling shall be inspected again. *If satisfactory, the test may be discontinued and the sample destroyed.*

4.5.2 Proof pressure tests. - The sample lengths selected in accordance with 4.3.1.2 shall be subjected to a hydrostatic (water) pressure of not less than 6000 p. s. i. for not less than 10 minutes duration while lying straight. In addition, each length shall have one end coiled into a circle of 30 inches bending diameter. With the hose suitably held, and with a hydrostatic pressure of 6000 p. s. i. applied, the coil shall be made to travel the entire length of hose and shall be returned. After completion of these tests, each of the sample lengths shall be subjected to an air pressure not less than 100 p. s. i. with the hose under water to detect any leakage.

4.6 Inspection for preparation for delivery. - Preparation for delivery shall be in accordance with section 5 herein.

5. PREPARATION FOR DELIVERY

5.1 Domestic shipment and early equipment installation and for storage of onboard repair parts. -

5.1.1 Flexible metal hose. -

5.1.1.1 Preservation and packaging. - Preservation and packaging which may be the supplier's commercial practice, shall be sufficient to afford adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the using activity and until early installation.

5.1.1.2 Packing. - Packing shall be accomplished in a manner which will insure acceptance by common carrier at the lowest rate and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early installation. The shipping containers or method of packing shall conform to the Uniform Freight Classification Ratings, Rules and Regulations or other carrier regulations as applicable to the mode of transportation and may conform to the suppliers commercial practice.

5.1.1.3 Marking. - Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice. The information shall include nomenclature, Federal stock number or manufacturer's part number, contract or order number, contractor's name and destination and mechanical operating characteristics or ratings (as applicable). The nomenclature shall be "Hose, Metal, Corrugated Bronze, High Pressure Air Service."

5.2 Domestic shipment and storage or overseas shipment. - The requirements and levels of preservation, packaging, packing and marking for shipment shall be specified by the procuring activity (see 6.1).

(5.2.1 The following provides various levels for protection during domestic shipment and storage and overseas shipment, which may be required when procurement is made.

5.2.1.1 Preservation and packaging. -

5.2.1.2.1 Level A. - Flexible metal hose assemblies shall be cleaned in accordance with process C-1 and the coupling shall be coated with preservative type P-2 of MIL-P-116. Closure of ends shall be by

caps conforming to MIL-C-52078 or by wrapping with barrier material conforming to MIL-B-121. The flexible hose may be coiled to a minimum diameter of 36 inches and individually packaged in containers in accordance with PPP-B-636 or PPP-B-665. Container closure and sealing shall be in accordance with the applicable container specification or appendix thereto.

5.2.1.1.2 Level C. - Preservation and packaging shall be sufficient to afford adequate protection against corrosion deterioration and physical damage during shipment from the supply source to the first receiving activity for early installation and may conform to the suppliers commercial practice.

5.2.1.2 Packing. -

5.2.1.2.1 Level A. - Flexible metal hose packaged as specified shall be packed in containers conforming to any one of the following at the option of the contractor:

<u>Specification</u>	<u>Classification</u>
PPP-B-591	Overseas type
PPP-B-636	Weather resistant
PPP-B-640	Class 2

Shipping containers shall have MIL-L-10547 caseliner and shall be closed and sealed in accordance with the appendix to that specification. Caseliners may be omitted for fiberboard boxes in accordance with PPP-B-636 and PPP-B-640 provided that all center and edge seams and manufacturers joints are sealed and waterproofed with pressure sensitive tape in accordance with the applicable fiberboard box specification. Shipping containers shall be closed, strapped or banded in accordance with the applicable box specification or appendix thereto. The gross weight of wood cleated and triple-wall boxes shall not exceed 250 pounds. PPP-B-636 containers shall not exceed the weight limitations of the specification.

5.2.1.2.2 Level B. - Flexible metal hose packaged as specified shall be packed in containers conforming to any one of the following at the option of the contractor:

<u>Specification</u>	<u>Classification</u>
PPP-B-591	Domestic type
PPP-B-636	Domestic type
PPP-B-640	Class 1

Shipping containers shall be closed, strapped or banded in accordance with the applicable container specification or appendix thereto, except that fiberboard containers may be sealed with tape conforming to PPP-T-45. The gross weight of wood cleated or triple wall containers shall not exceed 250 pounds PPP-B-636 containers shall not exceed the weight limitations of the specification.

5.3 Marking. - In addition to any special marking requirements, interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129, and shall include the mechanical operational characteristics of ratings (as applicable). The nomenclature shall be "Hose, Metal, Corrugated Bronze, High Pressure Air Service.")

6. NOTES

6.1 Ordering data. - Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Preservation, packaging, packing and marking requirements, if other than specified in 5.1 (see 5.2)

6.2 Preproduction. - Invitations for bids should provide that the Government reserves the right to waive the requirement for preproduction samples as to those bidders offering a product which has been previously procured 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 procurement.

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6.3 CHANGES FROM PREVIOUS ISSUE. THE EXTENT OF CHANGES (DELETIONS, ADDITIONS, ETC.) PRECLUDE THE ANNOTATION OF THE INDIVIDUAL CHANGES FROM THE PREVIOUS ISSUE OF THIS DOCUMENT.

Preparing activity:
Navy - SH
(Project 4720-N063Sh)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)***1. DOCUMENT NUMBER****2. DOCUMENT TITLE****3a. NAME OF SUBMITTING ORGANIZATION****4. TYPE OF ORGANIZATION (Mark one)**☐**VENDOR**☐**USER**☐**MANUFACTURER**☐**OTHER (Specify):** _____**b. ADDRESS (Street, City, State, ZIP Code)****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****c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional****8. DATE OF SUBMISSION (YYMMDD)**