

AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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AMS 5722

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Revised

STEEL, CORROSION AND HEAT RESISTANT 20Cr - 9Ni - 1.3Mo - 1.3W - Cb - Ti

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **FORM:** Bars, billets, and forgings.
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.
4. **COMPOSITION:**

		Check Analysis	
		Under Min	or Over Max
Carbon	0.28 - 0.35	0.02	0.02
Manganese	0.75 - 1.50	0.04	0.04
Silicon	0.30 - 0.80	0.05	0.05
Phosphorus	0.040 max	--	0.005
Sulfur	0.030 max	--	0.005
Chromium	18.00 - 21.00	0.25	0.25
Nickel	8.00 - 11.00	0.15	0.15
Molybdenum	1.00 - 1.60	0.05	0.05
Tungsten	1.00 - 1.70	0.05	0.05
Columbium + Tantalum	0.25 - 0.60	0.05	0.05
Titanium	0.20 - 0.50	0.05	0.05
Tantalum, if determined	(0.3xCb) max	--	--
Copper	0.50 max	--	0.03

5. **CONDITION:** Unless otherwise specified, the product shall be supplied as follows:

- 5.1 **Bars and Forgings:** Hot worked, with final working done at a temperature not lower than 1400 F, and stress relieved at not lower than 1200 F for not less than 4 hours.
- 5.2 **Forging Stock:** As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

6.1 Bars:

- 6.1.1 **Physical Properties at Room Temperature:** Bars shall conform to the following requirements:

Tensile Strength, psi	100,000 min
Yield Strength at 0.2% offset or at 0.0088 inch in 2 in. extension under load, psi	70,000 min
Elongation, % in 4D	20 min
Reduction of Area, %	40 min
Hardness, Brinell	228-277

6.1.2 Stress Rupture Test at 1200 F: Bars shall be capable of meeting the following requirements:

A tensile test specimen, maintained at $1200\text{ F} \pm 10$ while an axial load of 43,000 psi is applied continuously, shall not rupture in less than 100 hours. The test shall be continued after the 100 hours, until the specimen ruptures, either maintaining the same load or increasing the load to not over 60,000 psi as necessary to produce rupture. In either case, the elongation after rupture, measured at room temperature, shall be not less than 15% in 4D.

6.2 Forgings:

6.2.1 Physical Properties at Room Temperature: Unless otherwise specified, specimens cut in any direction from forgings shall conform to the following requirements:

Tensile Strength, psi	90,000 min
Yield Strength at 0.2% offset or at 0.0081 inch in 2 in. extension under load, psi	60,000 min
Elongation, % in 4D	15 min
Reduction of Area, %	15 min
Hardness, Brinell	228-269

6.2.2 Stress-Rupture Test at 1200 F: Forgings shall be capable of meeting the following requirements:

A tensile test specimen, maintained at $1200\text{ F} \pm 10$ while an axial load 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 after the 100 hours, until the specimen ruptures, either maintaining the same load or increasing the load to not over 60,000 psi as necessary to produce rupture. In either case, the elongation after rupture, measured at room temperature, shall be not less than 12% in 4D.

6.2.3 Inspection standards and procedures shall be as agreed upon by purchaser and vendor.

7. QUALITY: Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts.

8. TOLERANCES: Unless otherwise specified, tolerances for bars shall conform to the latest issue of AMS 2241 as applicable to hot finished.

9. REPORTS:

9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a notarized report of the results of tests for chemical composition and physical properties 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.