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# AEROSPACE MATERIAL SPECIFICATION

AMS 5722C

Issued 7-1-48
Revised 10-1-82

UNS K63198

## STEEL BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
## 19.5Cr - 9.5Ni - 1.4Mo - 1.4W - 0.42(Cb + Ta) - 0.22Ti

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of 9-27-72. It is recommended, therefore, that this specification not be specified for new designs.

This cover sheet should be attached to the "C" revision of the subject specification.

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This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of 10-1-82. By this action, subject specification number and title will be deleted from the active specification index of Aerospace Material Specifications.



This specification is under the jurisdiction of AMS Committee "F".

SUPERSEDED Came 62 5/5

SAE LAND SEA AIR SPACE

Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA NEW YORK N Y 1000

# AEROSPACE MATERIAL SPECIFICATION

AMS 5722C
Superseding AMS 5722B
Issued 7-1-48
Revised 11-1-68

## STEEL BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
19.5Cr - 9.5Ni - 1 4Mo - 1.4W - 0.42(Cb + Ta) - 0.22Ti

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, flash welded rings, and stock for forgings or flash welded rings.

3. APPLICATION: Parts and assemblies, such as bolts, dowels, fittings, turbine rotor wheels and discs, and turbine nozzle assemblies, requiring high strength up to 1200 F (649 C).

4. COMPOSITION:

| | min | max |
|---|---|---|
| Carbon | 0.28 | 0.35 |
| Manganese | 0.75 | 1.50 |
| Silicon | 0.30 | 0.80 |
| Phosphorus | -- | 0.040 |
| Sulfur | -- | 0.030 |
| Chromium | 18.00 | 21.00 |
| Nickel | 8.00 | 11.00 |
| Molybdenum | 1.00 | 1.75 |
| Tungsten | 1.00 | 1.75 |
| Columbium + Tantalum | 0.25 | 0.60 |
| Titanium | 0.10 | 0.35 |
| Copper | -- | 0.50 |

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

5. CONDITION:

5.1 Bars, Forgings, and Stock for Flash Welded Rings: Hot worked, with final working done at a temperature not lower than 1400 F (760 C) and stress relieved at not lower than 1200 F (649 C) for not less than 4 hours.

5.2 Flash Welded Rings: Stress relieved at not lower than 1200 F (649 C) for not less than 4 hours.

5.2.1 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 7490, unless otherwise specified.

5.3 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 Bars and Flash Welded Rings: Specimens taken from bars and from parent metal of flash welded rings shall conform to the requirements of 6.1.1 and 6.1.2 and shall be capable of meeting the requirements of 6.1.3.

6.1.1 Tensile Properties:

| Nominal Diameter or Distance Between Parallel Sides (Bars) or Radial Thickness (Flash Welded Rings) Inches | Tensile Strength psi, min | Yield Strength at 0.2% Offset or at Extension Indicated (E = 29,000,000) psi, min | Extension Under Load in. in 2 in. | Elongation % in 2 in. or 4D, min | Reduction of Area, %, min (Round Specimens) |
|---|---|---|---|---|---|
| Up to 2.625, incl | 100,000 | 70,000 | 0.0088 | 20 | 40 |
| Over 2.625 to 4.000, incl | 100,000 | 60,000 | 0.0081 | 20 | 40 |
| Over 4.000 to 5.000, incl | 100,000 | 50,000 | 0.0074 | 20 | 40 |
| Over 5.000 | 95,000 | 45,000 | 0.0071 | 20 | 40 |

6.1.2 Hardness:

| Nominal Diameter or Distance Between Parallel Sides (Bars) or Radial Thickness (Flash Welded Rings) Inches | Hardness, Brinell |
|---|---|
| Up to 4.000, incl | 228 - 285 |
| Over 4.000 to 5.000, incl | 217 - 277 |
| Over 5.000 | 207 - 269 |

6.1.3 Stress-Rupture Test at 1200 F (648.9 C): A tensile test specimen, maintained at 1200 F ± 3 (648.9 C ± 1.7) while an axial stress of 40,000 psi is applied continuously, shall not rupture in less than 100 hours. The test shall be continued to rupture. The elongation after rupture, measured at room temperature, shall be not less than 15% in 4D. Test shall be conducted in accordance with ASTM E139.

6.1.3.1 The test of 6.1.3 may be conducted at a stress higher than 40,000 psi but stress shall not be changed while test is in process, unless otherwise specified or allowed. Time to rupture and elongation requirements shall be as specified in 6.1.3.

6.1.3.2 When permitted by purchaser, the test of 6.1.3 may be conducted using incremental loading. In such case, a stress of 40,000 psi shall be used to rupture or for 100 hr, whichever occurs first. After the 100 hr and at intervals of 8 - 16 hr, preferably 8 - 10 hr, thereafter, the stress shall be increased in increments of 5000 psi. Time to rupture and elongation requirements shall be as specified in 6.1.3.

6.2 Forgings: Shall conform to the requirements of 6.2.1 and shall be capable of meeting the requirements of 6.2.2.

6.2.1 Hardness: Brinell 207 - 277 or equivalent.

6.2.2 Stress-Rupture Test at 1200 F (648.9 C): A tensile test specimen, maintained at 1200 F ± 3 (648.9 C ± 1.7) while an axial stress of 31,000 psi when axis of specimen is across the forging flow lines, or 40,000 psi when axis of specimen is approximately parallel to the forging flow lines, is applied continuously, shall not rupture in less than 100 hours. The test shall be continued to rupture. The elongation after rupture, measured at room temperature, shall be not less than 12% in 4D. Test shall be conducted in accordance with ASTM E139.

6.2.2.1 The test of 6.2.2 may be conducted at a stress higher than 31,000 psi when axis of specimen is across the forging flow lines, or higher than 40,000 psi when axis of specimen is parallel to forging flow lines, but stress shall not be changed while test is in process. Time to rupture and elongation requirements shall be as specified in 6.2.2.

6.2.2.2 When permitted by purchaser, the test of 6.2.2 may be conducted using incremental loading. In such case, a stress of 31,000 psi when axis of specimen is across the forging flow lines, or 40,000 Ø psi when axis of specimen is approximately parallel to the forging flow lines, shall be used to rupture or for 100 hr, whichever occurs first. After the 100 hr and at intervals of 8 - 16 hr, preferably 8 - 10 hr, thereafter, the stress shall be increased in increments of 5000 psi. Time to rupture and elongation requirements shall be as specified in 6.2.2.

7. QUALITY: 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 for bars shall conform to all applicable requirements of the latest issue of AMS 2241. Tolerances for sizes not covered by AMS 2241 shall be as agreed upon by purchaser and vendor.

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 and the results of Ø tests on each size from each heat to determine conformance to the technical requirements of this specification. 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:

10.1.1 Each straight bar 0.500 in. and over in diameter or least width of flat surface shall be marked in a row of characters recurring at intervals not greater than 3 ft with AMS 5722C, heat number, and manu- Ø facturer'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 and shall be sufficiently stable to withstand normal handling.

10.1.2 Straight bars less than 0.500 in. in OD or least width of flat surface shall be securely bundled and iden- Ø tified by a metal or plastic tag embossed with the purchase order number, AMS 5722C, 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.

10.2 Forgings: Shall be identified in accordance with the latest issue of AMS 2808.