

Arnavar™ (UNS #R30007) is a corrosion-resistant, nonmagnetic age-hardening alloy with good hot and cold working properties. A cobalt-base high-strength alloy, it is characterized principally by its high fatigue resistance, high tensile strength and torque values. Arnavar is vacuum melted to ensure uniformity of composition and cleanliness of the metal.

Forms Available

Arnold can provide this material in strip and foil forms.

Applications

Flapper valves, power springs, watch springs, electronic components, drive bands, and motion straps.

General Characteristics

Magnetic Qualities: After exposure to a field of 5000 oersteds, no residual magnetism can be detected with a search coil of 50 gauss sensitivity. Arnavar also has an exceptional combination of high-strength and fatigue-endurance limits and excellent corrosion resistance. It is generally resistant to pitting, stress and crevice corrosion cracking.

Mechanical Properties: Mechanical properties, especially spring properties, are retained to a satisfactory limit at sub-zero temperatures and up to about 750°F. The alloy is hard and tough but capable of cold forming. It is non-magnetic, age hardenable under controlled conditions, and has a corrosion resistance in the age hardened condition that is slightly better than in the untreated state. This alloy possesses exceptionally high resistance to permanent deformation, permitting a more constant delivery of torque over extended periods.

Physical Properties

	As Rolled	Aged
Tensile Strength (psi)	260,000-290,000	330,000-360,000
Yield Strength (psi)	230,000-260,000	225,000-280,000
Rockwell Hardness (C)	46-50	54-60
Specific Gravity (g/cc)		8.300
Density (lb/cu in)		0.300
Coefficient Linear Expansion (°C, 0-50°)		0.0000125
Electrical Resistivity (ohms/cir mil ft)		600
Thermoelasticity (°C, 0-65°)		0.00051
Elasticity Modulus		29,500,000
Thermal Conductivity	0.0298 cal/sec/cu cm/°C	
Permeability	1.00004 at 2000 gauss and 70 °F	
Torsional Modulus		11,200,000 psi
Fatigue Strength	(Aged) 10,000,000 cycles @ 100,000 psi	
		in reverse bending

Nominal Chemistry

Cobalt	42.00%
Beryllium	0.04%
Chromium	20.00%
Carbon	0.15%
Nickel	13.00%
Silicon	0.50%
Molybdenum	2.00%
Tungsten	2.80%
Manganese	1.40%
Iron Balance	

Heat Treatment & Annealing

Arnavar derives its properties from a combination of cold work and heat treatment. Variation in either or both of these can be made to meet the requirements for specific applications.

Heat Treatment: 850° - 1,000°F for 3 to 5 hours.

Vacuum treatment provides a bright finish which can be maintained during treatment.

Annealing: 2,125° - 2,175°F for 2 to 10 minutes in a protective atmosphere.

Aging: Cold rolled strip is aged at 875°F for 4 hours.

Workability

Cold working hardens the alloy quickly, but even after rolling it can be sheared, coiled, or stamped into simple shapes. The percentage of cold reduction greatly influences the final physical properties of the material after aging. Arnavar also remains formable, to a limited extent, after age hardening.

Machinability

Arnavar is difficult to machine since it work hardens rapidly in front of the cutting tool. Carbide tools are recommended. Machining should be done prior to heat treatment.