

# STELLITE® 190 ALLOY

## TECHNICAL DATA

TIG & OXY-ACETYLENE WELDING

PTA & LASER WELD DEPOSITION

### Nominal Composition (mass %) and Physical Properties

Co	Cr	W	C	Fe	Others	Hardness	Density	Melting Range
Base	27	14	3.3	<3	Ni, Si, Mn, Mo	52-60 HRC 570-760 HV	8.66 g/cm <sup>3</sup> 0.313 lb/in <sup>3</sup>	2192-2435 °F 1200-1335 °C

Stellite® 190 is a highly abrasion-resistant alloy, primarily used for the hardfacing of bearing journals in tricone rotary rock bits used in the Oil and Gas Industry. Tricone bits operate in hot and extremely abrasive downhole conditions.

Due to the high proportion of carbides, which provide the abrasion resistance, care must be taken to minimize cooling stresses incurred during hardfacing and to avoid service conditions which involve severe mechanical or thermal shock.

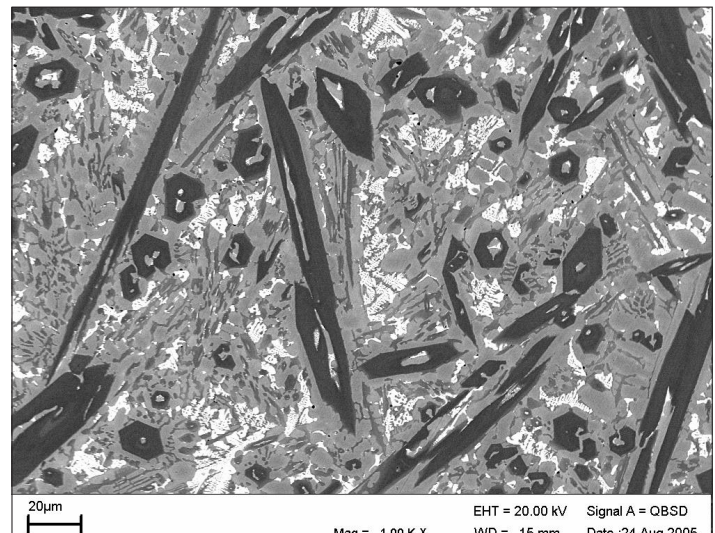
Stellite® 190 can only be finished by grinding.

#### Corrosion Resistance

Stellite® 190 is not designed primarily as a corrosion resistant alloy, although it may be expected to have reasonable corrosion resistance to brackish water and mildly oxidizing environments. The high carbide content reduces its corrosion resistance relative to other CoCrW alloys, such as Stellite® 6.

#### Nominal Tensile Properties at Room Temperature

Stellite® 190 is not designed to be a casting alloy. For small components of simple geometry requiring extreme abrasion resistance and not subject to severe mechanical shock, HIP-consolidated parts can be manufactured. The Charpy Impact Energy (unnotched) of HIP-consolidated Stellite® HS-190 is lower (5-10 J) than that of cast Stellite® 6 (typically 10-15 J).



Scanning Electron Micrograph of a Stellite® 190 Oxy-Acetylene Weld Deposit at 1000X magnification. The chrome-rich primary carbide which gives the alloy its exceptional abrasion resistance can be seen as a dark rod-like phase in longitudinal cross section, and also as a roughly hexagonal phase when sectioned transverse to its length. The small grey dispersed particles are a secondary (Cr,W) carbide and the white phase is a tungsten-rich complex carbide. All of these carbides are dispersed in a light grey CoCr alloy matrix, which is solid-solution strengthened with extra tungsten for excellent heat resistance.

### 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
Stellite® HS-190 (*)	167	1155	137	950	0.2	32.2	223

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

### Nominal Hot Hardness (DPH) as-deposited

	22° C (72°F)	427° C (800°F)	538° C (1000°F)	649° C (1200°F)	760° C (1400°F)
GTAW (TIG) deposit	495	355	305	295	255
Oxy-acet. deposit	570	No hardness data is available for higher temperatures, but the hardness can be expected to be above that of a GTAW deposit at all temperatures			

### Product Forms and Cross Reference Specifications

Stellite® 190 is available as welding rod and powder. It can be supplied to the following specifications, as well as to individual customer specifications:

Specification		Product Form
UNS	R30014	Rod, Powder
AWS A5.21 / ASME BPVC IIC SFA 5.21	ERCoCr-G	Rod

Stellite is a registered Trade Name of Deloro Stellite.

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