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

AEROSPACE MATERIAL SPECIFICATION

AMS 5616E
Superseding AMS 5616D
Issued 3-1-48
Revised 11-1-69

STEEL BARS, FORGINGS, TUBING, AND RINGS, CORROSION AND MODERATE, HEAT RESISTANT 13Cr - 2.0Ni - 3.0W

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, flash welded rings, and stock for forging, flash welded rings, or heading.

3. APPLICATION: Primarily for parts and assemblies, such as compressor wheels and blades, requiring oxidation resistance up to 1000 F (538 C). Strength at the higher temperature is superior to that of the standard 12Cr type.

4. COMPOSITION:

	min	max
Carbon	0.15	0.20
Manganese	--	0.50
Silicon	--	0.50
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	12.00	14.00
Nickel	1.80	2.20
Tungsten	2.50	3.50
Molybdenum	--	0.50
Aluminum	--	0.15
Nitrogen (1)	--	0.08
Copper	--	0.50
Tin	--	0.05

(1) Determination not required for routine acceptance.

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: Annealed, in a machinable condition, having hardness not higher than Brinell 311 or equivalent. All hexagons and other bars 2.75 in. and under in diameter or distance between parallel sides, shall be cold finished.

5.2 Wire: Annealed and cold finished having tensile strength not higher than 155,000 psi.

5.3 Mechanical Tubing: Annealed and cold finished, having hardness not higher than Brinell 311 or equivalent.

5.4 Forgings: As ordered.

5.5 Flash Welded Rings: Annealed, having hardness not higher than Brinell 311 or equivalent.

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5.5.1 Flash welded rings shall not be supplied unless specified on purchaser's part drawing. When supplied, they shall be manufactured in accordance with the latest issue of AMS 7493, unless otherwise specified.

5.6 Stock For Forging, Flash Welded Rings, or Heading: As ordered by the forging, flash welded ring, or heading manufacturer.

6. TECHNICAL REQUIREMENTS:

6.1 Hardenability: Material 0.375 in. and less in thickness and 0.375 in. thick specimens cut from larger bars, tubes, forgings, and flash welded rings shall be capable of meeting the following test:

6.1.1 Specimens shall be placed in a furnace which is at 1750 F ± 10 (954.4 C ± 5.6), allowed to heat to 1750 F ± 10 (954.4 C ± 5.6), held at heat for 25 min., and quenched in commercial paraffin oil approximately 100 SUS at 100 F (37.8 C)) at room temperature. Hardness of such specimens shall be not lower than Rockwell C 45.

7. QUALITY: Steel shall be aircraft quality and, when specified, shall conform to the latest issue of
Ø AMS 2303. Material 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 shall conform to all applicable requirements of the following:

8.1 Bars and Wire: The latest issue of AMS 2241. For sizes not covered by AMS 2241, tolerances shall be
Ø as agreed upon by purchaser and vendor.

8.2 Tubing: The latest issue of AMS 2243.

9. REPORTS:

9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a
Ø report of the results of tests for chemical composition and, when specified, the AMS 2303 frequency-severity rating of each heat in the shipment. 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.

9.2 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.

10. IDENTIFICATION: Unless otherwise specified, the product shall be identified as follows:

10.1 Bars, Wire, and Tubing:

10.1.1 Each straight bar and tube 0.500 in. and over in OD or least width of flat surface shall be marked in a
Ø row of characters recurring at intervals not greater than 3 ft with AMS 5616E, 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 markings shall have no deleterious effect on the material or its performance and shall be sufficiently stable to withstand normal handling.

10.1.2 Straight bars, wire, and tubes less than 0.500 in. in OD or least width of flat surface shall be securely
Ø bundled and identified by a metal or plastic tag embossed with the purchase order number, AMS 5616E, 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.