

# STELLITE 12

## 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 <sup>3</sup> 0.308 lb/in <sup>3</sup>	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.

**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 lowangle 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 narrowneck glass mold plungers; and for hardfacing of engine valves, pinch rollers in the metal-processing industries, and rotor blade edges.



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

#### 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 <sup>6</sup>	226
Stellite HS-12 (*)	174	1200	130	900	2	30.1x10 <sup>6</sup>	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/ft <sup>2</sup> /°F
Electrical resistivity	98 µ-ohm.cm	38.6 µ-ohm.cm

**PRODUCT FORMS AND CROSS REFERENCE SPECIFICATIONS**

Stellite™ 12 is available as welding wire, rod, powder, and electrodes; finished castings and P/M parts. Kennametal Stellite also offers hardfacing services.

Stellite™ 12 can be supplied to the following specifications:

SPECIFICATION	PRODUCT FORM
UNS R30012	Rod, Casting
UNS W73012	Electrode
UNS W73042	Wire

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

Kennametal Stellite™ manufactures sophisticated alloys in the form of castings, powders, coatings, consumables, and machined parts that resist wear, corrosion, and abrasion. Information provided in this document is intended only for general guidance about Kennametal Stellite™ products and is the best information in our possession at the time. Product users may request information about their individual use of our products, but Kennametal Stellite™ does not warrant or guarantee this information in any way. Selection and purchase of Kennametal Stellite™ products is the sole responsibility of the product user based on the suitability of each use. Individual applications must be fully evaluated by the user, including compliance with applicable laws, regulations, and non-infringement. Kennametal Stellite™ cannot know or anticipate the many variables that affect individual product use and individual performance results may vary. For these reasons, Kennametal Stellite™ does not warrant or guarantee advice or information in this document, assumes no liability regarding the same, and expressly disclaims any warranty of any kind, including any warranty of fitness for a particular purpose, regarding the same.

**EUROPEAN SALES OFFICES**

<b>Kennametal Stellite</b> Unit 3, Birch Kembrey Business Park Swindon SN2 8UU UK Phone: 44.1793.498500 Fax: 44.1793.498501	<b>Kennametal Stellite</b> Zur Bergpflege 51 – 53 56070 Koblenz Germany Phone: 49.261.80.88.0 Fax: 49.261.80.88.35	<b>Kennametal Stellite</b> Via G. Di Vittorio, 24 20090 Pieve Emanuele Milan Italy Phone: 39.02.907871 Fax: 39.02.90787 231
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E-mail: [europesales.stellite@kennametal.com](mailto:europesales.stellite@kennametal.com)

**AMERICAS SALES OFFICE**

**Kennametal Stellite**  
1201 Eisenhower Drive N  
Goshen, Indiana 46526  
USA  
Phone: 1.574.534.2585  
Fax: 1.574.534.3417

E-mail: [americasales.stellite@kennametal.com](mailto:americasales.stellite@kennametal.com)



[www.kennametal.com/stellite](http://www.kennametal.com/stellite)