

## Haynes Hastelloy® X alloy, sheet

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

### Material Notes:

Solid-solution-strengthened with very good high-temperature strength and very good resistance to oxidizing environments up to about 1095°C, and good carburization resistance. Applications include materials for fabricated or forged parts in gas turbine engines, and chemical and petrochemical plants, power plant and industrial heating applications. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Haynes-Hastelloy-X-alloy-sheet.php](http://www.lookpolymers.com/polymer_Haynes-Hastelloy-X-alloy-sheet.php)

Physical Properties	Metric	English	Comments
Density	8.22 g/cc	0.297 lb/in <sup>3</sup>	at RT.

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	765 MPa	111000 psi	
	97.0 MPa	14100 psi	
	@Temperature 1095 °C	@Temperature 2003 °F	
	175 MPa	25400 psi	
	@Temperature 980 °C	@Temperature 1800 °F	
	310 MPa	45000 psi	
	@Temperature 870 °C	@Temperature 1600 °F	
Tensile Strength, Yield	465 MPa	67400 psi	
	@Temperature 760 °C	@Temperature 1400 °F	
	570 MPa	82700 psi	
	@Temperature 650 °C	@Temperature 1200 °F	
	615 MPa	89200 psi	
	@Temperature 540 °C	@Temperature 1000 °F	
	380 MPa	55100 psi	
@Strain 0.200 %	@Strain 0.200 %		
	44.0 MPa	6380 psi	

Mechanical Properties	Metric @Strain 0.200 %, Temperature 1095 Å°C	English @Strain 0.200 %, Temperature 2003 Å°F	Comments
	91.0 MPa @Strain 0.200 %, Temperature 980 Å°C	13200 psi @Strain 0.200 %, Temperature 1800 Å°F	
	195 MPa @Strain 0.200 %, Temperature 870 Å°C	28300 psi @Strain 0.200 %, Temperature 1600 Å°F	
	235 MPa @Strain 0.200 %, Temperature 760 Å°C	34100 psi @Strain 0.200 %, Temperature 1400 Å°F	
	245 MPa @Strain 0.200 %, Temperature 540 Å°C	35500 psi @Strain 0.200 %, Temperature 1000 Å°F	
	245 MPa @Strain 0.200 %, Temperature 650 Å°C	35500 psi @Strain 0.200 %, Temperature 1200 Å°F	
Elongation at Break	44.2 %	44.2 %	in 51 mm
	49.5 % @Temperature 540 Å°C	49.5 % @Temperature 1000 Å°F	in 51 mm
	53.4 % @Temperature 760 Å°C	53.4 % @Temperature 1400 Å°F	in 51 mm
	54 % @Temperature 650 Å°C	54 % @Temperature 1200 Å°F	in 51 mm
	58.3 % @Temperature 870 Å°C	58.3 % @Temperature 1600 Å°F	in 51 mm
	59.8 % @Temperature 1095 Å°C	59.8 % @Temperature 2003 Å°F	in 51 mm
	65.1 % @Temperature 980 Å°C	65.1 % @Temperature 1800 Å°F	in 51 mm
Modulus of Elasticity	139 GPa @Temperature 1000	20200 ksi @Temperature 1830	

Mechanical Properties	<sup>°C</sup> Metric	<sup>°F</sup> English	Comments
	151 GPa	21900 ksi	
	@Temperature 900 °C	@Temperature 1650 °F	
	158 GPa	22900 ksi	
	@Temperature 800 °C	@Temperature 1470 °F	
	166 GPa	24100 ksi	
	@Temperature 700 °C	@Temperature 1290 °F	
	174 GPa	25200 ksi	
	@Temperature 600 °C	@Temperature 1110 °F	
	186 GPa	27000 ksi	
	@Temperature 400 °C	@Temperature 752 °F	
	197 GPa	28600 ksi	
	@Temperature 200 °C	@Temperature 392 °F	
	205 GPa	29700 ksi	
	@Temperature 20.0 °C	@Temperature 68.0 °F	

Thermal Properties	Metric	English	Comments
CTE, linear	15.0 µm/m-°C	8.33 µin/in-°F	
	@Temperature 20.0 - 500 °C	@Temperature 68.0 - 932 °F	
	15.3 µm/m-°C	8.50 µin/in-°F	
	@Temperature 20.0 - 600 °C	@Temperature 68.0 - 1110 °F	
	15.6 µm/m-°C	8.67 µin/in-°F	
	@Temperature 20.0 - 700 °C	@Temperature 68.0 - 1290 °F	
	16.0 µm/m-°C	8.89 µin/in-°F	
	@Temperature 20.0 - 800 °C	@Temperature 68.0 - 1470 °F	
	16.3 µm/m-°C	9.06 µin/in-°F	
	@Temperature 20.0 - 900 °C	@Temperature 68.0 - 1650 °F	

Thermal Properties	Metric $\mu\text{m/m-}\hat{\text{A}}^{\circ}\text{C}$	English $\text{in/in-}\hat{\text{A}}^{\circ}\text{F}$	Comments
	@Temperature 20.0 - 1000 $\hat{\text{A}}^{\circ}\text{C}$	@Temperature 68.0 - 1830 $\hat{\text{A}}^{\circ}\text{F}$	
Thermal Conductivity	16.9 W/m-K	117 BTU-in/hr-ft $\hat{\text{A}}^2$ - $\hat{\text{A}}^{\circ}\text{F}$	
	@Temperature 400 $\hat{\text{A}}^{\circ}\text{C}$	@Temperature 752 $\hat{\text{A}}^{\circ}\text{F}$	
	20.9 W/m-K	145 BTU-in/hr-ft $\hat{\text{A}}^2$ - $\hat{\text{A}}^{\circ}\text{F}$	
	@Temperature 600 $\hat{\text{A}}^{\circ}\text{C}$	@Temperature 1110 $\hat{\text{A}}^{\circ}\text{F}$	
	22.8 W/m-K	158 BTU-in/hr-ft $\hat{\text{A}}^2$ - $\hat{\text{A}}^{\circ}\text{F}$	
	@Temperature 700 $\hat{\text{A}}^{\circ}\text{C}$	@Temperature 1290 $\hat{\text{A}}^{\circ}\text{F}$	
	24.8 W/m-K	172 BTU-in/hr-ft $\hat{\text{A}}^2$ - $\hat{\text{A}}^{\circ}\text{F}$	
	@Temperature 800 $\hat{\text{A}}^{\circ}\text{C}$	@Temperature 1470 $\hat{\text{A}}^{\circ}\text{F}$	
	26.7 W/m-K	185 BTU-in/hr-ft $\hat{\text{A}}^2$ - $\hat{\text{A}}^{\circ}\text{F}$	
	@Temperature 900 $\hat{\text{A}}^{\circ}\text{C}$	@Temperature 1650 $\hat{\text{A}}^{\circ}\text{F}$	
	28.7 W/m-K	199 BTU-in/hr-ft $\hat{\text{A}}^2$ - $\hat{\text{A}}^{\circ}\text{F}$	
	@Temperature 1000 $\hat{\text{A}}^{\circ}\text{C}$	@Temperature 1830 $\hat{\text{A}}^{\circ}\text{F}$	
Melting Point	1260 - 1355 $\hat{\text{A}}^{\circ}\text{C}$	2300 - 2471 $\hat{\text{A}}^{\circ}\text{F}$	
Solidus	1260 $\hat{\text{A}}^{\circ}\text{C}$	2300 $\hat{\text{A}}^{\circ}\text{F}$	
Liquidus	1355 $\hat{\text{A}}^{\circ}\text{C}$	2471 $\hat{\text{A}}^{\circ}\text{F}$	
Maximum Service Temperature, Air	1095 $\hat{\text{A}}^{\circ}\text{C}$	2003 $\hat{\text{A}}^{\circ}\text{F}$	

Component Elements Properties	Metric	English	Comments
Boron, B	<= 0.0080 %	<= 0.0080 %	
Carbon, C	0.10 %	0.10 %	
Chromium, Cr	22 %	22 %	
Cobalt, Co	1.5 %	1.5 %	
Iron, Fe	18 %	18 %	
Manganese, Mn	<= 1.0 %	<= 1.0 %	
Molybdenum, Mo	9.0 %	9.0 %	

Component Elements Properties	Metric	English	Comments
Silicon, Si	<= 1.0 %	<= 1.0 %	
Tungsten, W	0.60 %	0.60 %	

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