Kovar® Alloy (Glass and Ceramic Sealing Alloy)

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Subcategory: Electronic/Magnetic Alloy; Metal; Superalloy

Key Words: Superalloy; UNS K94610; ASTM F15, 29-17 alloy

Component	Wt. %
C	Max 0.02
Co	17
Fe	53
Mn	0.3
Ni	29
Si	0.2

Material Notes:
Iron content calculated as remainder. Data provided by Carpenter Technology Corporation.

Kovar® alloy is a vacuum melted, Fe-Ni-Co, low expansion alloy whose chemical composition is controlled within narrow limits to assure precise uniform thermal expansion properties.

Kovar® alloy has been used for making hermetic seals with the harder Pyrex glasses and ceramic materials. This alloy has found wide application in power tubes, microwave tubes, transistors, and diodes. In integrated circuits, it has been used for the flat pack and the dual-in-line package.

Physical Properties	Metric	English	Comments
Density	8.36 g/cc	0.302 lb/in³	
Mechanical Properties			
Hardness, Brinell	120	120	
Hardness, Rockwell B	68	68	
Tensile Strength, Ultimate	517 MPa	75000 psi	
Tensile Strength, Yield	345 MPa	50000 psi	
Elongation at Break	30 %	30 %	in 50.8 mm
Modulus of Elasticity	138 GPa	20000 ksi	
Poisson's Ratio	0.317	0.317	
Shear Modulus	51.7 GPa	7500 ksi	
Electrical Properties			
Electrical Resistivity	4.9e-005 ohm-cm	4.9e-005 ohm-cm	
Curie Temperature	435 °C	815 °F	
Thermal Properties			
CTE, linear 20°C	5.86 µm/m-°C	3.26 µin/in-°F	from 25-100°C (77-212°F)
CTE, linear 250°C	5.13 µm/m-°C	2.85 µin/in-°F	from 25-300°C (77-570°F); 4.9 µm/m°C from 30-
CTE, linear 500°C	6.15 µm/m-°C	3.42 µin/in-°F	from 25-500°C (77-930°F);
CTE, linear 1000°C	11.26 µm/m-°C	6.26 µin/in-°F	25-900°C
Heat Capacity	0.439 J/g-°C	0.105 BTU/lb-°F	at 0°C (32°F); 0.649 J/g-°C at 430°C (805°F)
Thermal Conductivity	17.3 W/m-K	120 BTU-in/hr-ft²-°F	
Melting Point	1450 °C	2640 °F	
Solidus	1450 °C	2640 °F	Melting Point
Liquidus	1450 °C	2640 °F	Melting Point