STELLITE® 12 ALLOY

TECHNICAL DATA

TIG & OXY-ACETYLENE WELDING | MMA WELD DEPOSITION | MIG WELD DEPOSITION | PTA & LASER WELD DEPOSITION | HVOF & PLASMA SPRAY DEPOSITION

Nominal Composition (mass %) and Physical Properties

Co	Cr	W	C	Others	Hardness	Density	Melting Range
Base	27-32	7.5-9. 5	1.4-1.7 (hardfacings) 1.7-2.0 (castings)	Ni, Fe, Si, Mn	45-51 HRC 435-590 HV	8.53 g/cm^3 0.308 lb/in^3	2192-2489 °F 1200-1365 °C

Stellite® 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.

Optical Micrograph of a Stellite® 12 PTA Deposit at 500X.

Stellite® 12 could be considered an intermediate alloy between Stellite® 6 and Stellite® 1. It contains a higher fraction of hard, brittle carbides than Stellite® 6, and has increased resistance to low-angle erosion, abrasion, and severe sliding wear whilst retaining reasonable impact and cavitation resistance. Stellite® 12 is often used self-mated or running against Stellite® 6 or Stellite® 1. The higher tungsten content provides better high-temperature properties compared to Stellite® 6, and it can be used at temperatures up to about 700˚C.

Stellite® 12 is typically used for cutting tools that need to withstand abrasion, heat and corrosion. Examples include industrial knives for cutting carpets, plastics, paper and synthetic fibres; and saw tips in the timber industry. It is also used for control plates in the beverage industry, pump vanes, bearing bushes and narrow-neck glass mold plungers; and for hardfacing of engine valves, pinch rollers in the metal-processing industries, and rotor blade edges.

Corrosion Resistance

The typical electrode potential in sea water at room temperature is approximately -0.3 V (SCE). Like stainless steels, Stellite® 12 corrodes primarily by a pitting mechanism and not by general mass loss in seawater and chloride solutions. Information regarding corrosion resistance in other corrosive environments can be provided on request.

Nominal Thermal Expansion Coefficient (from 20°C 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)
µm/m.K	11.5	12.1	12.6	12.9	13.3	13.8	14.3	14.8	15.2	15.6
µ-inch/inch-°F	6.4	6.7	7.0	7.2	7.4	7.7	7.95	8.2	8.45	8.7

Nominal Tensile Properties at Room Temperature

	Ultimate Tensile Strength Rm		Yield Stress Rp(0.2%)		Elongation	Elastic Modulus	
	ksi	MPa	ksi	MPa	A(%)	psi	GPa
Castings	107	740	84	580	<1	$32.8x10^{6}$	226
Stellite® HS-12 (*)	174	1200	130	900	2	$30.1x10^{6}$	208

(*) "HS" = HIP -consolidated from the powder form.

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)
546	456	418	390	380	371	362	328	232	153

Thermal and Electrical Properties

	Approximate value at Room Temperature	
Thermal conductivity	14.6 W/m.K	100 Btu-in/hr/ft2/°F
Electrical resistivity	98 µ-ohm.cm	38.6 µ-ohm.inch

Product Forms and Cross Reference Specifications

Stellite® 12 is available as welding wire, rod, powder, and electrodes; finished castings and P/M parts. Deloro Stellite also offers hardfacing services. Stellite® 12 can be supplied to the following specifications:

SPECIFICATION	PRODUCT FORM	SPECIFICATION		PRODUCT FORM
UNS R30012	Rod, Castings	AWS A5.21 / ASME BPVC IIC SF	A 5.21 ERCoCr-B	Rod
UNS W73012	Electrode	AWS A5.21 / ASME BPVC IIC SF	A 5.21 ERCCoCr-B	Wire
UNS W73042	Wire	AWS A5.13 / ASME BPVC IIC SF	A 5.13 ECoCr-B	Electrode

Stellite is a registered Trade Name of Deloro Stellite.

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