

# STELLITE 3

## STELLITE™ 3 ALLOY

### TECHNICAL DATA

Castings | Powder Metallurgy Components

#### 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	8.69 g/cm <sup>3</sup> 0.314 lb/in <sup>3</sup>	1250-1290°C 2280-2355°F

**STELLITE COBALT-BASED 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.

The high carbon content of **STELLITE 3** increases the volume fraction of carbides and hence its abrasion and solid particle erosion resistance. The high tungsten content improves its high temperature properties. However, this results in an alloy that is nearly impossible to hardface crack-free and one that withstands very little impact. It has excellent metal-to-metal wear resistance and resists galling when mated with other Stellite alloys.

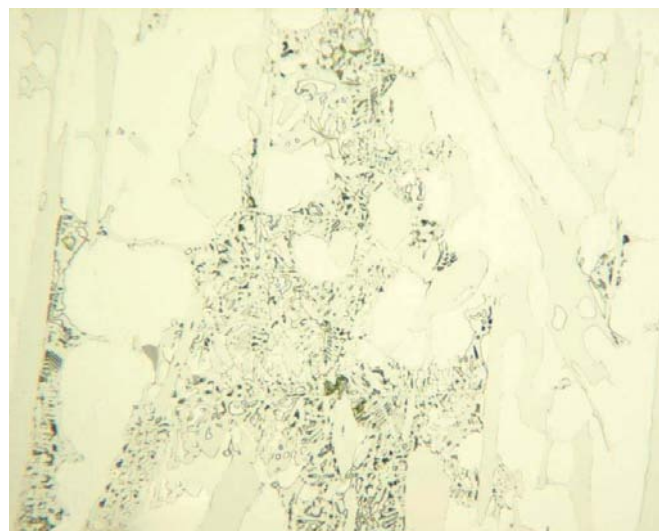
**STELLITE 3** has been used for valve seat inserts, needle holders, steel mill guide rolls, seaming rolls, sleeves, bushings, bearing balls, wear pads, burner nozzles, palm guides, surgical scissor inserts, and in many other applications.

#### CORROSION RESISTANCE

Stellite alloys 6 and 12 are considered to have superior corrosion resistance over **STELLITE 3** in most environments. Like most Stellite alloys, it has excellent resistance to oxidation but is not recommended for reducing acids. **STELLITE 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 is highly resistant to sulfuric 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 RESISTANCE

The higher carbon content results in an increase in volume fraction of carbides and higher abrasion resistance in low-stress abrasion tests. **STELLITE 3** is 3 to 4 times more resistant than **STELLITE 6** and twice as resistant as **STELLITE 12**. It is also superior to **DELCHROME™ 90** and O7 tool steel. **STELLITE 3** has exceptional metal-on-metal wear properties, and this improved resistance increases as loads are increased or speeds are increased to 10 times to 25 times that of **STELLITE 12** or **STELLITE 6**. The material is also resistant to erosion and most combinations of heat and wear.



Stellite 3 cast microstructure at 1000x magnification

#### FINISHING

**STELLITE 3** is more difficult to machine than **STELLITE 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 for machining.



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## 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(%)	psi	MPa
Casting	80	551	—	—	<1	36,000	248,000

## NOMINAL HOT HARDNESS (DPH)

	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)
Casting	606	573	540	508	485	453	406	330	217	140

## THERMAL PROPERTIES

	Approximate Value at Room Temperature
Thermal conductivity	68 BTU-in/hr/ft²/°F

## AVAILABLE PRODUCT FORMS:

STELLITE 3 is available as a finished casting and in powder metallurgy components.

DESIGNATION	PRODUCT FORM
UNS R30001	Castings
UNS R30103	Powder Metallurgy

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