

HAYNES® 617 alloy

Principal Features

HAYNES® 617 alloy (UNS N06617) is a nickel-chromium-cobalt-molybdenum alloy with a good combination of metallurgical stability, strength, and oxidation resistance at high temperatures. The alloy is readily formed and welded by conventional techniques. HAYNES® 617 alloy is used in applications such as gas turbines for combustion cans, ducting, and transition lines. For modern application, HAYNES® 230® alloy should be considered as a replacement (ask for brochure H-3000).

Nominal Composition

Weight %

Nickel:	54 Balance
Cobalt:	12.5
Chromium:	22
Molybdenum:	9
Manganese:	0.2 max.
Silicon:	0.2 max.
Iron:	1
Titanium:	0.3
Aluminum:	1.2
Carbon:	0.07
Boron:	0.006 max.

Physical Properties

Physical Property	British Units		Metric Units	
Density	RT	8.36 g/cm ³	RT	0.302 lb/in ³
Melting Range	2430- 2510°F	-	1330-1375°C	-
Electrical Resistivity	70°F	48.1 μohm-in	20°C	122 μohm-cm
	400°F	49.5 μohm-in	200°C	126 μohm-cm
	800°F	50.3 μohm-in	400°C	128 μohm-cm
	1000°F	51.5 μohm-in	600°C	131 μohm-cm
	1200°F	52.4 μohm-in	700°C	133 μohm-cm
	1400°F	52.8 μohm-in	800°C	134 μohm-cm
	1600°F	52.7 μohm-in	900°C	134 μohm-cm
Thermal Conductivity	70°F	113 Btu-in/ft ² -hr-°F	200°C	16.1 W/m-°C
	400°F	137 Btu-in/ft ² -hr-°F	430°C	19.5 W/m-°C
	800°F	149 Btu-in/ft ² -hr-°F	540°C	21.2 W/m-°C
	1000°F	161 Btu-in/ft ² -hr-°F	650°C	23.0 W/m-°C
	1200°F	173 Btu-in/ft ² -hr-°F	760°C	24.7 W/m-°C
	1400°F	185 Btu-in/ft ² -hr-°F	870°C	26.4 W/m-°C
	1600°F	113 Btu-in/ft ² -hr-°F	200°C	16.1 W/m-°C
Mean Coefficient of Thermal Expansion	70-800°F	7.6 μin/in-°F	20-430°C	134 μohm-cm
	70-1000°F	7.7 μin/in-°F	20-540°C	13.6 μm/m-°C
	70-1200°F	8.0 μin/in-°F	20-650°C	13.8 μm/m-°C
	70-1400°F	8.4 μin/in-°F	20-760°C	14.4 μm/m-°C
	70-1600°F	8.7 μin/in-°F	20-870°C	15.1 μm/m-°C
	70-1800°F	9.0 μin/in-°F	20-980°C	15.6 μm/m-°C
	70-800°F	7.6 μin/in-°F	20-430°C	16.1 μm/m-°C
Dynamic Modulus of Elasticity	70°F	30.6 x 10 ⁶ psi	20°C	211 GPa
	400°F	29.0 x 10 ⁶ psi	200°C	201 GPa
	800°F	26.9 x 10 ⁶ psi	400°C	188 GPa
	1000°F	25.8 x 10 ⁶ psi	600°C	173 GPa
	1200°F	24.6 x 10 ⁶ psi	700°C	166 GPa
	1400°F	23.3 x 10 ⁶ psi	800°C	157 GPa
	1600°F	21.9 x 10 ⁶ psi	900°C	149 GPa

RT= Room Temperature

Tensile Properties

Typical Tensile Properties, Plate

Test Temperature		0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation
°F	°C	ksi	MPa	ksi	MPa	%
RT	RT	53	367	113	779	52
1000	538	37	254	90	618	67
1200	649	35	239	91	627	67
1400	760	36	245	70	483	92
1600	871	30	207	41	286	99
1800	982	16	111	22	155	93
2000	1093	8	58	11	79	91

Stress-Rupture Strength

Typical Stress-Rupture Strength, Plate

Test Temperature		Approximate Initial Stress, Ksi (MPa) to Produce Rupture in:					
		100 h		1000 h		10,000 h	
°F	°C	ksi	MPa	ksi	MPa	ksi	MPa
1200	650	55	379	44	303	33.5	231
1400	760	29	200	19.5	134	14.5	100
1600	870	13	90	9.7	67	6.8	47
1800	980	6.06	46	4.1	28	2.5	17
1900	1040	4.1	28	2.5	17	-	-
2000	1095	2.05	17	1.4	9.7	-	-

Specifications and Codes

Specifications

HAYNES® 617 alloy (N06617, W86117)	
Sheet, Plate & Strip	AMS 5888 AMS 5889 SB 168/B 168 P= 43
Billet, Rod & Bar	SB 166/B 166 B 472 AMS 5887 P= 43
Coated Electrodes	SFA 5.11/ A 5.11 (ENiCrCoMo-1) F= 43
Bare Welding Rods & Wire	SFA 5.14/ A 5.14 (ERNiCrCoMo-1) F= 43
Seamless Pipe & Tube	SB 167/B 167 P= 43
Welded Pipe & Tube	-
Fittings	-
Forgings	SB 564/B 564 P= 43
DIN	-
Others	-

Codes

HAYNES® 617 alloy (N06617, W86117)				
ASME	Section I	1650°F (899°C) ¹		
	Section III	Class 1	-	
		Class 2	-	
		Class 3	-	
	Section IV	HF-300.2	-	
	Section VIII	Div. 1	1800°F (982°C) ¹ Code Case 2776 1650°F (899°C) ²	
		Div. 2	-	
	Section XII	-	-	
	B16.5	-	-	
	B16.34	-	-	
	B31.1	1200°F (649°C) ¹		
	B31.3	-		

¹Approved material forms: Plate, Sheet, Bar, Forgings, seamless pipe/tube

²Approved material forms: Bolting