

SILVAR™ & SILVAR-K™



*Metallic Composite Materials for Electronic
Thermal Management Applications*

➤ Technology and Microstructure

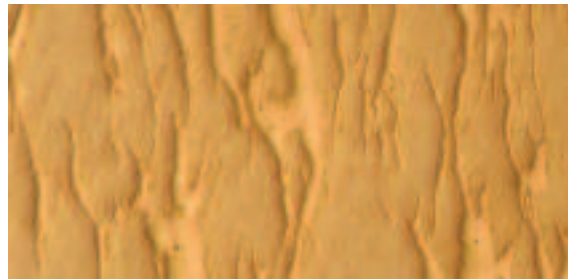
Silvar™ and Silvar-K™ are composite materials with microstructure consisting of two inter-penetrating metallic phases - pure silver and granular form Invar™ or Kovar™ alloys. To manufacture Silvar™, a porous Invar™ or Kovar™ preform made via powder metallurgy is infiltrated with liquid silver. After infiltration the material is rolled resulting in a type of microstructure presented on the micrograph as shown on reverse side. Here the dark phase is Invar™ or Kovar™ and the light phase is silver.

➤ Technological Advantages

- Lightweight as compared to Cu/Mo and Cu/W
- Controlled CTE up to 400C
- Silvar™ and Silvar-K™ can be readily stamped (in many cases to net-shape), machined and plated
- Silvar™ and Silvar-K™ are easily laser welded to Invar™ and Kovar™ and therefore present a unique advantage in applications where glass-metal seals are employed.
- Technology for materials manufacturing is well established and our engineers are always ready to assist customers with their application.

➤ Typical Applications

- Microwave carriers and heatsinks
- Microelectronic package baseplates
- Solid state laser packaging applications



Typical microstructure of Silvar™ and Silvar-K™

TYPICAL PHYSICAL, THERMAL AND MECHANICAL PROPERTIES

Property, [Unit of Measure]	Silvar™	Silvar-K™
Coefficient of Thermal Expansion, [$\mu\text{m}/\text{m}/\text{C}$]	7.2 (20C-225C)	7 (20C-400C)
Thermal Conductivity, [W/mK]	130	110
Thermal Capacity, [$\text{J}/\text{cc C}$]	3.19	3.19
Density, [g/cm^3]	8.9	8.8
Young's Modulus, [GPa]	110	125
Electrical Conductivity, [%IACS]	35	18.5

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