

HAYNES® HR-120® alloy

CHEMISTRY: Weight %

Fe ^a	Ni	Co	Cr	Mo	W	Cb	Mn	Si	N	Al	C	B
33	37	3*	25	2.5*	2.5*	0.7	0.7	0.6	0.20	0.1	0.05	0.004

^aAs balance * Maximum

ALLOY DESCRIPTION:

HAYNES HR-120 alloy is a solid-solution-strengthened heat-resistant alloy that provides excellent strength at elevated temperatures combined with very good resistance to carburizing and sulfidizing environments. Its oxidation resistance is comparable to other widely used Fe-Ni-Cr materials, such as alloys 330 and 800H, but its strength at temperatures up to 2000°F (1095°C) is significantly higher, even in comparison to Ni-Cr alloys. HR-120 alloy is beginning to find many applications in the industrial heating and heat treating industries. These include furnace retorts, muffles, fixtures, baskets, link belt pins, and others. Potential applications include components in the petrochemical, waste incineration, power and related industries. The alloy can be readily formed hot or cold, and is generally welded using HAYNES®556® filler wire.

PHYSICAL PROPERTIES:

	Temp., °F	British Units	Temp., °C	Metric Units
Density	Room	0.291 lb/in ³	Room	8.07 g/cm ³
Melting Range	2375-2600 (est.)		1300-1425	
Thermal Conductivity	800	121 BTU-in/ft ² -hr-°F	400	17.1 W/m-K
	1000	134 BTU-in/ft ² -hr-°F	600	21.0 W/m-K
	1200	150 BTU-in/ft ² -hr-°F	700	23.3 W/m-K
	1400	168 BTU-in/ft ² -hr-°F	800	24.9 W/m-K
	1600	180 BTU-in/ft ² -hr-°F	900	26.2 W/m-K
	1800	191 BTU-in/ft ² -hr-°F	1000	28.0 W/m-K
Mean Coefficient of Thermal Expansion	70-800	8.8 µin/in-°F	20-500	16.1 µm/m-°C
	70-1000	9.0 µin/in-°F	20-600	16.4 µm/m-°C
	70-1200	9.2 µin/in-°F	20-700	16.9 µm/m-°C
	70-1400	9.5 µin/in-°F	20-800	17.3 µm/m-°C
	70-1600	9.7 µin/in-°F	20-900	17.6 µm/m-°C
	70-1800	9.9 µin/in-°F	20-1000	17.8 µm/m-°C
Electrical Resistivity	400	44.4 µohm-in	200	113 µohm-cm
	800	46.3 µohm-in	400	117 µohm-cm
	1000	47.3 µohm-in	600	121 µohm-cm
	1200	48.2 µohm-in	700	123 µohm-cm
	1400	48.8 µohm-in	800	125 µohm-cm
	1600	49.4 µohm-in	900	126 µohm-cm
	1800	50.0 µohm-in	1000	127 µohm-cm

HEAT TREATMENT (Plate):

2250°F (1230°C)/15 min./WQ

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DYNAMIC MODULUS OF ELASTICITY:

Temp., °F	10 ⁶ psi	Temp., °C	GPa	Temp., °F	10 ⁶ psi	Temp., °C	GPa
70	28.6	20	197	1200	22.5	700	152
400	27.2	200	188	1400	21.3	800	143
800	24.9	400	174	1600	20.0	900	136
1000	23.6	600	159	1800	18.8	900	128

TYPICAL TENSILE PROPERTIES, PLATE:

Test Temperature		Ultimate Tensile Strength		0.2% Yield Strength		Elongation in 2 in (51mm)
°F	°C	ksi	MPa	ksi	MPa	%
ROOM	ROOM	106.5	735	45.6	375	50.0
1000	540	80.4	555	25.7	175	61.0
1200	650	73.0	505	24.9	170	59.8
1400	760	64.1	440	25.4	175	49.5
1600	870	47.5	325	27.0	185	50.8
1800	980	27.9	190	19.4	135	80.8
2000	1095	15.1	105	9.1	63	89.3
2200	1205	4.9	34	3.9	27	88.6

TYPICAL STRESS-RUPTURE STRENGTH, PLATE:

Temperature		Approximate Initial Stress, ksi (MPa) to Produce Rupture in:					
°F	(°C)	100 Hours		1,000 Hours		10,000 Hours	
1400	(760)	21.5	(150)	15.3	(105)	11.0	(76)
1500	(815)	15.3	(105)	11.0	(76)	7.8	(54)
1600	(870)	11.0	(76)	7.7	(53)	5.6	(39)
1700	(925)	7.8	(54)	5.2	(36)	3.4	(23)
1800	(980)	4.8	(33)	3.0	(21)	1.8	(12)
1900	(1040)	2.9	(20)	1.7	(12)	0.9	(6.2)
2000	(1095)	1.7	(12)	1.0	(6.9)	0.6	(4.1)

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