

## Haynes 230® alloy, cold rolled and 1232°C solution annealed sheet

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

### Material Notes:

Excellent high-temperature strength, outstanding resistance to oxidizing environments up to 1149°C, premier resistance to nitriding environments, and excellent long-term thermal stability. Applications include combustion cans, transition ducts, flameholders, thermocouple sheaths and other gas turbine components; used for catalyst grid supports in ammonia burners, high-strength thermocouple protection tubes, high-temperature heat exchangers, ducts, high-temperature bellows; furnace retorts, chains and fixtures, burner flame shrouds, recuperator internals, dampers, nitriding furnace internals, heat-treating baskets, grates, trays, sparger tubes, and cyclone internals. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Haynes-230-alloy-cold-rolled-and-1232C-solution-annealed-sheet.php](http://www.lookpolymers.com/polymer_Haynes-230-alloy-cold-rolled-and-1232C-solution-annealed-sheet.php)

Physical Properties	Metric	English	Comments
Density	8.97 g/cc	0.324 lb/in <sup>3</sup>	at RT

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	860 MPa	125000 psi	
	55.0 MPa	7980 psi	
	@Temperature 1204 °C	@Temperature 2199 °F	
	79.0 MPa	11500 psi	
	@Temperature 1149 °C	@Temperature 2100 °F	
	120 MPa	17400 psi	
	@Temperature 1093 °C	@Temperature 1999 °F	
	225 MPa	32600 psi	
	@Temperature 982 °C	@Temperature 1800 °F	
	400 MPa	58000 psi	
@Temperature 871 °C	@Temperature 1600 °F		
585 MPa	84800 psi		
@Temperature 760 °C	@Temperature 1400 °F		
670 MPa	97200 psi		
@Temperature 649 °C	@Temperature 1200 °F		
710 MPa	103000 psi		
@Temperature 538 °C	@Temperature 1000 °F		

Mechanical Properties	390 MPa Metric	56600 psi English	Comments
	@Strain 0.200 %	@Strain 0.200 %	
	<b>26.0 MPa</b>	<b>3770 psi</b>	
	@Strain 0.200 %, Temperature 1204 °C	@Strain 0.200 %, Temperature 2199 °F	
	<b>39.0 MPa</b>	<b>5660 psi</b>	
	@Strain 0.200 %, Temperature 1149 °C	@Strain 0.200 %, Temperature 2100 °F	
	<b>57.0 MPa</b>	<b>8270 psi</b>	
	@Strain 0.200 %, Temperature 1093 °C	@Strain 0.200 %, Temperature 1999 °F	
	<b>120 MPa</b>	<b>17400 psi</b>	
	@Strain 0.200 %, Temperature 982 °C	@Strain 0.200 %, Temperature 1800 °F	
	<b>225 MPa</b>	<b>32600 psi</b>	
	@Strain 0.200 %, Temperature 871 °C	@Strain 0.200 %, Temperature 1600 °F	
	<b>270 MPa</b>	<b>39200 psi</b>	
	@Strain 0.200 %, Temperature 649 °C	@Strain 0.200 %, Temperature 1200 °F	
	<b>275 MPa</b>	<b>39900 psi</b>	
	@Strain 0.200 %, Temperature 538 °C	@Strain 0.200 %, Temperature 1000 °F	
	<b>285 MPa</b>	<b>41300 psi</b>	
	@Strain 0.200 %, Temperature 760 °C	@Strain 0.200 %, Temperature 1400 °F	
<b>Elongation at Break</b>	<b>47.7 %</b>	<b>47.7 %</b>	<b>in 50.8 mm</b>
	<b>31.2 %</b>	<b>31.2 %</b>	<b>in 50.8 mm</b>
	@Temperature 1204 °C	@Temperature 2199 °F	
	<b>39.5 %</b>	<b>39.5 %</b>	<b>in 50.8 mm</b>
	@Temperature 1149 °C	@Temperature 2100 °F	
	<b>46.1 %</b>	<b>46.1 %</b>	<b>in 50.8 mm</b>
	@Temperature 760 °C	@Temperature 1400 °F	
	<b>49.6 %</b>	<b>49.6 %</b>	<b>in 50.8 mm</b>
	@Temperature 1093 °C	@Temperature 1999 °F	

Mechanical Properties	Metric	English	Comments
	@Temperature 649 °C	@Temperature 1200 °F	
	55.7 %	55.7 %	in 50.8 mm
	@Temperature 538 °C	@Temperature 1000 °F	
	58.9 %	58.9 %	in 50.8 mm
	@Temperature 871 °C	@Temperature 1600 °F	
	70.5 %	70.5 %	in 50.8 mm
	@Temperature 982 °C	@Temperature 1800 °F	
<b>Modulus of Elasticity</b>	<b>211 GPa</b>	<b>30600 ksi</b>	<b>RT</b>
	150 GPa	21800 ksi	
	@Temperature 1000 °C	@Temperature 1830 °F	
	157 GPa	22800 ksi	
	@Temperature 900 °C	@Temperature 1650 °F	
	164 GPa	23800 ksi	
	@Temperature 800 °C	@Temperature 1470 °F	
	171 GPa	24800 ksi	
	@Temperature 700 °C	@Temperature 1290 °F	
	177 GPa	25700 ksi	
	@Temperature 600 °C	@Temperature 1110 °F	
	184 GPa	26700 ksi	
	@Temperature 500 °C	@Temperature 932 °F	
	190 GPa	27600 ksi	
	@Temperature 400 °C	@Temperature 752 °F	
	196 GPa	28400 ksi	
	@Temperature 300 °C	@Temperature 572 °F	
	202 GPa	29300 ksi	
	@Temperature 200 °C	@Temperature 392 °F	
	207 GPa	30000 ksi	
	@Temperature 100 °C	@Temperature 212 °F	
<b>Charpy Impact</b>	<b>73.0 J</b>	<b>53.8 ft-lb</b>	<b>solution annealed (unknown temp)</b>

Thermal Properties	Metric	English	Comments
CTE, linear	12.7 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	7.06 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$	
	@Temperature 25.0 - 100 $^{\circ}\text{C}$	@Temperature 77.0 - 212 $^{\circ}\text{F}$	
	13.0 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	7.22 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$	
	@Temperature 25.0 - 200 $^{\circ}\text{C}$	@Temperature 77.0 - 392 $^{\circ}\text{F}$	
	13.3 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	7.39 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$	
	@Temperature 25.0 - 300 $^{\circ}\text{C}$	@Temperature 77.0 - 572 $^{\circ}\text{F}$	
	13.7 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	7.61 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$	
	@Temperature 25.0 - 400 $^{\circ}\text{C}$	@Temperature 77.0 - 752 $^{\circ}\text{F}$	
	14.0 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	7.78 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$	
	@Temperature 25.0 - 500 $^{\circ}\text{C}$	@Temperature 77.0 - 932 $^{\circ}\text{F}$	
14.4 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	8.00 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$		
@Temperature 25.0 - 600 $^{\circ}\text{C}$	@Temperature 77.0 - 1110 $^{\circ}\text{F}$		
14.8 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	8.22 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$		
@Temperature 25.0 - 700 $^{\circ}\text{C}$	@Temperature 77.0 - 1290 $^{\circ}\text{F}$		
15.2 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	8.44 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$		
@Temperature 25.0 - 800 $^{\circ}\text{C}$	@Temperature 77.0 - 1470 $^{\circ}\text{F}$		
15.7 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	8.72 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$		
@Temperature 25.0 - 900 $^{\circ}\text{C}$	@Temperature 77.0 - 1650 $^{\circ}\text{F}$		
16.1 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$	8.94 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$		
@Temperature 25.0 - 1000 $^{\circ}\text{C}$	@Temperature 77.0 - 1830 $^{\circ}\text{F}$		
Specific Heat Capacity	0.397 J/g- $^{\circ}\text{C}$	0.0949 BTU/lb- $^{\circ}\text{F}$	RT
	0.419 J/g- $^{\circ}\text{C}$	0.100 BTU/lb- $^{\circ}\text{F}$	
	@Temperature 100 $^{\circ}\text{C}$	@Temperature 212 $^{\circ}\text{F}$	
	0.435 J/g- $^{\circ}\text{C}$	0.104 BTU/lb- $^{\circ}\text{F}$	
	@Temperature 200 $^{\circ}\text{C}$	@Temperature 392 $^{\circ}\text{F}$	

Thermal Properties	Metric J/g-°C	English BTU/lb-°F	Comments
	@Temperature 300 °C	@Temperature 572 °F	
	0.465 J/g-°C	0.111 BTU/lb-°F	
	@Temperature 400 °C	@Temperature 752 °F	
	0.473 J/g-°C	0.113 BTU/lb-°F	
	@Temperature 500 °C	@Temperature 932 °F	
	0.486 J/g-°C	0.116 BTU/lb-°F	
	@Temperature 600 °C	@Temperature 1110 °F	
	0.574 J/g-°C	0.137 BTU/lb-°F	
	@Temperature 700 °C	@Temperature 1290 °F	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.000125 ohm-cm	0.000125 ohm-cm	RT
	0.000125 ohm-cm	0.000125 ohm-cm	
	@Temperature 1000 °C	@Temperature 1830 °F	
	0.0001258 ohm-cm	0.0001258 ohm-cm	
	@Temperature 100 °C	@Temperature 212 °F	
	0.0001265 ohm-cm	0.0001265 ohm-cm	
	@Temperature 200 °C	@Temperature 392 °F	
	0.0001271 ohm-cm	0.0001271 ohm-cm	
	@Temperature 900 °C	@Temperature 1650 °F	
	0.0001273 ohm-cm	0.0001273 ohm-cm	
	@Temperature 300 °C	@Temperature 572 °F	
	0.0001284 ohm-cm	0.0001284 ohm-cm	
	@Temperature 400 °C	@Temperature 752 °F	
	0.0001291 ohm-cm	0.0001291 ohm-cm	
	@Temperature 800 °C	@Temperature 1470 °F	
	0.0001302 ohm-cm	0.0001302 ohm-cm	
	@Temperature 500 °C	@Temperature 932 °F	
	0.0001307 ohm-cm	0.0001307 ohm-cm	
	@Temperature 700 °C	@Temperature 1290 °F	

Electrical Properties	Metric 312 ohm-cm	English 312 ohm-cm	Comments
	@Temperature 600 °C	@Temperature 1110 °F	

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