

AEROSPACE

MATERIAL SPECIFICATIONS

AMS 6446

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Revised

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

STEEL BARS AND FORGINGS
1.05Cr (0.95 - 1.10C) (SAE 51100)
Premium Quality

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. FORM: Bars, wire, forgings, and forging stock.
3. APPLICATION: Primarily for parts of small cross section, requiring a through-hardening steel usually with hardness of approximately Rockwell C 60 and which are subject to very rigid inspection standards.
4. COMPOSITION:

Carbon	0.95 - 1.10
Manganese	0.25 - 0.45
Silicon	0.20 - 0.35
Phosphorus	0.025 max
Sulfur	0.025 max
Chromium	0.90 - 1.15
Nickel	0.25 max
Molybdenum	0.10 max
Copper	0.25 max

- 4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2259, paragraph titled "Low Alloy Steels."

5. CONDITION:

- 5.1 Bars and Wire: Unless otherwise specified, bars and wire shall be supplied in a machinable condition, with microstructure of spheroidized cementite in ferrite matrix, and having hardness not higher than Brinell 207 or equivalent except that bars and wire ordered cold finished may have hardness as high as Brinell 248 or equivalent.

- 5.2 Forgings: As ordered.

- 5.3 Forging Stock: As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

- 6.1 Decarburization:

- 6.1.1 Bars and wire ordered ground, turned, or polished shall be free from decarburization on the ground, turned, or polished surfaces.
- 6.1.2 Allowable decarburization of bars and wire ordered for redrawing or forging, or to specified microstructural requirements, shall be as agreed upon by purchaser and vendor.

- 6.1.3 Decarburization of bars and wire to which 6.1.1 or 6.1.2 is not applicable shall be not greater than the following:

Nominal Diameter or Distance Between Parallel Sides Inches	Depth of Decarburization Inch
Up to 0.50, incl	0.015
Over 0.50 to 1.00, incl	0.020
Over 1.00 to 1.50, incl	0.025
Over 1.50 to 2.00, incl	0.030
Over 2.00 to 2.50, incl	0.035
Over 2.50 to 3.00, incl	0.040

- 6.1.4 Unless otherwise agreed upon by purchaser and vendor, decarburization shall be measured by Rockwell Superficial 30-N scale hardness method, or by equivalent hardness testing method, on hardened but untempered specimens protected during heat treatment to prevent changes in surface carbon content. Depth of decarburization, when measured by a hardness method, is defined as the perpendicular distance from the surface to the non-decarburized depth under that surface below which there is no further increase in hardness; such measurements shall be far enough away from any adjacent surface to be uninfluenced by any decarburization or lack of decarburization thereon.
- 6.1.5 When determining the depth of decarburization, it is permissible to disregard local areas provided the decarburization of such areas does not exceed the above limits by more than 0.005 in. and the width is 0.065 in. or less.

6.2 Inclusion Rating:

- 6.2.1 Fracture Test: The producer of the material shall prepare specimens, approximately 0.375 in. in thickness, cut from and representing the cross section of forging stock from the top and bottom of at least the first ingot, middle ingot, and last usable ingot. These ingots shall be the product of a single air melt heat or a master heat. A master heat shall be defined as the metal produced from the same lot of controlled raw material. These specimens shall be normalized, annealed, hardened, and fractured. The fractured specimens shall show freedom from pipe, porosity, excessive segregation, and injurious inclusions. The fractured surfaces shall show no non-metallic streaks over 1/16 in. in length and not more than one non-metallic 1/32 - 1/16 in. in length shall be permitted for each 10 sq in. or fraction thereof of such surfaces.
7. QUALITY: Steel shall be premium quality and shall conform to the requirements of the latest issue of AMS 2300. The product shall be uniform in quality and condition, clean, sound, and free from foreign material and from internal and external imperfections detrimental to fabrication or to performance of parts.
8. TOLERANCES: Unless otherwise specified, tolerances shall conform to all applicable requirements of the latest issue of AMS 2251; for all hexagons, tolerances for cold finished shall apply.