



<b>AEROSPACE MATERIAL SPECIFICATION</b>	<b>AMS5022™</b>	<b>REV. P</b>
	Issued 1940-01 Revised 2001-01 Noncurrent 2006-08 Reaf. Noncur. 2015-12 Stabilized 2020-04  Superseding AMS5022N	
Steel, Bars, Forgings, and Tubing, Free-Cutting 0.14 - 0.20C (SAE 1117)		UNS G11170

**RATIONALE**

AMS5022P has been stabilized as mature technology.

**STABILIZED NOTICE**

AMS5022P has been declared "STABILIZED" by SAE AMS Committee E Carbon and Low Alloy Steels. This document will no longer be updated and may no longer represent standard industry practice. This document was stabilized because this document is no longer state of the art and other documents contain similar but not necessarily equivalent requirements. Previously this document was Non-Current. The last technical update of this document occurred in January 2001. Users of this document should refer to the cognizant engineering organization for disposition of any issues with reports/certifications to this specification; including exceptions listed on the certification. NOTE: In many cases, the purchaser may represent a sub tier supplier and not the cognizant engineering organization.

AMS Committee E recommends that the following similar but not identical specifications may be considered for future procurement. This listing does not constitute authority to substitute these specifications for the "STABILIZED" specification.

ASTM A29/A29M Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for

ASTM A108 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

ASTM A510 Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

ASTM A512 Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing

ASTM A521 Standard Specification for Steel, Closed-Impression Die Forgings for General Industrial Use

ASTM A576 Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality

ASTM A711 Standard Specification for Steel Forging Stock

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<https://www.sae.org/standards/content/AMS5022P/>

## 1. SCOPE:

### 1.1 Form:

This specification covers a carbon steel in the form of bars, forgings, mechanical tubing, and stock for forging or heading.

### 1.2 Application:

These products have been used typically for parts requiring good machinability and response to carburizing heat treatment, 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 2231	Tolerances, Carbon Steel Bars
MAM 2231	Tolerances, Metric, Carbon Steel Bars
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 Steels, Wrought Products and Forging Stock
AMS 2372	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Forgings
AMS 2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat Resistant Steels and Alloys
AMS 2808	Identification, Forgings

### 2.2 ASTM Publications:

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

ASTM E 10	Brinell Hardness of Metallic Materials
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	0.14	0.20
Manganese (3.1.1)	1.00	1.30
Phosphorus	--	0.040
Sulfur	0.08	0.13

3.1.1 When agreed upon by purchaser and vendor, manganese may be as high as 1.60.

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

#### 3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Bars and Mechanical Tubing 2.50 Inches (63.5 mm) and Under in Nominal Diameter or Least Distance Between Parallel Sides: Cold finished, suitable for machining on high speed automatic screw machines.

3.2.2 Rounds Over 2.50 to 6.25 Inches (63.5 to 158.8 mm), Inclusive, in Nominal Diameter and Hexagons Over 2.50 to 3.125 Inches (63.5 to 79.38 mm), Inclusive, in Nominal Distance Between Parallel Sides: Cold finished, suitable for machining on high speed automatic screw machines, or, when specified, hot finished and normalized or otherwise heat treated to produce best machining qualities.

3.2.3 Rounds Over 6.25 Inches (158.8 mm), Hexagons Over 3.125 Inches (79.38 mm), Bars Other than Rounds and Hexagons Over 2.50 Inches (63.5 mm), and Mechanical Tubing Over 2.50 Inches (63.5 mm) in Nominal OD or Least Distance Between Parallel Sides: Hot finished and normalized or otherwise heat treated to produce best machining qualities.

3.2.4 Forgings: Normalized or otherwise heat treated to produce best machining qualities.

3.2.5 Stock for Forging or Heading: As ordered by the forging or heading manufacturer.

### 3.3 Properties:

The product shall conform to the following requirements:

3.3.1 Hardness: Shall be as follows, or equivalent (See 8.2), determined in accordance with ASTM E 10 on the surface except on rounds where a flat as necessary for Brinell accuracy may be made:

#### 3.3.1.1 Bars:

##### 3.3.1.1.1 Cold Finished:

TABLE 2

Nominal Diameter or Least Distance Between Parallel Sides Inches	Nominal Diameter or Least Distance Between Parallel Sides Millimeters	Brinell Hardness min	Brinell Hardness max
Up to 1.00, excl	Up to 25.4, excl	156	207
1.00 to 6.25, incl	25.4 to 158.8, incl	143	207

##### 3.3.1.1.2 Hot Finished:

TABLE 3

Nominal Diameter or Least Distance Between Parallel Sides Inches	Nominal Diameter or Least Distance Between Parallel Sides Millimeters	Brinell Hardness min	Brinell Hardness max
Over 2.50	Over 6.35	--	179

#### 3.3.1.2 Mechanical Tubing:

TABLE 4

Nominal OD Inches	Nominal OD Millimeters	Brinell Hardness min	Brinell Hardness max
Up to 1.00, excl	Up to 25.4, excl	156	248
1.00 to 2.50, incl	25.4 to 63.5, incl	143	248
Over 2.50	Over 63.5	--	179

3.3.1.3 Forgings: Not higher than 179 HB, or equivalent (See 8.2).

### 3.4 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, sound, and consistent with the type of steel involved, free from foreign materials and from imperfections detrimental to usage of the product.

### 3.5 Tolerances:

Shall conform to all applicable requirements of the following:

3.5.1 Bars: AMS 2231 or MAM 2231.

3.5.2 Mechanical Tubing: AMS 2253 or MAM 2253.

## 4. QUALITY ASSURANCE PROVISIONS:

### 4.1 Responsibility for Inspection:

The vendor of the product 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 to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

### 4.2 Classification of Tests:

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

### 4.3 Sampling and Testing:

Shall be in accordance with the following:

4.3.1 Bars, Mechanical Tubing and Forging or Heading Stock: In accordance with AMS 2370

4.3.2 Forgings: In accordance with AMS 2372

### 4.4 Reports:

The vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for hardness of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS 5022P, size, and quantity. If forgings are supplied, the size and melt source of stock used to make the forgings shall also be included.