Titanium alloys

Category:

high temperature

Titanium alloy Ti-SF61

Titanium Ti-SF61 is a new generation high temperature Titanium alloys. Because of its alloying element Yttrium that forms high temperature stable Oxides, it shows high fatigue strength at elevated temperatures and excellent creep resistance. Standard processing is triple vacuum arc melting for rotor grade quality. Ti-SF61 is the most advanced conventional high temperature Titanium alloy. Developed to replace Ti-6242Si and Ti-834 for jet engine application. Due to its excellent properties it has also potential for high performance automotive applications.

General properties:

- High strength at elevated temperatures
- Excellent creep resistance
- Wide processing window

Comparison with Standard alloy Ti-6242Si:

Advantages:
- Higher fatigue strength
- Higher creep resistance

Disadvantages:
- None

Material composition

Chemical Composition: Ti-5.9Al-2.7Sn-4Zr-0.45Mo-0.35Si-0.22Y

Mechanical properties

<table>
<thead>
<tr>
<th>Alloy</th>
<th>UTS 600°C</th>
<th>YS 760°C</th>
<th>El</th>
<th>UTS 600°C</th>
<th>YS 760°C</th>
<th>El</th>
<th>Fatigue R600°C</th>
<th>Residual Strain*</th>
<th>E-Modulus Gpa</th>
<th>Microstructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ti-SF61</td>
<td>1068</td>
<td>1050</td>
<td>11</td>
<td>752</td>
<td>655</td>
<td>16</td>
<td>195</td>
<td>0.029</td>
<td>120</td>
<td>Equiaxed, a+btrans</td>
</tr>
<tr>
<td>Ti-SF60</td>
<td>1058</td>
<td>989</td>
<td>14</td>
<td>674</td>
<td>553</td>
<td>23</td>
<td>176</td>
<td>0.079</td>
<td>121</td>
<td>Bi-modal</td>
</tr>
<tr>
<td>Timetal-834</td>
<td>1040</td>
<td>945</td>
<td>12</td>
<td>654</td>
<td>510</td>
<td>15</td>
<td>142</td>
<td>0.082</td>
<td>119</td>
<td>Equiaxed, a+btrans</td>
</tr>
<tr>
<td>Ti-6242</td>
<td>1020</td>
<td>910</td>
<td>12</td>
<td>560</td>
<td>485</td>
<td>15</td>
<td>138</td>
<td>0.154</td>
<td>116</td>
<td>-</td>
</tr>
</tbody>
</table>

*After creep exposure at 600°C, 150 Mpa, 100h.

Physical data

Hardness: 32-35 HRC
Density: 4.56 g/cm³
Elastic modulus: 120 GPa
CTE: 8.3x10-6
Thermal conductivity: 8 W/mK

Applications

- Inlet and outlet valves
- Compressor discs
- Compressor blades

Delivery form

- Bars
- Plates
- Forged valve blanks