SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5077F

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Superseding AMS 5077E

Steel Tubing, Welded
(0.22 - 0.28C) (SAE 1025)
Normalized or Stress Relieved

(Composition similar to UNS G10250)

1. SCOPE:

1.1 Form:

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

1.2 Application:

This tubing has been used typically for parts requiring a moderate-strength tubing suitable for forming and for welding and brazing, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2253	Tolerances, Carbon and Alloy Steel Tubing
MAM 2253	Tolerances, Metric, Carbon and Alloy Steel Tubing
AMS 2259	Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2370	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock
AMS 2807	Identification, Carbon and Low-Alloy Steels, Corrosion and Heat Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)
ASTM E 350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 350, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

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

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

3.2 Condition:

Normalized or stress relieved.

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:

3.3.1 Tensile Properties: Shall be as shown in Table 2, determined in accordance with ASTM E 8 or ASTM E 8M:

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	55 ksi (379 MPa)
Yield Strength at 0.2% Offset	36.0 ksi (248 MPa)
Elongation in 2 Inches (50.8 mm)	
Full Tube	22%
Strip Specimen	15%

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

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

3.3.3 Crushing Test: Specimens as in 4.3.1 shall withstand, without failure of the weld, crushing axially 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 two-thirds of the original length.

3.4 Quality:

Tubing, as received by purchaser, shall be uniform in quality and condition and shall have a finish conforming to the best practice for high-quality aircraft tubing. It shall be smooth and free from heavy scale or oxide, burrs, seams, tears, grooves, laminations, slivers, pits, and other imperfections detrimental to usage of the tubing. 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 imperfections is not required.

3.4.1 Each length of tubing shall be subjected to a nondestructive test by the tube manufacturer for detection of injurious imperfections. Internal or external imperfections, determined by such nondestructive test, having a length greater than 1/16 inch (1.6 m) and a total depth equivalent to, or greater than, one-half the nominal wall thickness of the tubing are not acceptable.

3.5 Tolerances:

Shall conform to all applicable requirements of AMS 2253 or MAM 2253 and the following:

3.5.1 The 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 inch (1.19 mm).

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

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the tubing shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and perform any confirmatory testing deemed necessary to ensure that the tubing conforms to specified requirements.

4.2 Classification of Tests:

All technical requirements of this specification are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2370 and the following:

4.3.1 At least one sample for crushing test (3.3.3) shall be selected from each 1,000 feet (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 approximately 1-1/2 times the nominal OD; the ends of the specimen shall be perpendicular to the axis.

4.4 Reports:

The vendor of tubing shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for tensile properties and of each lot, method and results of nondestructive testing and stating that the tubing conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS 5077F, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2370.