

HAYNES® X-750 alloy

CHEMISTRY: Weight %

Ni	Cr	Fe	Ti	Cb	Al	Co	Mn	Si	C
70 ^a	16	8	2.5	1	0.8	1*	0.35*	0.35*	0.08*

^a As Balance

*Maximum

ALLOY DESCRIPTION:

HAYNES X-750 (UNS No. N07750) alloy is an age-hardenable, nickel-base superalloy with very good strength at temperatures up to about 1600°F (870°C). It is widely used as a wrought material for forged and fabricated parts in aerospace and industrial applications. Its strength is somewhat less than that for HAYNES 718 alloy up to about 1400°F (760°C), and lower than that for HAYNES R-41 alloy at higher temperatures. Alloy X-750 can be cold-formed in the annealed condition, and may also be hot-formed at temperatures of about 1900°F (1040°C) or above. Weldability is somewhat limited by susceptibility to strain age cracking under conditions of heavy restraint. The alloy exhibits good resistance to oxidizing combustion gas environments at temperatures up to about 1600°F (870°C).

PHYSICAL PROPERTIES:

	Temp., °F	British Units	Temp., °C	Metric Units
Density	Room	0.298 lb/in ³	Room	8.26 g/cm ³
Melting Range	2540-2600		1395-1425	
Thermal Conductivity	400	98 BTU-in/ft ² -hr-°F	200	14.1 W/m-K
	800	120 BTU-in/ft ² -hr-°F	400	16.9 W/m-K
	1000	131 BTU-in/ft ² -hr-°F	600	19.8 W/m-K
	1200	143 BTU-in/ft ² -hr-°F	700	21.3 W/m-K
	1400	154 BTU-in/ft ² -hr-°F	800	22.7 W/m-K
	1600	164 BTU-in/ft ² -hr-°F	900	24.0 W/m-K
Mean Coefficient of Thermal Expansion	70-800	7.8 µin/in-°F	20-500	14.3 µm/m-°C
	70-1000	8.0 µin/in-°F	20-600	14.8 µm/m-°C
	70-1200	8.4 µin/in-°F	20-700	15.5 µm/m-°C
	70-1400	8.9 µin/in-°F	20-800	16.3 µm/m-°C
	70-1600	9.4 µin/in-°F	20-900	17.4 µm/m-°C
	70-1800	9.8 µin/in-°F	20-1000	17.9 µm/m-°C
Electrical Resistivity	70	47.7 µohm-in	20	121 µohm-cm
	400	48.8 µohm-in	200	124 µohm-cm
	800	50.5 µohm-in	400	126 µohm-cm
	1000	51.2 µohm-in	600	130 µohm-cm
	1200	51.3 µohm-in	700	129 µohm-cm
	1400	50.7 µohm-in	800	128 µohm-cm
	1600	49.8 µohm-in	900	126 µohm-cm

HEAT TREATMENT, SHEET AND STRIP (AMS 5598):

1900°F (1040°C)/Bright Anneal + 1350°F (730°C)/8 Hr./FC to 1150°F (620°C)/8 Hr./AC

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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	31.0	20	214	1200	25.5	700	176
400	29.2	200	201	1400	24.0	800	165
800	27.4	400	189	1600	22.1	900	152
1000	26.7	600	184	1800	20.0	1000	138

TYPICAL TENSILE PROPERTIES, SHEET (AMS 5598):

Test Temperature		Ultimate Tensile Strength		0.2% Yield Strength		Elongation in 2 in (51mm)
°F	°C	Ksi	MPa	Ksi	MPa	%
ROOM	ROOM	192.2	1325	141.1	975	23.6
1000	540	162.1	1120	124.9	860	22.2
1200	650	143.6	990	121.2	835	5.8
1400	760	94.3	650	92.0	635	2.5
1600	870	52.1	360	43.1	295	8.0
1800	980	16.6	115	9.1	63	42.0

TYPICAL STRESS-RUPTURE STRENGTH, SHEET (AMS 5598):

Test Temperature		Approximate Initial Stress, Ksi (MPa) to Produce Rupture in:					
°F	°C	10 Hours		100 Hours		1000 Hours	
1100	600	120	(825)	85	(585)	71	(490)
1200	650	80	(550)	66	(455)	50	(345)
1300	705	61	(420)	45	(310)	29	(200)
1400	760	41	(285)	26	(180)	15	(105)
1600	815	24	(165)	14	(97)	7.4	(51)
1700	870	12.5	(86)	6.6	(46)	-	-
1800	925	6.5	(45)	-	-	-	-

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