

## Haynes Hastelloy® S alloy, flat products

Category : Metal , Nonferrous Metal , Nickel Alloy , Superalloy

### Material Notes:

Nickel-based, high temperature alloy. Excellent thermal stability, low thermal expansion, excellent oxidation resistance to 1093°C, good high temperature and thermal fatigue strength. Applications include seal rings in gas turbine engines, and severe cyclical heating conditions where it retains strength, ductility, and integrity. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Haynes-Hastelloy-S-alloy-flat-products.php](http://www.lookpolymers.com/polymer_Haynes-Hastelloy-S-alloy-flat-products.php)

Physical Properties	Metric	English	Comments
Density	8.75 g/cc	0.316 lb/in <sup>3</sup>	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell A	52	52	
	@Thickness 1.45 mm	@Thickness 0.0571 in	
	57	57	
	@Thickness 12.7 mm	@Thickness 0.500 in	
Tensile Strength, Ultimate	110 MPa	16000 psi	
	@Thickness 1.10 - 1.60 mm, Temperature 1093 °C	@Thickness 0.0433 - 0.0630 in, Temperature 1999 °F	
	117 MPa	17000 psi	
	@Thickness 9.50 - 25.4 mm, Temperature 1093 °C	@Thickness 0.374 - 1.00 in, Temperature 1999 °F	
	193 MPa	28000 psi	
	@Thickness 1.10 - 1.60 mm, Temperature 982 °C	@Thickness 0.0433 - 0.0630 in, Temperature 1800 °F	
	228 MPa	33100 psi	
	@Thickness 9.50 - 25.4 mm, Temperature 982 °C	@Thickness 0.374 - 1.00 in, Temperature 1800 °F	
	341 MPa	49500 psi	
	@Thickness 1.10 - 1.60 mm, Temperature 871 °C	@Thickness 0.0433 - 0.0630 in, Temperature 1600 °F	
	363 MPa	52600 psi	

Mechanical Properties	@Thickness 9.50 - 25.4 mm, Metric	@Thickness 0.374 - 1.00 in, English	Comments
	Temperature 871 Â°C	Temperature 1600 Â°F	
	<b>547 MPa</b>	<b>79300 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 760 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1400 Â°F	
	<b>574 MPa</b>	<b>83300 psi</b>	
	@Thickness 1.10 - 1.60 mm, Temperature 760 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 1400 Â°F	
	<b>683 MPa</b>	<b>99100 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 649 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1200 Â°F	
	<b>720 MPa</b>	<b>104000 psi</b>	
	@Thickness 1.10 - 1.60 mm, Temperature 649 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 1200 Â°F	
	<b>727 MPa</b>	<b>105000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 538 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1000 Â°F	
	<b>751 MPa</b>	<b>109000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 427 Â°C	@Thickness 0.374 - 1.00 in, Temperature 801 Â°F	
	<b>756 MPa</b>	<b>110000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 316 Â°C	@Thickness 0.374 - 1.00 in, Temperature 601 Â°F	
	<b>773 MPa</b>	<b>112000 psi</b>	
	@Thickness 1.10 - 1.60 mm, Temperature 538 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 1000 Â°F	
	<b>789 MPa</b>	<b>114000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 204 Â°C	@Thickness 0.374 - 1.00 in, Temperature 399 Â°F	
	<b>814 MPa</b>	<b>118000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 93.0 Â°C	@Thickness 0.374 - 1.00 in, Temperature 199 Â°F	

Mechanical Properties	844 MPa Metric	122000 psi English	Comments
	@Thickness 1.10 - 1.60 mm, Temperature 20.0 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 68.0 Â°F	
	<b>849 MPa</b>	<b>123000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 20.0 Â°C	@Thickness 0.374 - 1.00 in, Temperature 68.0 Â°F	
	<b>864 MPa</b>	<b>125000 psi</b>	
	@Thickness 12.7 mm, Temperature 20.0 Â°C	@Thickness 0.500 in, Temperature 68.0 Â°F	
	<b>887 MPa</b>	<b>129000 psi</b>	
	@Thickness 1.45 mm, Temperature 20.0 Â°C	@Thickness 0.0571 in, Temperature 68.0 Â°F	
<b>Tensile Strength, Yield</b>	<b>52.0 MPa</b>	<b>7540 psi</b>	<b>0.2% offset</b>
	@Thickness 1.10 - 1.60 mm, Temperature 1093 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 1999 Â°F	
	<b>61.0 MPa</b>	<b>8850 psi</b>	<b>0.2% offset</b>
	@Thickness 9.50 - 25.4 mm, Temperature 1093 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1999 Â°F	
	<b>110 MPa</b>	<b>16000 psi</b>	<b>0.2% offset</b>
	@Thickness 1.10 - 1.60 mm, Temperature 982 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 1800 Â°F	
	<b>135 MPa</b>	<b>19600 psi</b>	<b>0.2% offset</b>
	@Thickness 9.50 - 25.4 mm, Temperature 982 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1800 Â°F	
	<b>218 MPa</b>	<b>31600 psi</b>	<b>0.2% offset</b>
	@Thickness 1.10 - 1.60 mm, Temperature 871 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 1600 Â°F	
	<b>233 MPa</b>	<b>33800 psi</b>	<b>0.2% offset</b>
	@Thickness 9.50 - 25.4 mm, Temperature 871 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1600 Â°F	
	<b>271 MPa</b>	<b>39300 psi</b>	<b>0.2% offset</b>
	@Thickness 9.50 - 25.4 mm, Temperature 760 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1400 Â°F	

Mechanical Properties	274 MPa Metric	39700 psi English	Comments 0.2% offset
	@Thickness 9.50 - 25.4 mm, Temperature 649 Å°C	@Thickness 0.374 - 1.00 in, Temperature 1200 Å°F	
	<b>283 MPa</b>	<b>41000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 538 Å°C	@Thickness 0.374 - 1.00 in, Temperature 1000 Å°F	0.2% offset
	<b>291 MPa</b>	<b>42200 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 316 Å°C	@Thickness 0.374 - 1.00 in, Temperature 601 Å°F	0.2% offset
	<b>297 MPa</b>	<b>43100 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 427 Å°C	@Thickness 0.374 - 1.00 in, Temperature 801 Å°F	0.2% offset
	<b>311 MPa</b>	<b>45100 psi</b>	
	@Thickness 1.10 - 1.60 mm, Temperature 760 Å°C	@Thickness 0.0433 - 0.0630 in, Temperature 1400 Å°F	0.2% offset
	<b>322 MPa</b>	<b>46700 psi</b>	
	@Thickness 1.10 - 1.60 mm, Temperature 649 Å°C	@Thickness 0.0433 - 0.0630 in, Temperature 1200 Å°F	0.2% offset
	<b>331 MPa</b>	<b>48000 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 204 Å°C	@Thickness 0.374 - 1.00 in, Temperature 399 Å°F	0.2% offset
	<b>338 MPa</b>	<b>49000 psi</b>	
	@Thickness 1.10 - 1.60 mm, Temperature 538 Å°C	@Thickness 0.0433 - 0.0630 in, Temperature 1000 Å°F	0.2% offset
	<b>365 MPa</b>	<b>52900 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 93.0 Å°C	@Thickness 0.374 - 1.00 in, Temperature 199 Å°F	0.2% offset
	<b>365 MPa</b>	<b>52900 psi</b>	
	@Thickness 12.7 mm, Temperature 20.0 Å°C	@Thickness 0.500 in, Temperature 68.0 Å°F	0.2% offset
	<b>383 MPa</b>	<b>55500 psi</b>	
	@Thickness 9.50 - 25.4 mm, Temperature 20.0 Å°C	@Thickness 0.374 - 1.00 in, Temperature 68.0 Å°F	0.2% offset

Mechanical Properties	Metric	English	Comments
	@Thickness 1.45 mm, Temperature 20.0 Â°C	@Thickness 0.0571 in, Temperature 68.0 Â°F	0.2% offset
	<b>444 MPa</b>  @Thickness 1.10 - 1.60 mm, Temperature 20.0 Â°C	<b>64400 psi</b>  @Thickness 0.0433 - 0.0630 in, Temperature 68.0 Â°F	0.2% offset
<b>Elongation at Break</b>	<b>46 %</b>  @Thickness 1.10 - 1.60 mm, Temperature 982 Â°C	<b>46 %</b>  @Thickness 0.0433 - 0.0630 in, Temperature 1800 Â°F	in 50.8 mm
	<b>47 %</b>  @Thickness 1.10 - 1.60 mm, Temperature 871 Â°C	<b>47 %</b>  @Thickness 0.0433 - 0.0630 in, Temperature 1600 Â°F	in 50.8 mm
	<b>49 %</b>  @Thickness 1.10 - 1.60 mm, Temperature 20.0 Â°C	<b>49 %</b>  @Thickness 0.0433 - 0.0630 in, Temperature 68.0 Â°F	in 50.8 mm
	<b>50 %</b>  @Thickness 1.10 - 1.60 mm, Temperature 538 Â°C	<b>50 %</b>  @Thickness 0.0433 - 0.0630 in, Temperature 1000 Â°F	in 50.8 mm
	<b>54 %</b>  @Thickness 12.7 mm, Temperature 20.0 Â°C	<b>54 %</b>  @Thickness 0.500 in, Temperature 68.0 Â°F	in 50.8 mm
	<b>55 %</b>  @Thickness 9.50 - 25.4 mm, Temperature 20.0 Â°C	<b>55 %</b>  @Thickness 0.374 - 1.00 in, Temperature 68.0 Â°F	in 50.8 mm
	<b>56 %</b>  @Thickness 1.10 - 1.60 mm, Temperature 649 Â°C	<b>56 %</b>  @Thickness 0.0433 - 0.0630 in, Temperature 1200 Â°F	in 50.8 mm
	<b>57 %</b>  @Thickness 9.50 - 25.4 mm, Temperature 871 Â°C	<b>57 %</b>  @Thickness 0.374 - 1.00 in, Temperature 1600 Â°F	in 50.8 mm
	<b>58 %</b>  @Thickness 1.45 mm, Temperature 20.0 Â°C	<b>58 %</b>  @Thickness 0.0571 in, Temperature 68.0 Â°F	in 50.8 mm

Mechanical Properties	59 % Metric	59 % English	Comments
	@Thickness 9.50 - 25.4 mm, Temperature 204 Â°C	@Thickness 0.374 - 1.00 in, Temperature 399 Â°F	in 50.8 mm
	59 %	59 %	
	@Thickness 9.50 - 25.4 mm, Temperature 649 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1200 Â°F	in 50.8 mm
	60 %	60 %	
	@Thickness 9.50 - 25.4 mm, Temperature 93.0 Â°C	@Thickness 0.374 - 1.00 in, Temperature 199 Â°F	in 50.8 mm
	61 %	61 %	
	@Thickness 9.50 - 25.4 mm, Temperature 538 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1000 Â°F	in 50.8 mm
	62 %	62 %	
	@Thickness 9.50 - 25.4 mm, Temperature 427 Â°C	@Thickness 0.374 - 1.00 in, Temperature 801 Â°F	in 50.8 mm
	62 %	62 %	
	@Thickness 9.50 - 25.4 mm, Temperature 982 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1800 Â°F	in 50.8 mm
	63 %	63 %	
	@Thickness 9.50 - 25.4 mm, Temperature 316 Â°C	@Thickness 0.374 - 1.00 in, Temperature 601 Â°F	in 50.8 mm
	69 %	69 %	
	@Thickness 9.50 - 25.4 mm, Temperature 760 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1400 Â°F	in 50.8 mm
	69 %	69 %	
	@Thickness 9.50 - 25.4 mm, Temperature 1093 Â°C	@Thickness 0.374 - 1.00 in, Temperature 1999 Â°F	in 50.8 mm
	70 %	70 %	
	@Thickness 1.10 - 1.60 mm, Temperature 760 Â°C	@Thickness 0.0433 - 0.0630 in, Temperature 1400 Â°F	in 50.8 mm
	75 %	75 %	
	@Thickness 1.10 - 1.60 mm,	@Thickness 0.0433 - 0.0630 in,	in 50.8 mm

Mechanical Properties	Temperature 1093 Â°C Metric	Temperature 1999 Â°F English	Comments
Modulus of Elasticity	132 GPa	19100 ksi	Heat treated at 1066Â°C, air cooled
	@Temperature 1093 Â°C	@Temperature 1999 Â°F	
	151 GPa	21900 ksi	Heat treated at 1066Â°C, air cooled
	@Temperature 927 Â°C	@Temperature 1700 Â°F	
	161 GPa	23400 ksi	Heat treated at 1066Â°C, air cooled
	@Temperature 813 Â°C	@Temperature 1500 Â°F	
	166 GPa	24100 ksi	Heat treated at 1066Â°C, air cooled
	@Temperature 760 Â°C	@Temperature 1400 Â°F	
	174 GPa	25200 ksi	Heat treated at 1066Â°C, air cooled
	@Temperature 649 Â°C	@Temperature 1200 Â°F	
	182 GPa	26400 ksi	Heat treated at 1066Â°C, air cooled
	@Temperature 538 Â°C	@Temperature 1000 Â°F	
	194 GPa	28100 ksi	Heat treated at 1066Â°C, air cooled
	@Temperature 357 Â°C	@Temperature 675 Â°F	

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