



AEROSPACE MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc.

485 Lexington Ave., New York, N. Y. 10017

AMS 5769A

Superseding AMS 5769

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ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT Iron Base - 20Cr - 20Ni - 20Co - 3Mo - 2W - 1(Cb + Ta) Solution Treated

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:** Primarily for parts and assemblies, such as turbine rotors, shafts, buckets, and bolts, requiring high strength up to 1350 F (732 C) and oxidation resistance up to 1800 F (982 C).
4. **COMPOSITION:**

| | min | max |
|----------------------|---------------|-------|
| Carbon | 0.08 | 0.16 |
| Manganese | 1.00 | 2.00 |
| Silicon | | 1.00 |
| Phosphorus | -- | 0.040 |
| Sulfur | -- | 0.030 |
| Chromium | 20.00 - 22.50 | |
| Nickel | 19.00 - 21.00 | |
| Cobalt | 18.50 - 21.00 | |
| Molybdenum | 2.50 - 3.50 | |
| Tungsten | 2.00 - 3.00 | |
| Columbium - Tantalum | 0.75 - 1.25 | |
| Nitrogen | 0.10 - 0.20 | |
| Iron | remainder | |

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

5. **CONDITION:**

- 5.1 **Bars, Forgings, and Flash Welded Rings:** Unless otherwise specified, solution heat treated and de-scaled.
 - 5.1.1 Flash welded rings shall not be supplied unless specified or permitted on purchaser's part drawing. When supplied, they shall be manufactured in accordance with the latest issue of AMS 7490, unless otherwise specified.
- 5.2 **Stock for Forgings or Flash Welded Rings:** As ordered by the forging or flash welded ring manufacturer.

6. **TECHNICAL REQUIREMENTS:**

- 6.1 **Bars, Forgings, and Flash Welded Rings:**
 - 6.1.1 **Heat Treatment:** The product shall be solution heat treated by heating to 2150 F \pm 25 (1176.7 C \pm 14), holding at heat for 1 hr, and quenching in water.

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6.1.2 Hardness:

6.1.2.1 Bars and Forgings: Shall be Brinell 157 - 217 or equivalent.

∅ 6.1.2.2 Flash Welded Rings: Shall be Brinell 157 - 241 or equivalent.

6.1.3 Stress-Rupture Test at 1350 F (732.2 C): Specimens taken from bars and forgings and from parent metal of flash welded rings shall be capable of meeting the following requirements:

6.1.3.1 A tensile test specimen, maintained at $1350\text{ F} \pm 3$ ($732.2\text{ C} \pm 1.7$) while an axial stress of 24,000 psi is applied continuously, shall not rupture in less than 100 hours. The test shall be continued to rupture. Elongation after rupture, measured at room temperature, shall be not less than 10% in 4D. Tests shall be conducted in accordance with the issue of ASTM E139 specified in the latest issue of AMS 2350.

∅ 6.1.3.1.1 The test of 6.1.3.1 may be conducted at a stress higher than 24,000 psi but the 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 6.1.3.1.

6.2 Stock for Forging and Flash Welding: When a sample of stock is forged to a test coupon and heat treated as in 6.1.1, specimens taken from the heat treated coupon shall conform to the requirements of 6.1.2 and 6.1.3. If specimens taken from the stock after heat treatment as in 6.1.1 conform to the requirements of 6.1.2 and 6.1.3, the tests shall be accepted as equivalent to tests of the forged coupon.

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 and forging stock shall conform to all applicable requirements of the latest issue of AMS 2261.

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.