Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10000

AEROSPACE MATERIAL SPECIFICATION

AMS 6485B
Superseding AMS 6485A
Issued 11-1-59
Revised 5-1-69

STEEL BARS AND FORGINGS
5.0Cr - 1.3Mo - 0.50V (0.38 - 0.43C)

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. FORM: Bars, forgings, and forging stock.

3. APPLICATION: Primarily for parts requiring relatively high levels of strength, fatigue resistance, toughness, ductility, and thermal stability for operation between -100 F (-73 C) and 1000 F (538 C), and where such parts may require welding.

4. COMPOSITION:

	min	max
Carbon	0.38	0.43
Manganese	0.20	0.40
Silicon	0.80	1.00
Phosphorus	--	0.020
ø Sulfur	--	0.020
Chromium	4.75	5.25
Molybdenum	1.20	1.40
Vanadium	0.40	0.60
Nickel	--	0.25
Copper	--	0.35

4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2248.

5. CONDITION: Unless otherwise ordered, the product shall be supplied in the following 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: As ordered.

5.3 Forging Stock: As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS: When ASTM methods are specified for determining conformance to ø the following requirements, tests shall be conducted in accordance with the issue of the ASTM method listed in the latest issue of AMS 2350.

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 and billets 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 Ø 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 nondecarburized 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 F ± 25 (1010 C ± 14), holding at heat for 15 - 45 min., and cooling in air to room temperature and then tempered three 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 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 2 in. or 4D	8 min
Reduction of Area (round specimens), %	30 min

6.2.2 Transverse Tensile Properties: The following requirements apply to specimens taken from bars and forging stock over 25 to 256 sq in., incl, in area, selected and prepared in accordance with the latest issue of AMS 2310 and heat treated as in 6.2:

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
Reduction of Area, % (round specimens)		
Cross Sectional Area, sq in.	Average	Minimum
Over 25 to 75, excl	15	6
75 to 100, incl	10	6
Over 100 to 150, incl	--	5
Over 150 to 225, incl	--	4
Over 225 to 256, incl	--	3

6.2.3 Hardness: Rockwell C 50 - 56 or equivalent, but hardness shall not be cause for rejection if tensile properties are met.

6.2.4 Grain Size: Predominantly 7 or finer with occasional grains as large as 5 permissible, ASTM E112; the procedure used shall be as agreed upon by purchaser and vendor.

6.2.5 Longitudinal Tensile Properties at 1000 F (537.8 C): Test specimens heated to 1000 F ± 10 (537.8 C ± 5.6), held at 1000 F ± 10 (537.8 C ± 5.6) for 30 min., and tested at 1000 F ± 5 (537.8 C ± 2.8) shall be capable of meeting the following requirements. These properties apply when the rate of strain is maintained at 0.003 - 0.007 in. per in. per min. through the yield strength and then is increased so as to produce failure in approximately one additional minute.

Tensile Strength, psi	175,000 min
Yield Strength at 0.2% Offset or at 0.0157 in. in 2 in. Extension Under Load (E = 23,000,000), psi	135,000 min
Elongation, % in 2 in. or 4D	10 min
Reduction of Area (round specimens), %	35 min

7. QUALITY: Steel shall be aircraft quality and shall conform to the requirements of the latest issue of AMS 2301. 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.

8. TOLERANCES: Unless otherwise specified, tolerances for bars shall conform to all applicable requirements of the latest issue of AMS 2251; for all hexagons, tolerances for cold finished shall apply.

9. REPORTS:

9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition, grain size, and AMS 2301 frequency-severity rating of each heat in the shipment and the results of tests on each size from each heat to determine conformance to the other technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number and its revision letter, nominal size, and quantity from each heat. If forgings are supplied, the part number and size of stock used to make the forgings shall also be included.

9.2 Unless otherwise specified, the vendor of finished or semifinished 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.