Material Ergste® 1.4112YL
Ergste® 1.4112YL is a stainless martensitic chromium steel with addition of molybdenum and vanadium. It is characterized by high hardness.
In terms of cutting ability, edge retention and sharpness this steel is superior to a 13% Cr steel.

Typical Applications
- Surgical cutting tools, e.g. scalpels
- Dental surgery (drills, reamers, stepped reamers, cutting tools and special tools with inside cooling)

Corresponding Standards
DIN EN 10088-3 (X90CrMoV18)

Polishability
Ergste® 1.4112YL is high gloss polishable.

Weldability
Ergste® 1.4112YL is usually not welded.

Magnetism
Ergste® 1.4112YL is magnetizable.

Corrosion Resistance
Ergste® 1.4112YL has sufficient resistance in moderate, non-chlorine-containing media. Corrosion resistance to water and water vapor is excellent.

Chemical Composition

<table>
<thead>
<tr>
<th>Element</th>
<th>C</th>
<th>Si</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
<th>Cr</th>
<th>Mo</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.85-0.95</td>
<td>max. 1.00</td>
<td>max. 1.00</td>
<td>max. 0.04</td>
<td>0.015-0.030</td>
<td>17.00-19.00</td>
<td>0.90-1.30</td>
<td>0.07-1.20</td>
</tr>
</tbody>
</table>

Hot Working
Forging at 2012 – 1472 °F.

Wear Resistance
Ergste® 1.4112YL shows high wear resistance.

Product Conditions

<table>
<thead>
<tr>
<th>Bars, drawn, straightened, ground, polished</th>
<th>Tensile [ksi]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>102 - 131</td>
</tr>
</tbody>
</table>

* Other conditions on request

Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulus of Elasticity E at 68 °F [ksi]</td>
<td>31,183</td>
</tr>
<tr>
<td>Specific Gravity p [lb/in³]</td>
<td>0.278</td>
</tr>
<tr>
<td>Thermal Conductivity λ bei 68°F [Btu in/hr ft² °F]</td>
<td>110</td>
</tr>
<tr>
<td>Coefficient of Thermal Expansion α [µin/in °F]</td>
<td>5.72</td>
</tr>
<tr>
<td>68 – 212 °F</td>
<td>5.72</td>
</tr>
<tr>
<td>68 – 392 °F</td>
<td>6.00</td>
</tr>
<tr>
<td>68 – 572 °F</td>
<td>6.22</td>
</tr>
<tr>
<td>68 – 752 °F</td>
<td>6.44</td>
</tr>
<tr>
<td>Specific Heat c at 68 °F [Btu/lb °F]</td>
<td>103</td>
</tr>
<tr>
<td>Electric Resistivity p at 68 °F [Ω circular-mil/ft]</td>
<td>481</td>
</tr>
</tbody>
</table>

Zapp is Certified to ISO 9001
Heat Treatment

**Soft Annealing**
Temperature: 1,436 – 1,544 °F
Slow cooling in furnace.

**Stress Relief Annealing**
Temperature: 1,202 °F
After heating, hold in neutral atmosphere for 1 - 2 hours.
Slow cooling in furnace.

**Hardening**
Temperature: 1,877 – 1,967 °F
Holding time: 0.5 h
Cooling: Oil

**Tempering**
Temperature: 212 – 302 °F
Tempering should follow right after hardening.

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Further information regarding our products and locations are available in our image brochure and under www.zapp.com

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