

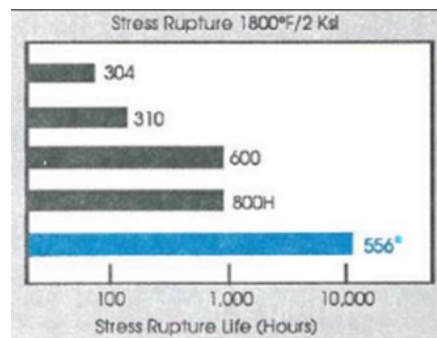
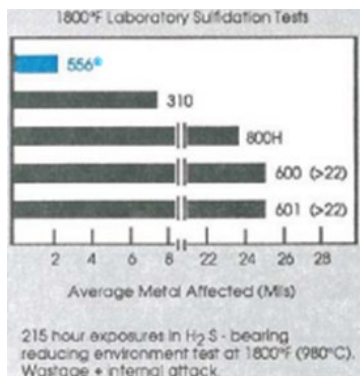
HAYNES® 556® alloy for Pulp & Paper Tech Brief

For High-Temperature Pulp & Paper Process Equipment

Operating conditions in high-temperature pulp and paper production processes are among the most corrosive in industry. Super heaters and cyclone separators in Kraft recovery boilers are subjected to highly corrosive gases generated from the combustion of black liquors. Other facilities are subjected to high-temperature corrosion from process feed stocks containing sulfur-rich gases or molten salts.

HAYNES® 556® alloy combines the resistance to high-temperature corrosion required for survival in many of these hostile environments with excellent high-temperature strength - enough strength to allow for significant reduction in required section size for many types of components when compared to austenitic stainless steels or 600 or 800 alloys.

As for corrosion resistance, HAYNES® 556® is designed to resist degradation from SO₂ or H₂S-bearing atmospheres at temperatures as high as 1800°F. It has very good resistance to molten salt environments, and is among the best materials for chlorine-contaminated oxidizing environments up to 1650°F. It also exhibits excellent resistance to carburization.



Nominal Composition

Iron:	Balance
Nickel:	20
Cobalt:	18
Chromium:	22
Molybdenum:	3
Tungsten:	2.5
Tantalum:	0.6
Nitrogen:	0.2
Silicon:	0.4
Manganese:	1
Aluminum:	0.2
Carbon:	0.1
Lanthanum:	0.02
Zirconium:	0.02

Typical Tensile Properties, Plate

Test Temperature	0.2% Yield Strength	Ultimate Tensile Strength	Elongation
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°F	°C	ksi	MPa	ksi	MPa	%
RT	RT	55	375	116	805	51
1000	540	31	210	90	625	60
1200	650	31	210	83	575	57
1400	760	29	200	69	470	53
1600	870	28	190	49	340	69
1800	980	19	130	31	210	84
2000	1095	9	60	16	110	95

Typical Rupture Properties, Plate

Test Temperature		Typical Rupture Properties: Stress Required to Produce Rupture in Hours Shown					
		100 h		1,000 h		10,000 h	
°F	°C	ksi	MPa	ksi	MPa	ksi	MPa
1400	760	25.0	172	17.5	121	11.9	82
1500	815	17.0	117	11.8	81	7.8	53
1600	870	11.5	79	7.5	52	4.9	34
1700	915	7.6	52	4.8	33	3.0	21
1800	980	4.8	33	3.0	21	1.9	13

Typical Room Temperature Physical Properties

Physical Property	British Units	Metric Units
Density	0.297 lb/in ³	8.23 g/cm ³
Electrical Resistivity	37.5 μohm-in	95.2 μohm-cm
Modulus of Elasticity	29.7 x 10 ⁶ psi	206 GPA
Thermal Conductivity	77 Btu-in/ft ² -h-°F	11.1 W/m-°C
Specific Heat	0.111 Btu/lb-°F	464 J/Kg-°C

Product Description

HAYNES[®] 556[®] alloy is an iron-nickel-chromium-cobalt alloy that combines effective resistance to sulfidizing, carburizing, and chlorine-bearing environments at high temperatures with good oxidation resistance, fabricability, and excellent high-temperature strength. It has also been found to resist corrosion by molten chloride salts and molten zinc.

HAYNES[®] 556[®] alloy is highly useful for service at elevated-temperature in moderately to severely corrosive environments. Applications include tubing and structural members in waste heat recuperators, super heaters, and internals in burner buckets, air nozzles, and fluidized bed combustor heat exchangers and internals; in municipal and chemical waste incinerators; power plant burner buckets, air nozzles and fluidized bed combustor heat exchangers and internals; high-speed furnace fans, galvanizing bath hardware and brazing fixtures; and high-temperature rotary calciners and kilns. There are also additional uses in the chemical/petrochemical process and pump and paper industries.

Environmental Resistance

Oxidation in Air - Excellent at 2000°F (1095°C)

Sulfidation - Second only to Co-base alloys

Molten Chloride Salts - Equal to alloy X

Chlorination - Very good to 1650°F (900°C)

Carburization - Equal to alloy 800H

Molten Zinc - Best Available

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