LION 3 ALLOY

TECHNICAL DATA

Nominal Composition (mass %) and Physical Properties

Co	Cr	W	C	Others	Hardness	Density	Melting Range
Base	30.5	12.5	2.3	Ni, Fe, Si,	48-63 HRC	8.64 g/cm^3 0.312lb/in^3	2215-2345°F 1213-1285 °C

LION® cobalt base alloys consist of complex carbides in an alloy matrix. They are resistant to wear, galling and corrosion and retain these properties at high temperatures. Their exceptional wear resistance is due mainly to the unique inherent characteristics of the hard carbide phase dispersed in a CoCr alloy matrix.

Description

The high carbon content of this alloy increases the volume fraction of carbides and hence its abrasion and solid particle erosion resistance. The high tungsten content improved its high temperature properties. However, this results in material which is nearly impossible to hardface crack free and one that withstands almost no impact. It has excellent metal-to-metal wear resistance and resists galling when mated with other LION® Alloys

Corrosion Resistance

 alloy is considered inferior to LION® alloys 6 and 12 in most environments. Like all LION® alloys, it has excellent resistance to oxidation but is not recommended for reducing acids. LION® alloy 3 is resistant to nitric acid over a range of concentrations at room temperature. It also has excellent resistance to phosphoric acid below 150°F and formic acid at room temperature. It also is highly resistant to sulphuric acid but only at room temperature. Since corrosion resistance varies with concentration, temperature, stress and contaminants, it is best to use production exposure tests to determine the suitability for each application.

Wear

The higher carbon content results in an increase in volume fraction of carbides and higher abrasion resistance in low stress abrasion tests. LION® alloy 3 is 3 to 4 times more resistant than LION® alloy 6 and twice as resistant as LION® alloy 12. It is also superior to Delcrome® 90 and 07 tool steel. In metal on metal wear LION 3 is superior and this improved resistance increases as loads are increased or speeds are increased to 10 times to 25 times that of LION® alloy 6 or 12. alloy also has higher hot hardness and resists galling like all LION® alloys when mated with another LION® alloy. material is also resistant to erosion and most combinations of heat and wear.

Finishing

 alloy is more difcult to machine than LION® alloy 6, but can be turned with carbide tip tools. If the hardness exceeds RC55 grinding is the preferred method. The material should be stress relieved before and during machining.

Nominal Thermal Expansion Coefficient (from 20°C/68°F to stated temperature)

	100°C (212°F)	200°C (392°F)	300°C (572°F)	400°C (752°F)	500°C (932°F)	600°C (1112°F)	700°C (1292°F)	800°C (1472°F)	900°C (1652°F)	1000°C (1832°F)
µ-inch/inch.°F	5.83	6.28	6.56	6.72	6.94	7.11	7.5	7.72	8.0	8.2

Nominal Tensile Properties at Room Temperature

	Ultimate Tensile Strength Rm		Yield Stress Rp(0.2%)		Elongation	Elastic Modulus	
	ksi	MPa	ksi	MPa	A(%)	ksi	MPa
Castings	80	551	-	-	<1	34,100	$235x10^3$

Nominal Hot Hardness (DPH) as-cast

20°C (68°F)	100°C (212°F)	200°C (392°F)	300°C (572°F)	400°C (752°F)	500°C (932°F)	600°C (1112°F)	700°C (1292°F)	800°C (1472°F)	900°C (1652°F)
606	573	540	508	485	453	406	330	217	140

Thermal and Electrical Properties

	Approximate value at Room Temperature
Thermal conductivity	102 Btu-in/hr/ft^2/°F
Electrical resistivity	269.24 µ-ohm.inch

Applications

Recommend for use as surgical scissor inserts, valve seat inserts, needle holders, steel mill guide rolls, seaming rolls, sleeves, bushings, bearing balls, wear pads, burner nozzles and palm guides.

Available forms

Welding powder or rod; cast components; powder metallurgy components.

Specifications

USN R30001; AWS A5.13 RCoCr-C; MIL-R-17131; RCoCr-C; SAE J775; MIL-C-15345 Alloy 22; MIL-C-24248 Comp IV