

MIL-T-20219D
21 August 1986
SUPERSEDING
MIL-T-20219C
22 July 1977
(See 6.4)

MILITARY SPECIFICATION

TUBE, BRASS, VOICE AND PNEUMATIC

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

1. SCOPE

1.1 Scope. This specification covers seamless drawn brass tube corresponding to copper alloy UNS No. C26000 for shipboard voice and pneumatic service.

1.2 Classification. Tube shall be size A, B, C, D, E, F, G or H as specified (see 3.5.1 and 6.2.1). Tubes are sized by outside diameter (od) except for sizes C, E and H which are sized by inside diameter (id) for use as couplings.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Standards. The following standards 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.

STANDARDS

FEDERAL

FED-STD-185 - Identification Marking of Copper and Copper Base Alloy Mill Products.

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-1627 - Bending of Pipe or Tube for Ship Piping Systems.

(Copies of those standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 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 4710

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2.2 Other publications. The following documents 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- B 135 - Standard Specification for Seamless Brass Tube. (Metric)
(DoD adopted)
- B 154 - Standard Method of Mercurous Nitrate Test for Copper
and Copper Alloys. (DoD adopted)
- B 251 - Standard Specification for General Requirements for Wrought
Seamless Copper and Copper-Alloy Tube. (DoD adopted)
- B 601 - Standard Practice for Temper Designations for Copper and
Copper Alloys-Wrought and Cast.
- E 8 - Standard Methods of Tension Testing of Metallic Materials.
(DoD adopted)
- E 18 - Standard Test Methods for Rockwell Hardness and Rockwell
Superficial Hardness of Metallic Materials. (DoD adopted)
- E 29 - Standard Recommended Practice for Indicating Which
Places of Figures are to be Considered Significant
in Specified Limiting Values. (DoD adopted)
- E 53 - Standard Method for Chemical Analysis of Copper (Electro-
lytic Determination of Copper).
- E 62 - Standard Methods for Chemical Analysis of Copper and
Copper Alloys (Photometric Methods).
- E 478 - Standard Methods for Chemical Analysis of Copper Alloys.

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

(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.)

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 Chemical. The tube shall conform to the chemical composition of alloy UNS No. C26000 as specified in table I.

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TABLE I. Chemical requirements.

Copper alloy, UNS no.	Copper, percent	Lead, maximum, percent	Iron, maximum, percent	Total other elements maximum, percent	Zinc, percent
C26000	68.5-71.5	0.07	0.05	0.15	remainder

3.2 Temper. Sizes A, C, D, E, F and H tube shall be in the hard drawn temper, H-80. Sizes B and G shall be in the light drawn (bending) temper, H-55. Temper designations are in accordance with ASTM B 601.

3.3 Mechanical properties.

3.3.1 Hardness and tensile strength. Hardness and tensile strength of drawn tube shall be as specified in table II.

TABLE II. Mechanical property requirements of drawn temper tube.

Copper alloy, UNS no.	Standard designation	Former designation	Tensile strength, ksi ^{1/}	Rockwell hardness 30T ^{2/}
C26000	H-55	light drawn (bending)	50-70	34-70
	H-80	hard-drawn ^{3/}	66 minimum	70 minimum

^{1/} ksi = 1000 pounds per square inch (lb/in²).

^{2/} Rockwell hardness shall be made on the inside surface of the tube. When suitable equipment is not available for determining the specified Rockwell hardness, other Rockwell scales and values may be specified subject to agreement between the manufacturer and the purchaser.

3.4 Residual stress. Tube shall be free from residual stress insofar as can be determined when tested as specified in 4.3.5.

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3.5 Dimensions and tolerances.

3.5.1 Diameter, wall thickness, and weight. Tube shall be furnished in conformance with the sizes, tolerances, and nominal weight requirements specified in table III.

TABLE III. Dimensions, tolerances, and weight per foot.^{1/}

Size	Od inches	Id inches	Average diameter tolerance inch	Wall thickness inch	Wall thickness tolerances (plus or minus) inch	Weight per foot (nominal) pounds
A	2.000	-----	+0.000 - .004	0.049	0.0035	1.10
B	2.000	-----	+ .000 - .004	.109	.005	2.39
C	-----	2.000	+ .004 - .000	.049	.005	1.16
D	2.250	-----	+ .000 - .004	.065	.006	1.65
E	-----	2.250	+ .004 - .000	.049	.005	1.30
F	3.000	-----	+ .000 - .004	.049	.005	1.67
G	3.000	-----	+ .000 - .004	.109	.007	3.65
H	-----	3.000	+ .004 - .000	.049	.005	1.73

^{1/} When tube bending is required, order wall thickness to meet the requirements of MIL-STD-1627.

3.5.2 Tolerances for length, straightness, squareness of cut and roundness shall be in accordance with ASTM B 135.

3.5.3 Length. Unless otherwise specified (see 6.2.1), tubes shall be furnished in accordance with length schedule as specified in ASTM B 251.

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3.6 Identification marking. Item identification marking shall be in accordance with FED-STD-185.

3.7 Workmanship. The tubes shall be clean, smooth, and of the proper dimensions and shall be free from scale, grooving, indentations, cracks, flaws, or other harmful defects.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, 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 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 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Certification of quality conformance. A certificate of quality conformance shall be prepared for each lot of material offered for acceptance (see 6.2.2). The certificate shall include actual data of specified chemical and mechanical tests. Qualitative results of nondestructive tests and other inspections or tests shall be recorded on the certificate. The certificate shall also state that each lot has been sampled, tested, and inspected in accordance with the specification and meets all specification requirements. The certificate shall be signed by a responsible representative of the contractor.

4.2 Sampling for quality conformance inspection.

4.2.1 Lot. For purposes of sampling, a lot shall consist of a maximum of 5000 pounds of tube of one size offered for delivery at one time.

4.2.2 Visual and dimensional examination. From each lot samples shall be selected for visual and dimensional examination in accordance with MIL-STD-105, general inspection level II, acceptable quality level 1.5.

4.2.3 Sampling for tests.

4.2.3.1 Chemical analysis. Sampling for chemical analysis shall be in accordance with ASTM B 251.

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4.2.3.2 Hardness test. Samples shall be selected in accordance with ASTM B 251.

4.2.3.3 Tension test. Samples shall be selected in accordance with ASTM B 251.

4.2.3.4 Residual stress test. From each lot one tube shall be selected and cut for the residual stress test.

4.3 Examination and tests.

4.3.1 Visual and dimensional examination. Each of the sample tubes selected in accordance with 4.2.2 shall be visually and dimensionally examined to verify compliance with this specification. Sample tubes shall be evaluated separately for visual and dimensional examination. Any tube in the sample containing one or more visual or dimensional defects shall not be offered for delivery, and if the number of defective tubes in any sample exceeds the acceptance number for that sample, the lot shall be rejected.

4.3.2 Chemical analysis. A chemical analysis shall be conducted in accordance with ASTM E 53, E 62, and E 478.

4.3.3 Hardness test. Hardness determinations on each sample specimen shall be made in accordance with ASTM E 18.

4.3.4 Tension test. Specimen preparation and tensile test shall be in accordance with the procedure for tubular products in ASTM E 8 and ASTM B 251. Full size section specimens shall be used unless the capacity of the testing equipment requires the use of longitudinal specimens taken from tube.

4.3.5 Residual stress test. Full section test specimens, 6 inches in length shall withstand the residual stress test without cracking in accordance with ASTM B 154.

4.3.6 Numerical limits. For purposes of determining compliance with the specified limits for requirements of the properties listed in table IV, an observed value or a calculated value shall be rounded off in accordance with ASTM E 29.

TABLE IV. Rounding off procedure for numerical limits.

Property	Rounding-off unit for observed or calculated value
Chemical composition	Nearest unit in the last right-hand place of figure of the specified limit
Tensile strength Yield strength	Nearest 1000 lb/in ²
Elongation	Nearest 1 percent

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4.3.7 Rejection. Any specimen failing to conform to this specification shall be cause for rejection of the entire lot.

4.4 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 Preservation, packaging and marking. Material shall be preserved, packaged and marked in accordance with ASTM B 135 (see 6.2.1).

6. NOTES

6.1 Intended use. Voice and pneumatic tubes are intended for use in all voice and pneumatic applications.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Total length of tube required.
- (c) Size of tube required (see 1.2 and 3.5.1).
- (d) Tube length required if other than random lengths (see 3.5.3).
- (e) Level of preservation, packaging and marking required (see 5.1).

6.2.2 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.410-6 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraph.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.1.2	Certification data/report	UDI-A-23264	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5010.12-L., Vol. I, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

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6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 Subject term (key word) listing.

Copper alloy tube, pneumatic application
Pneumatic tubes, dimensions and tolerances
Tube, brass, voice
Tube, pneumatic
Voice service shipboard tubes

6.4 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:

Army - MR
Navy - SH
Air Force - 99

Preparing activity:

Navy - SH
(Project 4710-0841)

Review activity:

DLA - CS

User activity:

Navy - OS