

MICROFABRICA™

MICROFABRICA MATERIALS DOSSIER
Material Properties





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Palladium Materials Data Sheet

Microfabrica Materials Dossier

Composition

Palladium	99.99%	99.99%
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Physical Properties

Crystal Structure	FCC	FCC
Resistivity @ RT	14.9 $\mu\text{ohm-cm}$	5.87 $\mu\text{ohm-in}$
Density	12 g/cc	0.43 lb/in ³
Thermal Conductivity (RT)	71 W/m-K	494 BTU-in/hr-ft ²
CTE (RT)	11.76 $\mu\text{m/m-}^\circ\text{C}$	6.5 $\mu\text{in/in-}^\circ\text{F}$
Melting Point	1552 $^\circ\text{C}$	2826 $^\circ\text{F}$

Mechanical Properties*

Yield Strength (0.2%)	1,100 MPa	160 x 10 ³ psi
Young's Modulus	110 GPa	16 x 10 ⁶ psi
Tensile Elongation	5%	5%
Ultimate Tensile Strength	1,500 MPa	220 x 10 ³ psi
Hardness	400 HV	41 HRC
Poissons Ratio	0.39	0.39



Valloy-120™ Materials Data Sheet

Microfabrica Materials Dossier

Composition

Nickel	80%	80%
Cobalt	20%	20%

Physical Properties

Crystal Structure	FCC	FCC
Resistivity @ RT	11.6 $\mu\text{ohm-cm}$	4.57 $\mu\text{ohm-in}$
Density	8.9 g/cc	0.32 lb/in ³
Thermal Conductivity (RT)	91 W/m-K	631 BTU-in/hr-ft ²
CTE (RT)	13.4 $\mu\text{m/m-}^\circ\text{C}$	7.4 $\mu\text{in/in-}^\circ\text{F}$
Melting Point	1726 $^\circ\text{C}$	3139 $^\circ\text{F}$

Mechanical Properties¹⁾

Yield Strength (0.2%)	900 MPa	130 x 10 ³ psi
Young's Modulus	170 GPa	25 x 10 ⁶ psi
Tensile Elongation	3%	3%
Ultimate Tensile Strength	1,100 MPa	160 x 10 ³ psi
Hardness	425 HV	43 HRC
Poissons Ratio	0.31	0.31



Palladium Materials Comparison Table

Microfabrica Materials Dossier

		Pt-10% Ir as cast/drawn	Microfabrica Palladium (as fabricated)
UTS	MPa	896	1,500
Elongation		1-2%	5%
Hardness	HV (Vickers)	150-180	400
Modulus of Elasticity	GPa	200-215	110
Electrical Resistivity (@20C)	ohm - meters	2.50E-07	1.49E-07
CTE (0-100C)	/K	8.40E-06	1.18E-05

		Pt-10% Ir as cast/drawn	Microfabrica Palladium (as fabricated)
UTS	ksi	130	220
Elongation		1-2%	5%
Hardness	HV (Vickers)	150-180	400
Modulus of Elasticity	10 ⁶ psi	29-31.2	16
Electrical Resistivity (@68F)	ohm - in	9.84E-06	5.87E-06
CTE (32-212F)	/F	4.67E-06	6.56E-06



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Valloy-120™ Materials Comparison Table

Microfabrica Materials Dossier

		Stainless Alloys			Microfabrica
		304 (half hard)	304 (Full hard)	17-4 H900	Valloy
UTS	MPa	1035	1275	1340	1,100
Yield .2%	MPa	760	965	1240	900
Elongation		10%	2-5%	7%	3%
Hardness	Rockwell C	30-32	40	44	43
Modulus of Elasticity	GPa	200	200	196	170
Electrical Resistivity (@20C)	ohm - meters	7.20E-07	7.20E-07	7.70E-07	1.16E-07
CTE (0-100C)	/K	1.66E-05	1.66E-05	1.08E-05	1.34E-05

		Stainless Alloys			Microfabrica
		304 (half hard)	304 (Full hard)	17-4 H900	Valloy
UTS	ksi	150	185	195	160
Yield .2%	ksi	110	140	180	130
Elongation		10%	2-5%	7%	3%
Hardness	Rockwell C	30-32	40	44	43
Modulus of Elasticity	10 ⁶ psi	29	2900%	28	25
Electrical Resistivity (@68F)	ohm - in	2.84E-05	2.84E-05	3.03E-05	4.57E-06
CTE (32-212F)	/F	9.20E-06	9.20E-06	6.00E-06	7.44E-06

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