

MIL-T-15119A(OS)  
 20 October 1976  
 SUPERSEDING  
 MIL-T-15119(BUOrd)  
 21 March 1950 and  
 Amendment 1  
 29 June 1962

## MILITARY SPECIFICATION

### TUBING; ROUND, SEAMLESS ALLOY STEEL

This specification is approved for use by the Naval Sea Systems Command (OS), 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 shall be of the following grades, as specified (see 3.2):

Grade A - No. 4130  
 Grade B - No. 8630

#### 2. APPLICABLE DOCUMENTS

2.1 The following documents of the issues in effect on date of invitation for bids or request for proposals form a part of this specification to the extent specified herein. In the event of conflict between this specification and other documents referenced herein, the requirements of this specification shall apply.

#### SPECIFICATIONS

##### Military

MIL-H-6875	Heat Treatment of Steels (Aircraft Practice), Process for
MIL-C-16173	Corrosion Preventive Compound, Solvent Cutback, Cold Application

#### STANDARDS

##### Federal

FED-STD-151	Metal, Test Methods
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Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Ordnance Station, Standardization Division (611), Indian Head, MD 20640, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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FED-STD-183	Continuous Identification of Iron and Steel Products
<u>Military</u>	
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-163	Steel Mill Products, Preparation for Shipment and Storage

## PUBLICATIONS

Naval Sea Systems Command (Code Ident 10001)

WR-43                      Preparation of Quality Assurance Provisions

(Copies of specifications, standards, 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 proposals shall apply. In the event of conflict between this specification and other documents referenced herein, requirements of this specification shall apply.

American Society for Testing and Materials (ASTM) Standards

ASTM E 8                      Tension Testing of Metallic Materials

ASTM E 112                   Estimating the Average Grain Size of Materials

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

Aerospace Material Specifications

AMS 2253                      Tolerances Carbon and Alloy Steel Tubing

(Application for copies should be addressed to Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.)

## 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.

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TABLE I  
CHEMICAL COMPOSITION I

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
Phosphorus	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

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 the specified range. The average of all the separate determinations shall be within the specified range.

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3.2 Chemical Composition (MI02). The chemical composition of the steel shall be as specified in Table I. Either grade is acceptable.

3.3 Grain Size (MI03). 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 on a billet before piercing, hot working, or cold drawing.

3.4 Heat treatment (MI04). After the last cold draw pass, the tubing shall be heat treated in accordance with MIL-H-6875 to produce the mechanical properties listed in Table II.

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 (MI05). The tubing dimensions shall be as specified in the contract or purchase order (see 6.2 and 6.4).

3.6 Tolerances (MI06). Unless otherwise specified (see 6.2), the permissible variations in dimensions shall be as specified in AMS 2253.

3.7 Hydrostatic test (CI). The tubing shall not break or permanently increase in diameter more than 0.003 inch when subjected to the hydrostatic test of 4.9.

3.8 Marking. All tubing shall be marked in accordance with FED-STD-183.

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 imperfections is not required.

#### 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 other 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.

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4.2 Quality conformance inspection. The examination and testing of tubing shall be classified as quality conformance inspection.

4.3 Lot. A lot shall consist of homogeneous tubing produced from the same heat and the same heat treatment.

4.4 Classification of characteristics. The characteristics verified by the tests and examinations herein are classified as critical, major, or minor in accordance with WR 43. 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.

#### 4.5 Examinations.

4.5.1 Examinations of product. All tubing shall be visually examined for compliance with surface conditions and workmanship requirements. Samples shall be selected in accordance with MIL-STD-105, AQL 1.0%, and examined to assure compliance with specified dimensions and tolerances and identification marking requirements.

4.5.2 Examination of preparation for delivery. Preparation for delivery of all tubing shall be examined for conformance to the requirements of Section 5.

#### 4.6 Chemical analysis.

4.6.1 Sampling. At least five samples shall be selected for check chemical analysis in accordance with FED-STD-151 to represent the heat in the lot. Failure of the samples to meet the 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.

4.6.2 Method. Specimens shall be prepared in accordance with Methods 111.2 or 112.2 of FED-STD-151 and shall be tested by wet chemical or spectrochemical methods. In the event of dispute, analysis shall be by wet chemical methods.

#### 4.7 Tensile test.

4.7.1 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.

4.7.2 Method. Specimens shall be prepared and tested in accordance with ASTM E 8.

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4.8 Grain size.

4.8.1 Sampling. 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.

4.8.2 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.

4.9 Hydrostatic test. All tubing shall be subjected to the minimum hydrostatic pressure specified in the contract or purchase order (see 6.2). The test shall be performed on tubing lengths up to 12 feet. The outside diameter of each test length shall be gaged 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.

## 5. PACKAGING

5.1 Preservation. Unless otherwise specified, all tubing shall be coated inside and outside with corrosion preventive compound conforming to MIL-C-16173, which shall be diluted 50%, by volume, with the solvent specified in paragraph entitled "Solvent" of MIL-C-16173.

5.2 Packing. Unless otherwise specified, tubing shall be packed in accordance with MIL-STD-129.

## 6. NOTES AND CONCLUDING MATERIAL

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.

6.2 Ordering data. Procurement documents should specify:

- a. Title, number, and date of this specification
- b. Dimensions (see 3.5)
- c. Quantity and lengths
- d. Level of packaging, if other than level A
- e. Preservation, if other than specified in 5.1
- f. Tolerances, if other than specified in 3.6
- g. Hydrostatic test pressure (see 4.9 and 6.3).

6.3 Hydrostatic test fiber stress. 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:

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

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.

6.4 New designs. For new designs, standard wall thicknesses and diameters specified in AND 10102 should be used where possible.

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

6.6 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.

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NAVY-OS

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