TECHNICAL DATA

STELLITE™ 21 ALLOY

STELLITE™ COBALT-BASED ALLOYS consists 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™ 21 consists of a CoCrMo alloy matrix containing dispersed hard carbides which strengthen the alloy and increase its hardness, but also decrease the ductility. The type, shape, size, and distribution of the carbides is strongly influenced by the processing history of the alloy, and for this reason the mechanical properties of Stellite™ 21 are very dependent upon the manufacturing route and any subsequent heat treatments. Due to the low volume fraction of carbides, the Co-based alloy matrix dominates the wear and corrosion properties. Stellite™ 21 has excellent cavitation, galling and metal-to-metal sliding wear resistance, but is not recommended for severe hard particle abrasion. The surface can work harden considerably during wear or even during machining, and the use of correct machining tools and techniques is important to achieve optimal results. Stellite™ 21 has excellent resistance to thermal and mechanical shock. Stellite™ 21 is similar to the medical implant alloy ASTM F-75 and was previously also known as Stellite™ 8.

CORROSION RESISTANCE

Stellite™ 21 is resistant to oxidizing and reducing gaseous atmospheres up to 1150°C (2100°F). Because its ternary alloying element is Mo and not W, it has higher resistance to reducing or complex environments (e.g. sulphuric acid, hydrochloric acid, and sour gas) than CoCrW alloys such as Stellite™ 6. The typical electrode potential in sea water at room temperature is approx. -0.3 V (SCE). Like stainless steels, Stellite™ 21 corrodes primarily by a pitting mechanism and not by general mass loss in seawater and chloride solutions.

NOMINAL CHEMICAL COMPOSITION (MASS%)

<table>
<thead>
<tr>
<th>ALLOY</th>
<th>Co</th>
<th>Cr</th>
<th>Ni</th>
<th>Fe</th>
<th>Mo</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stellite™ 21</td>
<td>Bal.</td>
<td>27,0</td>
<td>2,5</td>
<td>1,5</td>
<td>5,5</td>
<td>C, B, Si, Mn</td>
</tr>
</tbody>
</table>

PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>ALLOY</th>
<th>Hardness</th>
<th>Density</th>
<th>Melting Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stellite™ 21</td>
<td>27 - 40 HRC / 290 - 430 HV</td>
<td>~ 8,33 g/cm³</td>
<td>~ 1295 – 1435°C</td>
</tr>
</tbody>
</table>
NOMINAL HOT HARDNESS (HV resp. DPH) OF UNDILUTED WELD DEPOSIT

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>20</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
<th>900</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>347</td>
<td>279</td>
<td>248</td>
<td>228</td>
<td>208</td>
<td>197</td>
<td>181</td>
<td>153</td>
<td>123</td>
<td>92</td>
</tr>
</tbody>
</table>

EXAMPLE FOR TENSILE PROPERTIES AT ROOM TEMPERATURE

<table>
<thead>
<tr>
<th>PRODUCT FORM</th>
<th>Ultimate Tensile Strength Rm</th>
<th>Yield Stress Rp (0.2%)</th>
<th>Elongation A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casting, As cast</td>
<td>~ 710 MPa</td>
<td>~ 565 MPa</td>
<td>&lt; 3 %</td>
</tr>
</tbody>
</table>

PRODUCT FORMS

Components

- Castings
- Cladded / Hardfaced
- PM / HIP parts*
- ALM parts*

* On special request.

Consumables for Cladding / Hardfacing and Additive Layer Manufacturing (ALM)

- Rods
- Electrode
- Cored Wire
- Powder

- TIG-Welding
- MMA Welding
- MIG Welding
- Submerged Arc Welding
- PTA Cladding
- Laser Cladding
- HVOF Spraying
- ALM

TYPICAL STRUCTURES

- Casted Stellite™ 21 Alloy (Resin Shell Casting)
- Welded Stellite™ 21 Alloy (TIG Cladding)

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