

AEROSPACE

MATERIAL SPECIFICATIONS

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

AMS 6488

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Revised

STEEL BARS AND FORGINGS

5.0Cr - 1.3Mo - 0.50V (0.38 - 0.43C)
Premium Quality

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. FORM: Bars, forgings, and forging stock.
3. APPLICATION: Primarily for parts requiring premium quality steel with relatively high levels of strength, fatigue resistance, toughness, ductility, and thermal stability for operation between -100 F (-75 C) and 1000 F (540 C), and where such parts may require welding.

4. COMPOSITION:

Carbon	0.38 - 0.43
Manganese	0.20 - 0.40
Silicon	0.80 - 1.00
Phosphorus	0.015 max
Sulfur	0.015 max
Chromium	4.75 - 5.25
Molybdenum	1.20 - 1.40
Vanadium	0.40 - 0.60

- 4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2248; check analysis limits for vanadium shall be 0.04 under min or over maximum.

5. CONDITION:

- 5.1 Bars: In a machinable condition and hot finished having hardness not higher than Brinell 235 or equivalent, except that bars ordered cold finished may have hardness as high as Brinell 255 or equivalent.
 - 5.2 Forgings: Normalized and tempered, having hardness not higher than Brinell 248 or equivalent, unless otherwise specified.
 - 5.3 Forging Stock: As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

- 6.1 Decarburization:

- 6.1.1 Bars ordered ground, turned, or polished shall be free from decarburization on the ground, turned, or polished surfaces.
 - 6.1.2 Allowable decarburization of bars 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 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 0.375, incl	0.010
Over 0.375 to 0.500, incl	0.015
Over 0.500 to 0.625, incl	0.020
Over 0.625 to 1.000, incl	0.025
Over 1.000 to 2.000, incl	0.035
Over 2.000 to 3.000, incl	0.048
Over 3.000 to 4.000, incl	0.062
Over 4.000 to 5.000, incl	0.094
Over 5.000	0.125

- 6.1.4 Unless otherwise agreed upon by purchaser and vendor, decarburization shall be measured by the microscopic method, or by Rockwell Superficial 30-N scale hardness method, or 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.

- 6.1.4.1 When determining the depth of decarburization, it is permissible to disregard local areas provided the decarburization of such areas does not exceed the limits above by more than 0.005 in. and the width is 0.065 in. or less.

- 6.2 Properties After Heat Treatment: Specimens austenitized by heating to $1850\text{ F} + 25$ ($1010\text{ C} + 14$), holding at heat for 15 - 45 min., and cooling in air to room temperature and then tempered 3 times by heating to not lower than 1000 F (538 C), holding at heat for 2 - 3 hr, and cooling in air shall conform to the following requirements:

- 6.2.1 Longitudinal Tensile Properties: The following requirements apply to specimens, tested at room temperature, taken from bars and forging stock 25 sq in. and under in cross sectional area and from forgings with axis approximately parallel to the forging flow lines; in addition, specimens from coupons of stock over 25 sq in. in cross sectional area forged to 25 sq in. in area shall be capable of meeting these requirements.

Tensile Strength, psi	260,000 min
Yield Strength at 0.2% Offset or at 0.0181 in. in 2 in. Extension Under Load ($E = 30,400,000$), psi	215,000 min
Elongation, % in 4D	8 min
Reduction of Area, %	30 min

- 6.2.2 Transverse Tensile Properties: Shall conform to the requirements of the latest issue of AMS 2310 on specimens selected and prepared in accordance with that specification and heat treated as in 6.2.