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

AEROSPACE MATERIAL SPECIFICATION

AMS 6426A
Superseding AMS 6426

Issued 11-1-69
Revised 5-1-70

STEEL BARS, FORGINGS, AND TUBING
0.75Si - 1.0Cr - 0.58Mo (0.80 - 0.90C)
Vacuum Consumable Melted

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, mechanical tubing, and forging stock.

3. APPLICATION: Primarily for critical parts, such as bearing components for service up to 500 F (260 C), requiring a through-hardening steel capable of developing hardness not lower than Rockwell C 60 in sections up to 3 in. inclusive.

4. COMPOSITION:

	min	max
Carbon	0.80	0.90
Manganese	0.20	0.50
Silicon	0.60	0.90
Phosphorus	--	0.015
ø Sulfur	--	0.015
Chromium	0.85	1.15
Molybdenum	0.50	0.65
Nickel	--	0.15
Copper	--	0.15

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: 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 bars ordered cold finished may have hardness as high as Brinell 248 or equivalent.

5.2 Wire: In a machinable condition and hot finished, with a microstructure of spheroidized cementite in ferrite matrix and having tensile strength not higher than 105,000 psi, except that wire ordered cold finished may have tensile strength as high as 125,000 psi.

5.3 Forgings: As ordered.

5.4 Mechanical Tubing: In a machinable condition and cold finished with microstructure of spheroidized cementite in ferrite matrix and having hardness not higher than Rockwell C 24 or equivalent, except that tubing ordered hot finished shall have hardness not higher than Rockwell B 95 or equivalent.

5.5 Forging Stock: As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS: When ASTM methods are specified for determining conformance to 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 Hardenability: Specimens from bars and wire shall be full cross section of the material ground on both faces normal to the axis so that length is 0.50 inch. Specimens from mechanical tubing shall be full sections of the tubing, shall have wall thickness of 0.50 in. or less with wall thickness over 0.50 in. being turned to 0.50 in., and shall be ground on both faces normal to the axis so that length is 0.625 inch. The specimens shall be protected by suitable means, or treated in an atmosphere, to minimize scaling and prevent either carburization or decarburization during heat treatment. The specimens shall be placed in a furnace which is at 1600 F ± 10 (871.1 C ± 5.6), allowed to heat to 1600 F ± 10 (871.1 C ± 5.6), held at heat for 20 min., and quenched in commercial paraffin oil (100 SUS at 100 F (37.8 C)) at room temperature. The hardened specimens shall have substantially uniform hardness not lower than Rockwell C 66 at any point below any permissible decarburization.

6.2 Decarburization:

6.2.1 Bars, wire, and mechanical tubing ordered ground, turned, or polished shall be free from decarburization on the ground, turned, or polished surfaces. Decarburization of the ID of such tubing shall not exceed the maximum depth specified in 6.2.4.

6.2.2 Allowable decarburization of bars, wire, pierced billets, and tubing ordered for redrawing or forging or to specified microstructural requirements shall be as agreed upon by purchaser and vendor.

6.2.3 Decarburization of bars and wire to which 6.2.1 or 6.2.2 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
Over 3.00	0.045

6.2.4 Decarburization of all mechanical tubing to which 6.2.1 or 6.2.2 is not applicable shall be not greater than 0.025 in. on the ID and 0.025 in. on the outside diameter.

6.2.5 Unless otherwise agreed upon by purchaser and vendor, decarburization shall be measured 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 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.

6.2.5.1 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.

6.3 Inclusion Rating: Steel from which the product is produced shall be subjected to the following methods of inclusion rating. Specimens shall be cut from and represent the cross section of billet stock taken from the top and bottom of at least the first ingot, middle ingot, and last usable consumable ingot of each heat.

6.3.1 Macroetch: Specimens, 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, shall show freedom from pipe, excessive porosity, segregation, and injurious inclusions.

6.3.2 Fracture: Specimens approximately 0.375 in. in thickness shall be annealed, hardened, and fractured approximately through the center of the cross section. The fractured specimens shall show freedom from pipe, excessive segregation, and porosity. The fractured specimens shall show no nonmetallic inclusions over 1/16 in. in length and not more than one nonmetallic inclusion 1/32 - 1/16 in. in length for each 10 sq in. or fraction thereof of such surfaces.

6.3.3 Micro-Inclusion: Radial specimens, approximately 0.28 sq in. in surface area cut midway between center and surface of hardened fracture specimens, shall be polished on a face longitudinal to the direction of rolling for micro-inclusion rating in accordance with the Jernkonteret chart in ASTM E45. No specimen shall exceed the following limits:

Inclusion Type	Dimensional Limitation Thickness or Diameter, Inch	Worst Field
A - Thin	0.00016 max	1.5
A - Heavy	0.00040 max	1.0
B - Thin	0.0003 to 0.0005, excl	1.5
B - Heavy	0.0005 to 0.0010, incl	1.0
C - Thin	0.00020 max	1.5
C - Heavy	0.00035 max	1.0
D - Thin	0.0002 to 0.0004, excl	1.5
D - Heavy	0.0004 to 0.0010, incl	1.0

6.3.3.1 For Type A thin, there shall be not more than five fields of 1.5 rating, and not more than three lower rateable fields per specimen. For types B and C thin combined, there shall be not more than three fields of 1.5 rating and not more than three lower rateable fields per specimen. For type D thin, there shall be not more than three No. 1.5 fields and not more than five lower rateable D type thin fields per specimen. There shall be no more than one field each of No. 1.0, A, B, C, or D type heavy per specimen.

6.3.3.2 A rateable field is defined as one which has a type A, B, C, or D inclusion rating of at least No. 1.0 thin or heavy in accordance with the dimensional limitations of 6.3.2 and the Jernkontoret chart, Plate III, ASTM E45.

6.4 Hardness Retention: Specimens, taken from the full cross section of annealed bars, wire, or tubes, machined to 0.50 in. in thickness, and hardened as in 6.1, shall be capable of maintaining a room temperature hardness not lower than Rockwell C 60 following 400 hr exposure at 500 F ± 10 (260 C ± 5.6).

6.5 Surface Requirements:

6.5.1 Bars, wire, and tubes ordered ground, turned, or polished shall be free from seams, laps, tears, and cracks open to the ground, turned, or polished surfaces.

6.5.2 Product ordered to surface conditions other than ground, turned, or polished shall, after removal of the standard machining allowance, be free from seams, laps, tears, cracks, and other defects exposed to the machined surfaces. Standard machining allowance shall be in accordance with values shown in the latest issue of AMS 2300.

7. QUALITY: Steel shall be premium quality and shall conform to the requirements of the latest issue of AMS 2300; it shall be multiple melted using vacuum consumable electrode process in the remelt cycle, unless otherwise permitted. 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. SAMPLING: Bars, wire, and mechanical tubing shall be sampled in accordance with the latest issue of AMS 2370, and as specified herein. Forgings and forging stock shall be sampled as agreed upon by purchaser and vendor.

9. TOLERANCES: Unless otherwise specified, tolerances shall conform to all applicable requirements of the following:

9.1 Bars and Wire: The latest issue of AMS 2251.

9.2 Mechanical Tubing: The latest issue of AMS 2253.

10. REPORTS:

10.1 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, hardenability, AMS 2300 frequency-severity rating, and inclusion rating of each heat in the shipment. A heat shall be the consumable electrode remelted ingots produced from steel originally melted in a single furnace charge. 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 size of stock used to make the forgings shall also be included.

10.2 Unless otherwise specified, 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.

11. IDENTIFICATION:

11.1 Bars, Wire, and Tubing:

11.1.1 Each straight bar, wire, and tube 0.500 in. and over in OD or least width of flat surface shall be marked in a row of characters recurring at intervals not greater than 3 ft with AMS 6426A, heat number, and manufacturer's identification. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be capable of being removed in hot alkaline cleaning solution without rubbing. The marking shall have no deleterious effect on the material or its performance and shall be sufficiently stable to withstand normal handling.

11.1.2 Straight bars, wire, and tubes less than 0.500 in. in OD or least width of flat surface shall be securely bundled and identified by a metal or plastic tag embossed with the purchase order number, AMS 6426A, heat number, nominal size, and manufacturer's identification and attached to each bundle or shall be boxed and the box marked with the same information.

11.1.3 Coiled bars and wire shall be securely bundled and identified by a metal or plastic tag embossed with the purchase order number, AMS 6426A, heat number, nominal size, and manufacturer's identification and attached to each coil or shall be boxed and the box marked with the same information.