

STELLITE® 6 ALLOY

TECHNICAL DATA

TIG & OXY-ACETYLENE WELDING

MMA WELD DEPOSITION

MIG WELD DEPOSITION

PTA & LASER WELD DEPOSITION

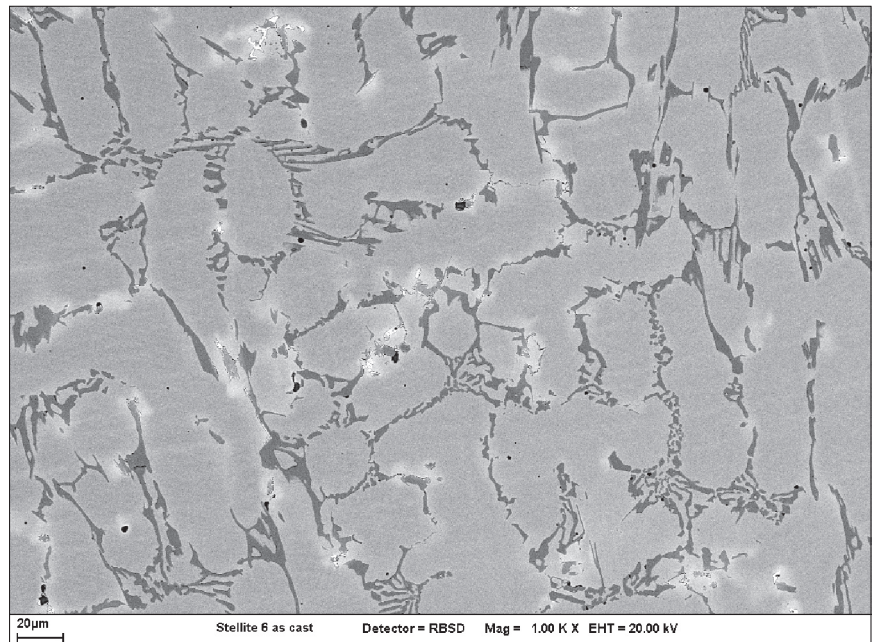
HVOF & PLASMA SPRAY DEPOSITION

Nominal Composition (mass %) and Physical Properties

| Co | Cr | W | C | Others | Hardness | Density | Melting Range |
|------|---------|-------|---------|-----------------------|-------------------------|--|------------------------------|
| Base | 27 - 32 | 4 - 6 | 0.9-1.4 | Ni, Fe, Si, Mn, Mo | 36-45 HRC 380-490 HV | 8.44 g/cm ³ 0.305 lb/in ³ | 2340-2570 °F 1285-1410 °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® 6 is the most widely used of the wear resistant cobalt based alloys and exhibits good all-round performance. It is regarded as the industry standard for general-purpose wear resistance applications, has excellent resistance to many forms of mechanical and chemical degradation over a wide temperature range, and retains a reasonable level of hardness up to 500°C (930°F). It also has good resistance to impact and cavitation erosion. **Stellite® 6** is ideally suited to a variety of hardfacing processes and can be turned with carbide tooling. Examples include valve seats and gates; pump shafts and bearings, erosion shields and rolling couples. It is often used self-mated.



Scanning Electron Micrograph of Cast Stellite 6 at 1000x magnification.

Corrosion Resistance

The typical electrode potential in sea water at room temperature is -0.25V (SCE). Like stainless steels, Stellite® 6 corrodes primarily by a pitting mechanism and not by general mass loss in seawater and chloride solutions. Its mass loss in sea water is below 0.05mm per year at 22°C. More information regarding corrosion resistance can be provided on request.

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) |
|----------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| µm/m.K | 11.35 | 12.95 | 13.6 | 13.9 | 14.2 | 14.5 | 14.7 | 15.05 | 15.5 | 17.5 |
| µ-inch/inch.°F | 6.31 | 7.20 | 7.56 | 7.72 | 7.89 | 8.06 | 8.17 | 8.36 | 8.61 | 9.72 |

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 | 123 | 850 | 101.5 | 700 | <1 | 30.3x10 ⁶ | 209 |
| Stellite® HS-6 (*) | 183.5 | 1265 | 109 | 750 | 3 - 5 | 34x10 ⁶ | 237 |

(*) "HS" = HIP-consolidated. Ref: Ashworth et al. Powder Metal. 1999 **42**[3] p.243-249 and internal tests.

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) |
|----------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 410 | 390 | 356 | 345 | 334 | 301 | 235 | 155 | 138 | 95 |

Thermal and Electrical Properties

| | Approximate value at Room Temperature | |
|------------------------|---------------------------------------|------------------------------------|
| Thermal conductivity | 14.82 W/m.K | 102.7 Btu-in/hr/ft ² °F |
| Electrical resistivity | 106 µ-ohm.cm | 41.7 µ-ohm.inch |

Product Forms and Cross Reference Specifications

Stellite® 6 is available as welding wire, rod, powder, and electrodes; finished castings and P/M parts. Deloro Stellite also offers hardfacing services. A separate brochure is available for the wrought forms of this alloy, namely Stellite® 6B and Stellite® 6K. Stellite® 6 can be supplied to the following specifications:

| SPECIFICATION | PRODUCT FORM | SPECIFICATION | PRODUCT FORM |
|---------------|---------------|--|--------------|
| UNS R30006 | Rod, Castings | AWS A5.21 / ASME BPVC IIC SFA 5.21 ERCoCr-A | Rod |
| UNS R30106 | P/M Parts | AWS A5.21 / ASME BPVC IIC SFA 5.21 ERCCoCr-A | Wire |
| UNS W73006 | Electrode | AWS A5.13 / ASME BPVC IIC SFA 5.13 ECoCr-A | Electrode |
| UNS W73036 | Wire | | |
| UNS 5387 | Castings | | |
| AMS 5788 | Rod, Wire | | |

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