

# HAYNES<sup>®</sup> 230<sup>®</sup> alloy

## Physical Properties

Physical Property	British Units		Metric Units	
Density	RT	0.324 lb/in <sup>3</sup>	RT	8.97 g/cm <sup>3</sup>
Melting Temperature	2400-2570°F	-	1301-1371°C	-
Electrical Resistivity	RT	49.2 μohm-in	RT	125.0 μohm-cm
	200°F	49.5 μohm-in	100°C	125.8 μohm-cm
	400°F	49.8 μohm-in	200°C	126.5 μohm-cm
	600°F	50.2 μohm-in	300°C	127.3 μohm-cm
	800°F	50.7 μohm-in	400°C	128.4 μohm-cm
	1000°F	51.5 μohm-in	500°C	130.2 μohm-cm
	1200°F	51.6 μohm-in	600°C	131.2 μohm-cm
	1400°F	51.1 μohm-in	700°C	130.7 μohm-cm
	1600°F	50.3 μohm-in	800°C	129.1 μohm-cm
	1800°F	49.3 μohm-in	900°C	127.1 μohm-cm
	-	-	1000°C	125.0 μohm-cm
Thermal Diffusivity	RT	3.8 x 10 <sup>-3</sup> in <sup>2</sup> /sec	RT	24.2 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	200°F	4.1 x 10 <sup>-3</sup> in <sup>2</sup> /sec	100°C	26.8 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	400°F	4.7 x 10 <sup>-3</sup> in <sup>2</sup> /sec	200°C	29.9 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	600°F	5.2 x 10 <sup>-3</sup> in <sup>2</sup> /sec	300°C	32.9 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	800°F	5.6 x 10 <sup>-3</sup> in <sup>2</sup> /sec	400°C	35.7 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	1000°F	6.1 x 10 <sup>-3</sup> in <sup>2</sup> /sec	500°C	38.5 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	1200°F	6.5 x 10 <sup>-3</sup> in <sup>2</sup> /sec	600°C	41.9 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	1400°F	6.7 x 10 <sup>-3</sup> in <sup>2</sup> /sec	700°C	43.0 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	1600°F	6.7 x 10 <sup>-3</sup> in <sup>2</sup> /sec	800°C	43.2 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	1800°F	7.3 x 10 <sup>-3</sup> in <sup>2</sup> /sec	900°C	44.4 x 10 <sup>-3</sup> cm <sup>2</sup> /s
	-	-	1000°C	48.2 x 10 <sup>-3</sup> cm <sup>2</sup> /s
Thermal Conductivity	RT	62 Btu-in/ft <sup>2</sup> -hr-°F	RT	8.9 W/m-°C
	200°F	71 Btu-in/ft <sup>2</sup> -hr-°F	100°C	10.4 W/m-°C
	400°F	87 Btu-in/ft <sup>2</sup> -hr-°F	200°C	12.4 W/m-°C
	600°F	102 Btu-in/ft <sup>2</sup> -hr-°F	300°C	14.4 W/m-°C
	800°F	118 Btu-in/ft <sup>2</sup> -hr-°F	400°C	16.4 W/m-°C
	1000°F	133 Btu-in/ft <sup>2</sup> -hr-°F	500°C	18.4 W/m-°C
	1200°F	148 Btu-in/ft <sup>2</sup> -hr-°F	600°C	20.4 W/m-°C
	1400°F	164 Btu-in/ft <sup>2</sup> -hr-°F	700°C	22.4 W/m-°C
	1600°F	179 Btu-in/ft <sup>2</sup> -hr-°F	800°C	24.4 W/m-°C
	1800°F	195 Btu-in/ft <sup>2</sup> -hr-°F	900°C	26.4 W/m-°C
	-	-	1000°C	28.4 W/m-°C

<b>Specific Heat</b>	RT	0.095 Btu/lb-°F	RT	397 J/kg·°C
	200°F	0.099 Btu/lb-°F	100°C	419 J/kg·°C
	400°F	0.104 Btu/lb-°F	200°C	435 J/kg·°C
	600°F	0.108 Btu/lb-°F	300°C	448 J/kg·°C
	800°F	0.112 Btu/lb-°F	400°C	465 J/kg·°C
	1000°F	0.112 Btu/lb-°F	500°C	473 J/kg·°C
	1200°F	0.134 Btu/lb-°F	600°C	486 J/kg·°C
	1400°F	0.140 Btu/lb-°F	700°C	574 J/kg·°C
	1600°F	0.145 Btu/lb-°F	800°C	595 J/kg·°C
	1800°F	0.147 Btu/lb-°F	900°C	609 J/kg·°C
	-	-	1000°C	617 J/kg·°C
<b>Mean Coefficient of Thermal Expansion</b>	70-200°F	6.5 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-100°C	$11.8 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-400°F	6.9 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-200°C	$12.4 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-600°F	7.2 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-300°C	$12.8 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-800°F	7.4 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-400°C	$13.2 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-1000°F	7.6 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-500°C	$13.6 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-1200°F	8.0 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-600°C	$14.1 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-1400°F	8.3 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-700°C	$14.7 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-1600°F	8.6 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-800°C	$15.2 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	70-1800°F	8.9 $\mu\text{in/in} \cdot ^\circ\text{F}$	25-900°C	$15.7 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
	-	-	25-1000°C	$16.1 \times 10^{-6} \text{m/m} \cdot ^\circ\text{C}$
<b>Dynamic Modulus of Elasticity</b>	RT	30.3 mpsi	RT	209 GPa
	200°F	30.1 mpsi	100°C	207 GPa
	400°F	29.0 mpsi	200°C	200 GPa
	600°F	27.8 mpsi	300°C	193 GPa
	800°F	26.8 mpsi	400°C	186 GPa
	1000°F	25.9 mpsi	500°C	181 GPa
	1200°F	24.9 mpsi	600°C	175 GPa
	1400°F	23.6 mpsi	700°C	168 GPa
	1600°F	22.2 mpsi	800°C	159 GPa
	1800°F	20.7 mpsi	900°C	150 GPa
	2000°F	19.1 mpsi	1000°C	141 GPa

<b>Dynamic Shear Modulus</b>	RT	11.5 mpsi	RT	79 GPa
	200°F	11.4 mpsi	100°C	79 GPa
	400°F	11.0 mpsi	200°C	76 GPa
	600°F	10.5 mpsi	300°C	73 GPa
	800°F	10.1 mpsi	400°C	70 GPa
	1000°F	9.7 mpsi	500°C	67 GPa
	1200°F	9.3 mpsi	600°C	64 GPa
	1400°F	8.8 mpsi	700°C	61 GPa
	1600°F	8.2 mpsi	800°C	57 GPa
	1800°F	7.6 mpsi	900°C	52 GPa
	2000°F	7.0 mpsi	1000°C	48 GPa
<b>Poisson's Ratio</b>	RT	0.31	RT	0.31
	200°F	0.31	100°C	0.31
	400°F	0.32	200°C	0.32
	600°F	0.32	300°C	0.32
	800°F	0.33	400°C	0.33
	1000°F	0.33	500°C	0.33
	1200°F	0.34	600°C	0.34
	1400°F	0.34	700°C	0.34
	1600°F	0.35	800°C	0.34
	1800°F	0.36	900°C	0.35

\*RT= Room Temperature

## Thermal Expansion Characteristics

HAYNES® 230® alloy has relatively low thermal expansion characteristics compared to most high-strength superalloys, iron-nickel-chromium alloys, and austenitic stainless steels. This means lower thermal stresses in service for complex component fabrications, as well as tighter control over critical part dimensions and clearances.

