

Haynes X-750 Nickel Alloy Sheet and Strip (AMS 5598, UNS N07750)

Category : Metal , Nonferrous Metal , Nickel Alloy

Material Notes:

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). Property data for samples Heat-treated at 1900°F(1040°C) and 1350°F(730°C)/8hr/FC to 1150°F(620°C)/8hr/AC. Data provided by the manufacturer, Haynes International, Inc.

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http://www.lookpolymers.com/polymer_Haynes-X-750-Nickel-Alloy-Sheet-and-Strip-AMS-5598-UNS-N07750.php

Physical Properties	Metric	English	Comments
Density	8.26 g/cc	0.298 lb/in ³	

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	115 MPa	16700 psi	
	@Temperature 980 °C	@Temperature 1800 °F	
	360 MPa	52200 psi	
	@Temperature 870 °C	@Temperature 1600 °F	
	650 MPa	94300 psi	
	@Temperature 760 °C	@Temperature 1400 °F	
	990 MPa	144000 psi	
@Temperature 650 °C	@Temperature 1200 °F		
1120 MPa	162000 psi		
@Temperature 540 °C	@Temperature 1000 °F		
1325 MPa	192200 psi		
@Temperature 25.0 °C	@Temperature 77.0 °F		
63.0 MPa	9140 psi		

Tensile Strength, Yield Mechanical Properties	Metric @Strain 0.200 %, Temperature 980 Å°C	English @Strain 0.200 %, Temperature 1800 Å°F	Comments
	295 MPa @Strain 0.200 %, Temperature 870 Å°C	42800 psi @Strain 0.200 %, Temperature 1600 Å°F	
	635 MPa @Strain 0.200 %, Temperature 760 Å°C	92100 psi @Strain 0.200 %, Temperature 1400 Å°F	
	835 MPa @Strain 0.200 %, Temperature 650 Å°C	121000 psi @Strain 0.200 %, Temperature 1200 Å°F	
	860 MPa @Strain 0.200 %, Temperature 540 Å°C	125000 psi @Strain 0.200 %, Temperature 1000 Å°F	
	975 MPa @Strain 0.200 %, Temperature 25.0 Å°C	141000 psi @Strain 0.200 %, Temperature 77.0 Å°F	
Elongation at Break	2.5 % @Temperature 760 Å°C	2.5 % @Temperature 1400 Å°F	2-inch (51 mm) sample
	5.8 % @Temperature 650 Å°C	5.8 % @Temperature 1200 Å°F	2-inch (51 mm) sample
	8.0 % @Temperature 870 Å°C	8.0 % @Temperature 1600 Å°F	2-inch (51 mm) sample
	22.2 % @Temperature 540 Å°C	22.2 % @Temperature 1000 Å°F	2-inch (51 mm) sample
	23.6 % @Temperature 25.0 Å°C	23.6 % @Temperature 77.0 Å°F	2-inch (51 mm) sample
	42 % @Temperature 980 Å°C	42 % @Temperature 1800 Å°F	2-inch (51 mm) sample
Rupture Strength	45.0 MPa @Temperature 925 Å°C, Time 36000 sec	6530 psi @Temperature 1700 Å°F, Time 10.0 hour	Initial Stress

Mechanical Properties	Metric	English	Comments
	46.0 MPa		
	@Temperature 870 Â°C, Time 360000 sec	@Temperature 1600 Â°F, Time 100 hour	Initial Stress
	51.0 MPa	7400 psi	
	@Temperature 815 Â°C, Time 3.60e+6 sec	@Temperature 1500 Â°F, Time 1000 hour	Initial Stress
	86.0 MPa	12500 psi	
	@Temperature 870 Â°C, Time 36000 sec	@Temperature 1600 Â°F, Time 10.0 hour	Initial Stress
	97.0 MPa	14100 psi	
	@Temperature 815 Â°C, Time 360000 sec	@Temperature 1500 Â°F, Time 100 hour	Initial Stress
	105 MPa	15200 psi	
	@Temperature 760 Â°C, Time 3.60e+6 sec	@Temperature 1400 Â°F, Time 1000 hour	Initial Stress
	165 MPa	23900 psi	
	@Temperature 815 Â°C, Time 36000 sec	@Temperature 1500 Â°F, Time 10.0 hour	Initial Stress
	180 MPa	26100 psi	
	@Temperature 760 Â°C, Time 360000 sec	@Temperature 1400 Â°F, Time 100 hour	Initial Stress
	200 MPa	29000 psi	
	@Temperature 705 Â°C, Time 3.60e+6 sec	@Temperature 1300 Â°F, Time 1000 hour	Initial Stress
	285 MPa	41300 psi	
	@Temperature 760 Â°C, Time 36000 sec	@Temperature 1400 Â°F, Time 10.0 hour	Initial Stress
	310 MPa	45000 psi	
	@Temperature 705 Â°C, Time 360000 sec	@Temperature 1300 Â°F, Time 100 hour	Initial Stress
	345 MPa	50000 psi	
	@Temperature 650 Â°C, Time 360000 sec	@Temperature 1200 Â°F, Time 1000 hour	Initial Stress

Mechanical Properties	Time 3.60e+6 sec Metric	°F English Time 1000 hour	Comments
	420 MPa @Temperature 705 °C, Time 36000 sec	60900 psi @Temperature 1300 °F, Time 10.0 hour	Initial Stress
	455 MPa @Temperature 650 °C, Time 360000 sec	66000 psi @Temperature 1200 °F, Time 100 hour	Initial Stress
	490 MPa @Temperature 600 °C, Time 3.60e+6 sec	71100 psi @Temperature 1110 °F, Time 1000 hour	Initial Stress
	550 MPa @Temperature 650 °C, Time 36000 sec	79800 psi @Temperature 1200 °F, Time 10.0 hour	Initial Stress
	585 MPa @Temperature 600 °C, Time 360000 sec	84800 psi @Temperature 1110 °F, Time 100 hour	Initial Stress
	825 MPa @Temperature 600 °C, Time 36000 sec	120000 psi @Temperature 1110 °F, Time 10.0 hour	Initial Stress
Modulus of Elasticity	138 GPa @Temperature 1000 °C	20000 ksi @Temperature 1830 °F	Dynamic
	152 GPa @Temperature 900 °C	22000 ksi @Temperature 1650 °F	Dynamic
	165 GPa @Temperature 800 °C	23900 ksi @Temperature 1470 °F	Dynamic
	176 GPa @Temperature 700 °C	25500 ksi @Temperature 1290 °F	Dynamic
	184 GPa @Temperature 600 °C	26700 ksi @Temperature 1110 °F	Dynamic

Mechanical Properties	189 GPa Metric	27400 ksi English	Comments
	@Temperature 400 Â°C	@Temperature 752 Â°F	
	201 GPa	29200 ksi	Dynamic
	@Temperature 200 Â°C	@Temperature 392 Â°F	
	214 GPa	31000 ksi	Dynamic
	@Temperature 20.0 Â°C	@Temperature 68.0 Â°F	

Thermal Properties	Metric	English	Comments
CTE, linear	14.3 Âµm/m-Â°C	7.94 Âµin/in-Â°F	
	@Temperature 20.0 - 500 Â°C	@Temperature 68.0 - 932 Â°F	
	14.8 Âµm/m-Â°C	8.22 Âµin/in-Â°F	
	@Temperature 20.0 - 600 Â°C	@Temperature 68.0 - 1110 Â°F	
	15.5 Âµm/m-Â°C	8.61 Âµin/in-Â°F	
	@Temperature 20.0 - 700 Â°C	@Temperature 68.0 - 1290 Â°F	
Thermal Conductivity	16.3 Âµm/m-Â°C	9.06 Âµin/in-Â°F	
	@Temperature 20.0 - 800 Â°C	@Temperature 68.0 - 1470 Â°F	
	17.4 Âµm/m-Â°C	9.67 Âµin/in-Â°F	
	@Temperature 20.0 - 900 Â°C	@Temperature 68.0 - 1650 Â°F	
	17.9 Âµm/m-Â°C	9.94 Âµin/in-Â°F	
	@Temperature 20.0 - 1000 Â°C	@Temperature 68.0 - 1830 Â°F	
	14.1 W/m-K	97.9 BTU-in/hr-ftÂ²- Â°F	
	@Temperature 200 Â°C	@Temperature 392 Â°F	
	16.9 W/m-K	117 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 400 Â°C	@Temperature 752 Â°F	
	19.8 W/m-K	137 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 600 Â°C	@Temperature 1110 Â°F	
	21.3 W/m-K	148 BTU-in/hr-ftÂ²-Â°F	
		@Temperature 1290	

Thermal Properties	@Temperature 700 Â°C Metric	Â°F English	Comments
	22.7 W/m-K	158 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 800 Â°C	@Temperature 1470 Â°F	
	24.0 W/m-K	167 BTU-in/hr-ftÂ²-Â°F	
	@Temperature 900 Â°C	@Temperature 1650 Â°F	
Melting Point	1395 - 1425 Â°C	2543 - 2597 Â°F	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.000121 ohm-cm	0.000121 ohm-cm	
	@Temperature 20.0 Â°C	@Temperature 68.0 Â°F	
	0.000124 ohm-cm	0.000124 ohm-cm	
	@Temperature 200 Â°C	@Temperature 392 Â°F	
	0.000125 ohm-cm	0.000125 ohm-cm	
	@Temperature 400 Â°C	@Temperature 752 Â°F	
	0.000126 ohm-cm	0.000126 ohm-cm	
	@Temperature 900 Â°C	@Temperature 1650 Â°F	
	0.000128 ohm-cm	0.000128 ohm-cm	
	@Temperature 800 Â°C	@Temperature 1470 Â°F	
	0.000129 ohm-cm	0.000129 ohm-cm	
	@Temperature 700 Â°C	@Temperature 1290 Â°F	
	0.000130 ohm-cm	0.000130 ohm-cm	
	@Temperature 600 Â°C	@Temperature 1110 Â°F	

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