

INCH-POUND

MIL-DTL-15119B(OS)

11 September 2012

SUPERSEDING

MIL-T-15119A(OS)

20 October 1976

DETAIL SPECIFICATION

TUBING, ROUND, SEAMLESS ALLOY STEEL

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers round seamless alloy steel tubing (see 6.1).

1.2 Classification. Tubing covered by this specification are of the following grades, as specified (see 3.2 and 6.2):

Grade A – No. 4130

Grade B – No. 8630

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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 of documents cited in sections 3, 4, or 5 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.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1916 - DoD Preferred Methods for Acceptance of Product

DOD-STD-2101 - Classification of Characteristics

(Copies of these documents are available online at <https://assist.dla.mil/quicksearch/> or <https://assist.dla.mil/>.)

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". 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>.

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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 E8/E8M	-	Standard Test Methods for Tension Testing of Metallic Materials
ASTM E112	-	Standard Test Methods for Determining Average Grain Size
ASTM E350	-	Standard Test Methods for Chemical Analysis of Carbon Steel, Low Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron
ASTM E1282	-	Standard Guide for Specifying the Chemical Compositions and Selecting Sampling Practices and Quantitative Analysis Methods for Metals, Ores, and Related Materials

(Copies of these documents are available from ASTM International, 100 Barr Harbor Dr., P.O. Box C700, West Conshohocken, PA 19428-2959 or online at www.astm.org.)

NCSL INTERNATIONAL

ANSI/NCSL Z540.3	-	Requirements for the Calibration of Measuring and Test Equipment
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(Copies of this document are available from NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301-5404 or online at www.ncsli.org.)

SAE INTERNATIONAL

SAE-AMS2253	-	Tolerances, Carbon and Alloy Steel Tubing
SAE-AMS2806	-	Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys
SAE-AMS2807	-	Identification, Carbon and Low-Alloy Steels, Corrosion and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing
SAE-AMS-H-6875	-	Heat Treatment of Steel Raw Materials

(Copies of these documents are available from SAE World Headquarters, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or online at www.sae.org.)

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, 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 Manufacture (M101). The tubing shall be drawn from fully killed steel manufactured by either the open hearth or electric furnace process. M101 indicates this is a major requirement that shall be interpreted in accordance with 4.3. The classification of 4.3 shall apply for similarly designated critical (Cx) and major (M1xx) requirements throughout this specification.

3.2 Chemical composition (M102). The chemical composition of the steel shall be as specified in [table I](#), determined in accordance with 4.4.

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TABLE I. Chemical composition.

Element	Grade			
	4130		8630	
	Analysis (%)	Check Analysis Tolerance (%)	Analysis (%)	Check Analysis Tolerance (%)
Carbon	0.27 – 0.33	±0.02	0.27 – 0.33	±0.02
Manganese	0.40 – 0.60	±0.03	0.70 – 0.90	±0.03
Phosphorous	0.025 (max.)	±0.005	0.025 (max.)	±0.005
Sulfur	0.025 (max.)	±0.005	0.025 (max.)	±0.005
Silicon	0.20 – 0.35	±0.02	0.20 – 0.35	±0.02
Nickel			0.40 – 0.70	±0.03
Chromium	0.80 – 1.10	+0.05, -0.03	0.40 – 0.60	±0.03
Molybdenum	0.15 – 0.25	±0.02	0.15 – 0.25	±0.03
NOTE:				
1. Individual determinations may vary from the specified range to the extent shown in the check analysis column except that elements in any heat shall not vary both above and below specified range. The average of all separate determinations shall be within the specified range.				

3.3 Grain size (M103). The grain size of the steel used for this tubing shall be predominately No. 5 or finer with grains as large as No. 3 permissible. The grain size shall be determined in accordance with 4.5.

3.4 Mechanical properties (M104). After the last cold draw pass, the tubing shall be heat treated in accordance with SAE-AMS-H-6875 to produce the mechanical properties listed in [table II](#). Mechanical properties shall be verified in accordance with 4.6.

TABLE II. Mechanical properties.

Tensile Strength (PSI)	Yield Strength at 0.2% Offset (PSI)	Elongation in 2 Inches Full Tube Specimen (%)
110,000 – 130,000	85,000 – 120,000	12 – 22

3.5 Dimensions (M105). The tubing dimensions shall be as specified (see 6.2). Dimensions shall be verified in accordance with 4.7.

3.6 Tolerances (M106). Unless otherwise specified (see 6.2), the permissible variations in dimensions shall be as specified in SAE-AMS2253. Tolerances shall be verified in accordance with 4.8.

3.7 Hydrostatic test (C1). The tubing shall not break or permanently increase in diameter more than 0.003 inches when tested in accordance with 4.9 (see 6.2).

3.8 Marking. All tubing shall be marked in accordance with SAE-AMS2806 and SAE-AMS2807. Marking shall be verified in accordance with 4.10.

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3.9 Workmanship. The tubing shall have a smooth, clean surface, free from heavy scale or oxide, pipes, burrs, seams, cracks, tears, grooves, laminations, slivers, pits, and other injurious defects that may affect its suitability for the purpose intended. Surface imperfections such as handling marks, straightening marks, light mandrel and die marks, shallow pits, and scale patterns shall not be considered as injurious defects, provided the imperfections are not deeper than may be removed without reducing the diameter or wall thickness of the tubing below the permissible tolerance limits. The removal of surface imperfection is not required. Workmanship shall be verified in accordance with 4.11.

4. VERIFICATION

4.1 Conformance inspection. The examination and testing of tubing shall be classified as conformance inspection. Inspection sampling requirements for critical, major, and minor characteristics are defined in MIL-STD-1916. Unless otherwise specified (see 6.2), Inspection Level IV shall be used for all characteristics defined as major and Inspection Level II for all minor characteristics; critical characteristics shall be addressed in accordance with MIL-STD-1916. In addition to the sampling requirements stated herein, Verification Level VII shall be used to verify the 100 percent screening operation of critical characteristics.

4.2 Lot. A lot shall consist of homogenous tubing produced from the same heat and the same heat treatment. See 6.5 for definitions.

4.3 Classification of characteristics. The characteristics verified by the tests and examinations herein are classified as critical, major, or minor in accordance with DOD-STD-2101. Tests and examinations that verify critical characteristics are identified by the symbol (C) and major characteristics by the symbol (M). The number following the classification symbol indicates the serial number of the test or examination. Tests and examinations which are not annotated with a classification code are classified minor.

4.4 Chemical composition.

4.4.1 Sampling. At least five samples shall be selected for check chemical analysis to represent the heat in the lot. Failure of the samples to meet requirements of 3.2 shall be cause for rejection of the lot represented. Check chemical analysis may be waived provided that all of the material in the lot can be identified as being made from a heat previously analyzed and found to conform to the chemical composition specified herein.

4.4.2 Method. Specimens shall be prepared in accordance with ASTM E1282 and shall be tested by wet chemical methods in accordance with ASTM E350.

4.5 Grain size.

4.5.1 Sampling. Grain size shall be determined on a billet before piercing, hot working, or cold drawing. One or more samples shall be selected from one or more billets used in making the tubing lot and suitable for determining the grain size. Failure of the sample to meet the requirements of 3.3 shall be cause for rejection of the lot represented.

4.5.2 Method. Specimens shall be taken one-half way between the center and outside of the billet. The specimens shall be approximately 1 inch square or round and normalized at 1650 °F. The specimens shall be prepared and the grain size determined in accordance with ASTM E112.

4.6 Mechanical properties.

4.6.1 Sampling. At least one tensile test sample shall be selected from each 1000 feet or less of each lot for determination of mechanical properties. Failure of the sample to meet the requirements of 3.4 shall be cause for rejection of the lot represented.

4.6.2 Method. Specimens shall be prepared and tested in accordance with ASTM E8/E8M.

4.7 Dimensions. Dimensions shall be verified using standard measuring instruments whose calibration is managed by a calibration system compliant with ANSI/NCSL Z540.3 or a government-approved equivalent.

4.8 Tolerances. The tolerances shall be verified using standard measuring instruments whose calibration is managed by a calibration system compliant with ANSI/NCSL Z540.3 or a government-approved equivalent.

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4.9 Hydrostatic test. All tubing shall be subjected to the minimum hydrostatic pressure specified (see 6.2). The test shall be performed on tubing lengths up to 12 feet. The outside diameter of each test length shall be gauged in the same location before and after application of the specified pressure. Failure of the tubing to meet the requirements of 3.7 shall be cause for rejection of the lot.

4.10 Marking. The marking requirements of 3.8 shall be verified by visual inspection.

4.11 Workmanship. All tubing shall be visually examined for compliance with surface conditions and workmanship requirements.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When 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's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. 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 seamless alloy steel tubing covered by this specification is manufactured into primer tubes subjected by explosive charges to high internal gas pressures of short duration. Since the primer tubes are manufactured for use in U. S. Navy gun ammunition, there is no commercial application.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Grade of material (see 1.2).
- c. Dimensions (see 3.5).
- d. Quantity and lengths.
- e. Tolerances, if other than specified in 3.6.
- f. Hydrostatic test pressure (see 3.7, 4.9, and 6.3).
- g. Conformance inspection levels, if other than specified in 4.1.
- h. Packaging, if other than specified in 5.1 and 6.4.2.
- i. Preservation, if other than specified in 6.4.1.

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6.3 Hydrostatic test fiber stress. The pressure criteria for the hydrostatic test is as specified (see 6.2.f). It is intended that the tubes covered by this specification be subjected by the hydrostatic pressure test to a fiber stress no greater than 75,000 pounds per square inch as calculated from the following formula:

$$S = P \frac{b^2 + a^2}{b^2 - a^2}$$

Where:

S=Fiber stress in pounds per square inch

P=Hydrostatic test pressure in pounds per square inch

b=Outside radius of the tube in inches

a=Inside radius of the tube in inches

6.3.1 Rejection due to failing hydrostatic test. Failure of hydrostatic test should be cause for rejection of the tubing lot. The Government may waive rejection of this CRITICAL requirement if a subsequent investigation into the failure is able to determine that a) the root cause for the failure is isolated to the tubing that failed, and b) the tubing otherwise meets all of the requirements of the contract and this specification, and c) sufficient measures are in place to prevent defective tubing from this lot from being used in a gun primer.

6.4 Packaging.

6.4.1 Preservation. Unless otherwise specified (see 6.2), all tubing should be coated inside and outside with corrosion preventive compound conforming to MIL-PRF-16173, which should be diluted 50 percent, by volume, with the solvent specified in paragraph entitled "Solvent" of MIL-PRF-16173.

6.4.2 Packing. Unless otherwise specified (see 6.2), tubing should be packed in accordance with ASTM A700. When tubing is procured for receipt, storage, and issue by a Department of Defense facility, marking of the packaging should be in accordance with MIL-STD-129.

6.5 Definitions. For definitions of terms relating to metals and metal-working, refer to MIL-HDBK-723.

6.6 Subject term (key word) listing.

Primer tubes

U.S. Navy Ammunition

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

Preparing Activity:
Navy – OS
(Project 4710-2011-002)

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>.