Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE MATERIAL SPECIFICATION

AMS 5070D
Superseding AMS 5070C
Issued 3-1-42
Revised 5-15-73

STEEL BARS AND FORGINGS
(0.18 - 0.23C) (SAE 1022)

1. SCOPE:

1.1 FORM: This specification covers a carbon steel in the form of bars, forgings, and forging stock.

1.2 APPLICATION: Primarily for parts requiring a material of low strength and high ductility.

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., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2231 - Tolerances, Carbon Steel Bars
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
AMS 2372 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Forgings and Forging Stock
AMS 2808 - Identification, Forgings

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

ASTM A370 - Mechanical Testing of Steel Products
ASTM E112 - Estimating Average Grain Size of Metals
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, Pennsylvania 19120.

2.3.1 Federal Standards:

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

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:

Printed in U.S.A.

	min	max
Carbon	0.18	0.23
Manganese (3.1.1)	0.70	1.00
Phosphorus	--	0.040
Sulfur	--	0.050
Silicon	0.15	0.30

3.1.1 When permitted by purchaser, manganese may be as low as 0.30.

3.1.2 Check Analysis: Composition variations shall meet the requirements of AMS 2259, paragraph titled, "Carbon Steels".

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Bars: Cold finished.

3.2.2 Forgings: Normalized.

3.2.3 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties: Bars and forgings shall conform to the following requirements; tensile testing shall be performed in accordance with ASTM A370:

3.3.1 Tensile Properties: Shall be as follows:

3.3.1.1 Bars:

TABLE I

Nominal Diameter or Distance Between Parallel Sides Inches	Tensile Strength psi, min	Yield Strength 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
Up to 0.875, incl	70,000	60,000	18
Over 0.875 to 1.250, incl	65,000	55,000	16
Over 1.250 to 2.000, incl	60,000	50,000	15
Over 2.000 to 3.000, incl	55,000	45,000	15
Over 3.000		As agreed upon	

TABLE I (SI)

Nominal Diameter or Distance Between Parallel Sides Millimeters	Tensile Strength MPa, min	Yield Strength 0.2% Offset MPa, min	Elongation 50.8 mm or 4D %, min
Up to 22.22, incl	483	414	18
Over 22.22 to 31.75, incl	448	379	16
Over 31.75 to 50.80, incl	414	345	15
Over 50.80 to 76.20, incl	379	310	15
Over 76.20		As agreed upon	

3.3.1.2 Forgings:

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) or 4D, min	22%

3.3.1.2.1 For each 2000 psi (13.8 MPa) in excess of 55,000 psi (379 MPa) tensile strength, a reduction in elongation of 1% to a minimum elongation of 10% shall be allowed.

3.3.2 Grain Size: Predominantly 4 or finer with occasional grains as large as 2 permissible, ASTM E112, McQuaid-Ehn test.

3.4 Quality: The product shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, bars 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 for bars shall conform to all applicable requirements of AMS 2231.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product 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 assure that the product 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 or routine control tests.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Bars: AMS 2370.

4.3.2 Forgings and Forging Stock: AMS 2372.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition and grain size of each heat in the shipment and for tensile properties of each size from each heat. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat. If forgings are supplied, the part number and the size and melt source of stock used to make the forgings shall also be included.

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 material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.