

# AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.  
29 West 39th Street  
New York City

## AMS 5610D

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STEEL, CORROSION AND MODERATE HEAT RESISTANT  
13Cr Low Carbon (SAE 51416F)  
Free-Machining

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
2. FORM: Bars, billets, forgings, and mechanical tubing.
3. APPLICATION: Primarily for parts requiring hardness up to Rockwell C 35, with corrosion resistance and oxidation resistance up to 1000 F, but useful at the higher temperatures only when stresses are low.

4. COMPOSITION:

Check Analysis  
Under Min or Over Max

Carbon	0.15	max	--	0.01
Manganese	1.20	max	--	0.04
Silicon	1.00	max	--	0.05
Phosphorus	0.040	max	--	0.005
* Sulfur	0.030	max	--	0.005
Chromium	11.50	13.50	0.15	0.15
Nickel	0.50	max	--	0.03
Molybdenum or Zirconium	0.60	max	--	0.03
* Selenium	0.18	- 0.35	0.03	0.03
Copper	0.50	max	--	0.03

\*Sulfur may be present in the range 0.18 - 0.35% if selenium is absent; in such case, check analysis for sulfur shall be 0.02% under min or over max.

5. CONDITION:

- 5.1 Bars: All hexagons, and other bars 2.75 in. and less in diameter or distance between parallel sides shall be cold finished. All bars shall be free machining and have hardness of Brinell 187-241 or equivalent.
- 5.2 Tubing: Cold finished, free machining, and having hardness of Brinell 187-241 or equivalent.
- 5.3 Forgings: As ordered.
- 5.4 Forging Stock: As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

- 6.1 Hardenability: Material shall be capable of meeting the following test:

- 6.1.1 Specimens 3/8 in. thick, cut from a bar, tube or forging, shall be heated to 1825 F + 10, held for 25 minutes and quenched in commercial paraffin oil (100 SUS at 100 F) at room temperature. Hardness of such specimens shall be not lower than Rockwell C 35.

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7. QUALITY: Material shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external defects, consistent with the type of steel involved, detrimental to fabrication or to performance of parts.
8. TOLERANCES: Unless otherwise specified, tolerances shall conform to the following:
- 8.1 Rods and Bars: Shall conform to the latest issue of AMS 2241 as applicable and as specified below:
- 8.1.1 Diameter or thickness of all hexagons, and other shapes of rods and bars 2.75 in. and less in diameter or distance between parallel sides, shall conform to Table I.
- 8.1.2 Diameter or thickness of rods and bars, other than hexagons, over 2.75 in. in diameter or distance between parallel sides shall conform to Table II.
- 8.2 Tubing: Shall conform to the latest issue of AMS 2243 as applicable and as specified below:
- 8.2.1 Diameter shall conform to Table I, columns headed "Annealed or Solution Heat Treated".
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 of each heat in the shipment. This report shall include the purchase order number, heat number, material specification number, 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, 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:
- 10.1 Bars and Tubing: Individual pieces or bundles shall have attached a metal tag stamped with the purchase order number, AMS 5610D, nominal size, and heat number, or shall be boxed and the box marked with the same information. In addition to the above identification, flats 2 x 1 in. and larger and other bars 1 in. and over in diameter or distance between parallel sides shall be stamped with the heat number within 2 in. of one end.
- 10.2 Forgings: Shall be identified in accordance with the latest issue of AMS 2808.
11. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.