Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5077C
Superseding AMS 5077B
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UNS G10250

STEEL TUBING, WELDED
(0.22 - 0.28C) (SAE 1025)

1. SCOPE:

1.1 Form: This specification covers a low-carbon steel in the form of welded tubing.

1.2 Application: Primarily for parts requiring moderate-strength, welded tubing suitable for forming and for welding and brazing.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2253 - Tolerances, Carbon and Alloy Steel Tubing
AMS 2259 - Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2350 - Standards and Test Methods
AMS 2370 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Wrought Products Except Forgings and Forging Stock

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E8 - Tension Testing of Metallic Materials
ASTM E350 - Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

Printed in U.S.A.

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E350, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
Carbon	0.22	0.28
Manganese	0.30	0.60
Phosphorus	--	0.040
Sulfur	--	0.050
Silicon	0.10	0.30

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2259.

3.2 Condition: As welded, normalized, or stress relieved, having a uniform fine grain size in all parts of the tubing.

3.2.1 Fabrication:

3.2.1.1 Tubing shall be produced by electrical-resistance, shielded-metal-arc, or gas welding the edges of formed sheet or strip.

3.2.1.2 Any surface finishing operation applied to remove objectionable pits and surface blemishes shall be performed prior to normalizing or stress relieving. A light polish to improve surface appearance may be employed after normalizing or stress relieving.

3.3 Properties: Tubing shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E8:

Tensile Strength, min	55,000 psi (379 MPa)
Yield Strength at 0.2% Offset, min	36,000 psi (248 MPa)
Elongation in 2 in. (50.8 mm), min	
Full Tube	22%
Strip Specimen	15%

3.3.1.1 For each 2,000 psi (13.8 MPa) in excess of 55,000 psi (379 MPa) tensile strength, a reduction shall be allowed in elongation of 1% to a minimum elongation of 10% for full tube specimens or to a minimum elongation of 8% for strip specimens.

3.3.2 Response to Heat Treatment: Tubing shall develop the tensile properties specified in 3.3.1 when normalized by heating to 1625° F ± 10 (885° C ± 6) and cooling in still air.

3.3.3 Crushing Test: Specimens of tubing shall withstand without failure of the weld, crushing, lengthwise under a gradually applied load until the cross-sectional dimension is increased in one zone by 20%, or until one complete fold is formed, or until the specimen is reduced in length to 2/3 of its original length.

3.4 Quality: Tubing shall be uniform in quality and condition and shall have a finish conforming to the best practice for high quality tubing. It shall be smooth and free from heavy scale or oxide, burrs, seams, tears, grooves, laminations, slivers, pits, and other injurious conditions. Surface imperfections such as handling marks, straightening marks, light mandrel and die marks, shallow pits, and scale pattern will not be considered injurious if the imperfections are removable within the tolerances specified for wall thickness but removal of such surface imperfections is not required.

3.4.1 Each length of tubing shall be subjected to a nondestructive test by the tube manufacturer for the detection of injurious imperfections. The method of testing shall be capable of detecting all imperfections, internal or external, having a length greater than 1/16 in. (1.6 mm) and a total depth equivalent to one-half the nominal wall thickness of the tubing.

3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight tubing will be acceptable in mill lengths of 6 - 20 ft (1.8 - 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.6 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2253; flash tolerances shall conform to the following:

3.6.1 The maximum height of the ID welding flash shall not exceed 60% of the nominal wall thickness, but in no case shall it be greater than 0.047 in. (1.19 mm).

3.6.2 Tubing 1-1/8 in. (28.6 mm) and over in nominal OD, when ordered flash removed, shall have no flash height exceeding 0.010 in. (0.25 mm).

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of tubing shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the tubing conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests.

4.3 Sampling: Shall be in accordance with AMS 2370 and the following:

4.3.1 One or more specimens for crushing test shall be selected from each 1,000 ft (305 m) or less from each lot of tubing in the shipment. Specimens shall be full cross-section of the tube, with the length equal to 1-1/2 times the nominal OD; the ends shall be perpendicular to the axis.

4.4 Reports:

4.4.1 The vendor of tubing shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of each heat and for tensile properties of each size from each heat and stating that the tubing conforms to the other technical requirements of this specification. The report shall include the purchase order number, material specification number and its revision letter, size, and quantity from each heat.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of tubing, part number, and quantity. When tubing for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of tubing to determine conformance to the requirements of this specification, and shall include in the report a statement that the tubing conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2370.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Tubing shall be identified as follows: