



Hamilton Precision Metals  
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## TECHNICAL DATA SHEET

### HAVAR

Havar<sup>®</sup> 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.

#### NOMINAL COMPOSITION:

Cobalt	42.0%	Molybdenum	2.2%
Chromium	19.5%	Manganese	1.6%
Nickel	12.7%	Carbon	.2%
Tungsten	2.7%	Iron	Balance

#### TYPICAL MECHANICAL PROPERTIES:<sup>1</sup>

	<u>ANNEALED</u>	<u>COLD ROLLED</u>	<u>COLD ROLLED HEAT TREATED</u>
Ultimate Tensile	140,000 PSI	270,000 PSI	330,000 PSI
Yield Strength (.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 .002" and less.

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

## HAVAR

### 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

### 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 .0005” to .025” and widths to 7.5”. A foil product is available in thicknesses down to .000060” and widths of 4.0”. The material corresponds to UNS R30004.

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