

# AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.  
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## ALLOY, CORROSION AND HEAT RESISTANT Iron Base - 20Cr - 20Ni - 20Co - 4W - 4Mo - 4Cb Solution and Precipitation 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, billets, and forgings.
3. APPLICATION: Parts and assemblies, such as turbine rotors, shafts, buckets, and bolts, requiring high strength up to 1500 F and oxidation resistance up to 1800 F.
4. COMPOSITION:

	Check Analysis		
	Under	Min	Over
	Max		Max
Carbon	0.38 - 0.48	0.00	0.00
Manganese	2.00 max	--	0.04
Silicon	1.00 max	--	0.05
Phosphorus	0.040 max	--	0.005
Sulfur	0.030 max	--	0.005
Chromium	19.00 - 22.00	0.25	0.25
Nickel	18.50 - 21.50	0.20	0.20
Cobalt	18.50 - 21.50	0.10	0.10
Molybdenum	3.50 - 4.50	0.10	0.10
Tungsten	3.50 - 4.50	0.05	0.05
Columbium + Tantalum	3.50 - 4.50	--	0.03
Copper	0.50 max	--	--
Iron	remainder		

5. CONDITION:

5.1 Bars: Cold finished, solution and precipitation heat treated.

5.2 Forgings: Solution and precipitation heat treated.

5.3 Forging Stock: As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

6.1 Heat Treatment: Bars and forgings shall be solution heat treated by heating to 2200 F  $\pm$  20, holding at that temperature for not less than one hour, followed by quenching in water, and shall then be precipitation heat treated by heating to 1400 F  $\pm$  10, holding at that temperature for not less than 10 hours followed by air cooling.

6.2 Hardness: Bars and forgings shall have hardness of Brinell 248 - 331 or equivalent.

6.3 Stress-Rupture Test at 1350 F: Specimens taken from bars and forgings shall be capable of meeting the following requirements:

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