

HAYNES® X-750 alloy

Principle Features

HAYNES® X-750 (UNS N07750) alloy is an age-hardenable, nickel-base superalloy with a 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).

Nominal Composition

Weight %

Nickel:	70 Balance
Chromium:	16
Iron:	8
Titanium:	2.5
Columbium + Tantalum:	1
Aluminum:	0.8
Cobalt:	1 max.
Manganese:	0.35 max.
Silicon:	0.35 max.
Carbon:	0.08 max.

Stress-Rupture Data

Sheet (AMS 5598)

Test Temperature		Approximate Initial Stress to Produce Rupture in:					
		10 h		100 h		1000 h	
°F	°C	ksi	MPa	ksi	MPa	ksi	MPa
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	-	-	-	-

Heat Treatment

Sheet and Strip

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

Physical Properties

Physical Property	British Units		Metric Units	
Density	RT	0.298 lb/in. ³	RT	8.26 g/cm. ³
Melting Range	2540-2600°F	-	1395-1425°C	-
Electrical Resistivity	700°F	47.7 μohm.in	20°C	121 μohm.m
	400°F	48.8 μohm.in	200°C	124 μohm.m
	800°F	50.5 μohm.in	400°C	126 μohm.m
	1000°F	51.2 μohm.in	600°C	130 μohm.m
	1200°F	51.3 μohm.in	700°C	129 μohm.m
	1400°F	50.7 μohm.in	800°C	128 μohm.m
	1600°F	49.8 μohm.in	900°C	126 μohm.m
Thermal Conductivity	400°F	82 Btu.in/h.ft ² .°F	200°C	14.1 W/m.°C
	600°F	93 Btu.in/h.ft ² .°F	400°C	16.9 W/m.°C
	800°F	107 Btu.in/h.ft ² .°F	600°C	19.8 W/m.°C
	1000°F	120 Btu.in/h.ft ² .°F	700°C	21.3 W/m.°C
	1200°F	132 Btu.in/h.ft ² .°F	800°C	22.7 W/m.°C
	1400°F	147 Btu.in/h.ft ² .°F	900°C	24.0 W/m.°C
Mean Coefficient of Thermal Expansion	RT	-	RT	-
	70-800°F	7.8 μin/in.°F	20-500°C	14.3 μm/m-°C
	70-1000°F	8.0 μin/in.°F	20-600°C	14.8 μm/m-°C
	70-1200°F	8.4 μin/in.°F	20-700°C	15.5 μm/m-°C
	70-1400°F	8.9 μin/in.°F	20-800°C	16.3 μm/m-°C
	70-1600°F	9.4 μin/in.°F	20-900°C	17.4 μm/m-°C
	70-1800°F	9.8 μin/in.°F	20-1000°C	17.9 μm/m-°C
Dynamic Modulus of Elasticity	70°F	31.0 x 10 ⁶ psi	20°C	214 GPa
	400°F	29.2 x 10 ⁶ psi	200°C	201 GPa
	800°F	27.4 x 10 ⁶ psi	400°C	189 GPa
	1000°F	26.7 x 10 ⁶ psi	600°C	184 GPa
	1200°F	25.5 x 10 ⁶ psi	700°C	176 GPa
	1400°F	24.0 x 10 ⁶ psi	800°C	165 GPa
	1600°F	22.1 x 10 ⁶ psi	900°C	152 GPa
	1800°F	20.0 x 10 ⁶ psi	1000°C	138 GPa

RT= Room Temperature

Tensile Data

Sheet (AMS 5598)

Test Temperature		0.2% Yield Strength		Ultimate Tensile Strength		Elongation
°F	°C	ksi	MPa	ksi	MPa	%
RT	RT	141.1	975	192.2	1325	23.6
1000	538	124.9	860	162.1	1120	22.2
1200	649	121.1	835	143.6	990	5.8
1400	760	92	635	94.3	650	2.5
1600	871	43.1	295	52.1	360	8
1800	982	9.1	63	16.6	115	42

RT=Room Temperature

Specifications and Codes

Specifications

HAYNES® X-750 alloy (N07750)	
Sheet, Plate & Strip	AMS 5542 AMS 5598
Billet, Rod & Bar	AMS 5667 AMS 5668 AMS 5670 AMS 5671 AMS 5747
Coated Electrodes	-
Bare Welding Rods & Wire	AMS 5778 SFA 5.14/ A 5.14 (ERNiCrFe-8)
Seamless Pipe & Tube	-
Welded Pipe & Tube	-
Fittings	-
Forgings	AMS 5667 AMS 5668 AMS 5670 AMS 5671 AMS 5747 SB 637/B 637
DIN	No. 2.4669 NiCr15Fe7TiAl
Others	NACE MR0175 ISO 15156

Codes

HAYNES® X-750 alloy N07750	
MMPDS	6.3.6