SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York, N.Y. 10017

AEROSPACE MATERIAL SPECIFICATIONS

AMS 6442C
Superseding AMS 6442B
Issued 7-1-48
Revised 11-1-67

STEEL BARS AND FORGINGS
0.50Cr (0.98 - 1.10C) (SAE 50100)
Bearing Quality

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter 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, such as needle bearings, requiring a through-hardening steel usually with hardness of approximately Rockwell C 60.

4. COMPOSITION:

	min	max
Carbon	0.98	1.10
Manganese	0.25	0.45
Silicon	0.20	0.35
Phosphorus	--	0.025
Ø Sulfur	--	0.025
Chromium	0.40	0.60
Nickel	--	0.25
Molybdenum	--	0.06
Copper	--	0.35

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

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

5.1 Bars and Wire: In a machinable condition and hot finished with microstructure of spheroidized cementite in ferrite matrix and having hardness not higher than Brinell 207 or equivalent, except that Ø 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: When ASTM methods are specified for determining conformance to the Ø 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 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.

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6.1.3 Decarburization of bars and wire for anti-friction balls and rollers 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	
	Hot Finished	Cold Finished
Up to 0.250, incl	0.005	0.003
Over 0.250 to 0.500, incl	0.006	0.004
Over 0.500 to 0.750, incl	0.008	0.006
Over 0.750 to 1.000, incl	0.010	0.008

6.1.4 Decarburization of bars to which 6.1.1, 6.1.2, or 6.1.3 is not applicable shall be not greater than the following:

Nominal Diameter or Distance Between Parallel Sides Inches	Depth of Decarburization, Inch		
	Hot Finished	Annealed	Cold Finished
Up to 1.000, incl	0.012	0.015	0.012
Over 1.000 to 2.000, incl	0.017	0.022	0.015
Over 2.000 to 3.000, incl	0.025	0.030	0.025
Over 3.000 to 4.000, incl	0.035	0.045	0.035
Over 4.000 to 5.000, incl	0.055	0.065	0.055

6.1.4.1 Limits for depth of decarburization of bars over 5.000 in. in nominal diameter or distance between parallel sides shall be as agreed upon by purchaser and vendor.

6.1.5 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 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 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.

6.2 Inclusion Rating: Steel from which the product is produced shall be subjected to two of the following three methods of inclusion rating. The methods of test to be used and frequency of testing shall be as agreed upon by purchaser and vendor. Specimens shall represent the cross section of billet stock taken from the top and bottom of at least the first ingot, middle ingot, and last usable ingot.

6.2.1 Macroetch: Specimens shall be macroetched in hot hydrochloric acid (1:1) at 160 - 180 F (71.1 - 82.2 C) for sufficient time to develop a well defined macrostructure. Such specimens shall show freedom from pipe, excessive porosity, segregation, and injurious inclusions.

6.2.2 Fracture: Specimens, approximately 0.375 in. in thickness, shall be normalized, annealed, hardened, and fractured. The fractured specimens shall show freedom from pipe, porosity, excessive segregation, and injurious inclusions. No nonmetallic inclusion over 1/8 in. in length and not more than one nonmetallic inclusion 1/16 - 1/8 in. in length shall be evident on the fractured surfaces of two or fewer specimens. If more than two of the specimens exceed these limits, the heat shall be retested after additional discard or shall be rejected.

6.2.3 Micro-Inclusion: Radial specimens, approximately 0.28 sq in. in surface area cut midway between center and surface of hardened fracture samples, shall be polished, on a face longitudinal to the directional of rolling, for micro-inclusion rating in accordance with the Jernkontoret chart in ASTM E45. Two-thirds of all specimens and at least one from each ingot tested, as well as the average of all specimens, shall not exceed the following limits when evaluated in accordance with ASTM E45, Method A.