



AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.

400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

SPECIFICATION

AMS 5585A

Superseding AMS 5585

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UNS R30155

ALLOY TUBING, WELDED, CORROSION AND HEAT RESISTANT

32Fe - 21Cr - 20Ni - 20Co - 3Mo - 2.5W - 1.0(Cb+Ta) - 0.15N

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant iron alloy in the form of welded tubing.

1.2 Application: Primarily for parts and assemblies requiring high strength up to approximately 1500°F (815°C) and oxidation resistance up to 1800°F (982°C).

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 2243 - Tolerances, Corrosion and Heat Resistant Steel Tubing

AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys

AMS 2350 - Standards and Test Methods

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings

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 E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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

3. TECHNICAL REQUIREMENTS:

SAE Technical Board rules provide that: "All technical reports, including standards, approved by the Board, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

- 3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
Ø Carbon	0.08	0.16
Manganese	1.00	2.00
Silicon	--	1.00
Phosphorus	--	0.030
Sulphur	--	0.030
Chromium	20.00	22.50
Nickel	19.00	21.00
Cobalt	18.50	21.00
Molybdenum	2.50	3.50
Tungsten	2.00	3.00
Columbium + Tantalum	0.75	1.25
Nitrogen	0.10	0.20
Copper	--	0.50
Iron	remainder	

- Ø 3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

- 3.2 Condition: Solution heat treated and descaled.

- 3.3 Fabrication: Tubing shall be produced by a welded and drawn process. Any surface finishing operation applied to remove objectionable pits and surface blemishes shall be performed prior to final solution heat treatment. A light polish to improve surface appearance may be employed after solution heat treatment. Passivation treatment shall follow any polishing treatment.

- 3.4 Solution Heat Treatment: Tubing shall be solution heat treated by heating to $2150^{\circ}\text{F} \pm 25$ ($1177^{\circ}\text{C} \pm 15$) in a suitable protective atmosphere, holding at heat for not less than 15 min., and cooling in air.

- 3.5 Properties: Tubing shall conform to the following requirements:

- Ø 3.5.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E8:

Tensile Strength	100,000 - 140,000 psi (690 - 965MPa)
Elongation in 2 in. (50.8 mm)	
Strip	35%
Full Section, tubing OD 0.625 in. (15.88 mm) and over	40%
Full Section, tubing OD under 0.625 in. (15.88 mm)	30%

- 3.5.2 Flarability: Tubing shall withstand flaring at room temperature, without formation of cracks or other visible defects, by being forced axially with steady pressure over a hardened and polished tapered steel pin having a 74 deg (1.29 rad) included angle, to produce a flare having the permanent expanded OD not less than that specified in Table I.

TABLE I

Nominal OD Inches	Expanded OD Inches	Nominal OD Inches	Expanded OD Inches
0.188	0.290	0.750	0.937
0.250	0.359	1.000	1.187
0.312	0.421	1.250	1.500
0.375	0.484	1.500	1.721
0.500	0.656	1.750	2.106
0.625	0.781	2.000	2.356

TABLE I (SI)

Nominal OD Millimetres	Expanded OD Millimetres	Nominal OD Millimetres	Expanded OD Millimetres
4.78	7.37	19.05	23.80
6.35	9.12	25.40	30.15
7.92	10.69	31.75	38.10
9.52	12.29	38.10	43.71
12.70	16.66	44.45	53.49
15.88	19.84	50.80	59.84

- 3.5.2.1 Tubing with nominal OD between any two standard sizes given in 3.5.2 shall take the same percentage flare as shown for the larger of the two sizes.
- 3.5.2.2 Tubing with nominal OD greater than 2.000 in. (50.80 mm) or less than 0.188 in. (4.78 mm) shall have flareability as agreed upon by purchaser and vendor.
- 3.5.3 Pressure Testing: Tubing shall show no bulges, leaks, or other defects when subjected to an internal hydrostatic pressure, based on nominal dimensions, sufficient to cause a tensile stress of 20,000 psi (138 MPa) in the tubing wall.
- 3.6 Quality:
- 3.6.1 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.
- 3.6.2 If beads are present at the welds on the inner surface of the tubing, such beads shall be not thicker than 0.010 in. (0.25 mm) unless otherwise specified. The outer surfaces of the tubing shall be free from beads.
- 3.7 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).
- 3.8 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2243.

4. QUALITY ASSURANCE PROVISIONS: