



<b>AEROSPACE MATERIAL SPECIFICATION</b>	<b>AMS6360™</b>	<b>REV. P</b>
	Issued	1939-12
	Revised	2018-08
Superseding AMS6360N		
<p>Steel Tubing, Seamless  0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130)  Normalized or Stress Relieved  (Composition similar to UNS G41300)</p>		

## RATIONALE

AMS6360P adds the silicon range in Table 1 that was inadvertently removed in AMS6360N.

AMS6360N resulted from a Five-Year Review and update of this specification that revised composition testing analytical methods (3.1), grain size determination (3.1.1 and 3.3.2), tensile testing strain rates (3.3.1.1), decarburization determination (3.3.3), reporting (4.4) and identification (5.2).

### 1. SCOPE

#### 1.1 Form

This specification covers an aircraft-quality, low-alloy steel in the form of seamless tubing.

#### 1.2 Application

This tubing has been typically used in thin-walled sections where minimum tensile strength up to 160 ksi (1103 MPa) is required and where parts may be welded during fabrication, 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 cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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## 2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

AMS2253	Tolerances, Carbon and Alloy Steel Tubing
AMS2259	Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS2301	Steel Cleanliness, Aircraft Quality, Magnetic Particle Inspection Procedure
AMS2370	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock
AMS2807	Identification, Carbon and Low-Alloy Steels, Corrosion and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications

## 2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, [www.astm.org](http://www.astm.org).

ASTM A370	Mechanical Testing of Steel Products
ASTM A751	Standard Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
ASTM E112	Determining Average Grain Size
ASTM E384	Microindentation Hardness of Materials
ASTM E1077	Standard Test Methods for Estimating the Depth of Decarburization of Steel Specimens
ASTM E1444	Magnetic Particle Testing

## 3. TECHNICAL REQUIREMENTS

### 3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM A751 or by other analytical methods acceptable to purchaser.

**Table 1 - Composition**

Element	Min	Max
Carbon	0.28	0.33
Manganese	0.40	0.60
Silicon	0.15	0.35
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	0.80	1.10
Molybdenum	0.15	0.25
Nickel	--	0.25
Copper	--	0.35

3.1.1 Aluminum, vanadium, and columbium are optional grain refining elements and need not be determined or reported unless used to satisfy the average grain size requirements of 3.3.2.2.

### 3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2259.

### 3.2 Condition

The tubing shall be supplied cold finished and either normalized and tempered, stress relieved, or otherwise heat treated.

### 3.3 Properties

Tubing shall conform to the following requirements; tensile testing shall be performed in accordance with ASTM A370:

#### 3.3.1 Tensile Properties

Shall be as shown in Table 2.

**Table 2**

**Table 2A - Minimum tensile properties, inch/pound units**

Nominal OD Inch	Nominal Wall Thickness Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches % Full Tube	Elongation in 2 Inches % Strip
Up to 0.500, excl	Up to 0.188, incl	95	75	10	-
Up to 0.500, excl	Over 0.188	90	70	10	-
0.500 and over	Up to 0.188, incl	95	75	12	7
0.500 and over	Over 0.188	90	70	15	10

**Table 2B - Minimum tensile properties, SI units**

Nominal OD Millimeters	Nominal Wall Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm % Full Tube	Elongation in 50.8 mm % Strip
Up to 12.70, excl	Up to 4.78, incl	655	517	10	-
Up to 12.70, excl	Over 4.78	621	483	10	-
12.70 and over	Up to 4.78, incl	655	517	12	7
12.70 and over	Over 4.78	621	483	15	10

3.3.1.1 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of  $\pm 0.002$  in/in/min ( $0.002$  mm/mm/min) through 0.2% offset yield strain. After the yield strain, the speed of the testing machine shall be set between 0.05 and 0.5 in/in (mm/mm) of the length of the reduced section (or distance between the grips for specimens not having a reduced section) per minute. Alternatively, an extensometer and strain rate indicator may be used to set the strain rate between 0.05 and 0.5 in/in/min (mm/mm/min).

#### 3.3.2 Average Grain Size

Average grain size shall be determined by either 3.3.2.1 or 3.3.2.2.

3.3.2.1 Shall be ASTM No. 5 or finer, determined in accordance with ASTM E112.

3.3.2.2 The product of a heat shall be considered to have an ASTM No. 5 or finer austenitic grain size if one or more of the following are determined by heat analysis (see 8.5):

3.3.2.2.1 A total aluminum content of 0.020 to 0.050%.

3.3.2.2.2 An acid soluble aluminum content of 0.015 to 0.050%.