



## HAVAR® (UNS R30004)

Havar® is a heat treatable Cobalt base alloy that provides very high strength. The alloy has excellent corrosion resistance and is non-magnetic. Applications have included pressure diaphragms, power springs, gap spacers in magnetic heads, and target foils in nuclear physics.

### GENERAL INFORMATION

Forming cold rolled Havar requires large radius (90° Bend – 8 X thickness) prior to age hardening. The joining can be accomplished using both welding and soldering techniques. The ultimate endurance life is achieved by heat treating the alloy at 1000°F after 80% cold work. The alloy will retain 75% of room temperature strength up to 950°F (Figure 1).

### AVAILABILITY

Havar® is available from Hamilton Precision Metals as strip product in thicknesses from 0.0005" to 0.025" (0.0127 mm to 0.635 mm) and widths to 7.5" (190.5 mm). A foil product is available in thicknesses down to 0.000060" and widths of 4.0" (101.6 mm). The material corresponds to UNS R30004.



## Technical Data

TYPICAL MECHANICAL PROPERTIES <sup>1</sup>			
	ANNEALED	COLD ROLLED	COLD ROLLED HEAT TREATED
Ultimate Tensile Strength	140,000 PSI	270,000 PSI	330,000 PSI
Yield Strength (0.2% Offset)	70,000 PSI	250,000 PSI	300,000 PSI
Elongation in 2" *	40%	1%	1%
Hardness	RC 25	RC50	RC60
Modulus of Elasticity (Tension)	29.5 x 10 <sup>6</sup> PSI	-	-

\*The measured elongation will be less as thickness decreases to 0.002" and less.

<sup>1</sup> These values may be adjusted by control of process variables – consult HPM for desired values.

PHYSICAL PROPERTIES <sup>2</sup>	
Density	0.300 lbs/cu.in.
Melting Point (Approx.)	1480°C
Electrical Resistivity @ R.T.	92 Microhm · cm
Thermal Expansion Coefficient (0° to 50°C)	12.5 x 10 <sup>-6</sup> /°C
Thermal Conductivity	13.0 W/m · K
Magnetic Attraction	None

<sup>2</sup> Typical values to guide alloy selection but are not a guarantee of minimum or maximum.

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NOMINAL COMPOSITION	
Cobalt	42.0%
Chromium	19.5%
Nickel	12.7%
Tungsten	2.7%
Molybdenum	2.2%
Manganese	1.6%
Carbon	0.2%
Iron	Balance