

HAYNES[®] HR-160[®] alloy

High-temperature Corrosion Resistance

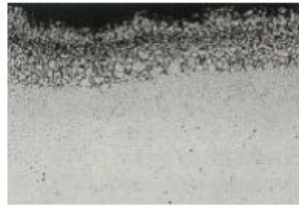
Sulfidation in Reducing Atmospheres

Ar - 5%H₂ - 5%CO - 1%CO₂ - 0.15%H₂S (Vol. %) (PO₂ = 3 x 10⁻¹⁹ atm, PS₂ = 0.9 x 10⁻⁶ atm)

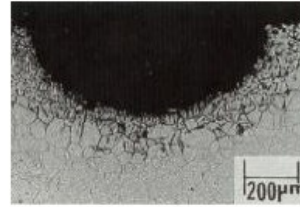
1600°F (871°C) / 215 hours



HR-160[®] alloy



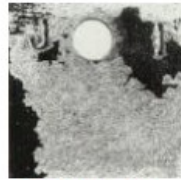
556[™] alloy



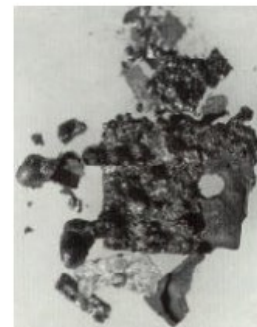
Alloy 800H

Top edge of the photograph represents the original sample surface. The specimens were tested and then cathodically descaled to remove the corrosion products prior to mounting for metallography.

1600°F (871°C) / 500 hours



HR-160[®] alloy



RA330 alloy

1600°F (871°C)/500 hours

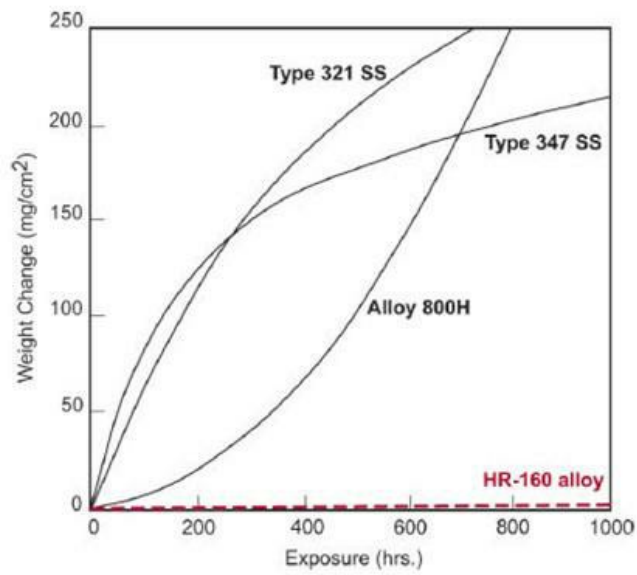
Alloy	Cobalt %	Metal Loss		Average Depth of Attack		Max. Depth of Attack	
		mils	mm	mils	mm	mils	mm
-							
6B	57	0.3	0.008	3.1	0.08	3.3	0.08
HR-160[®]	30	0.2	0.005	5.2	0.13	5.7	0.14
25	51	4.1	0.10	8.4	0.21	14.6	0.37
188	39	7.6	0.10	14.9	0.38	23.6	0.60
150	50	10.3	0.26	22.1	0.56	28.3	0.72
556[®]	18	20.6	0.52	31.9	0.81	35.6	0.90

Sulfidation in Reducing Atmospheres

H₂-46%CO-0.8%CO-1.7%HS
Total Depth Attack

Alloy	1100°F (593°C)		1300°F (704°C)	
	mpy	mm/y	mpy	mm/y
-				
HR-160[®]	14.4	0.37	27.3	0.70
6B	23.6	0.60	264.4	6.72
150	37.7	0.96	108.8	2.76
25	94.1	2.39	188.5	4.79
188	150.5	3.82	292.6	7.43
556[®]	121.1	3.08	345.8	8.78

H_2 -7%CO-1.5% H_2O -0.6% H_2S
($P_{O_2} = 1 \times 10^{-23}$ atm, $P_{S_2} = 1 \times 10^{-9}$ atm, $a_c = 0.3-0.4$ at 1292°F (700°C))



Sulfate-Induced Sulfidation in Combustion Atmospheres

Laboratory Hot Corrosion Burner Rig Testing - Specimens were exposed to a combustion stream generated in a burner rig fired with No. 2 fuel oil with a constant injection of 50 ppm (by weight) salt (mostly sodium chloride) into the combustion stream. Specimens were also subjected to thermal cycling by cycling them out of the test chamber once every hour and rapid fan cooling to less than 390°F (199°C) for two minutes.

