Technical Information: PM 420-CW

PM 420-CW is a powder metallurgy, high vanadium, stainless steel. The grade is used in corrosive, high wear, environments such as plastic processing equipment. PM 420-CW has similar wear resistance to PM A11 tool steel.

<table>
<thead>
<tr>
<th>Typical Chemical Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon 2.25%</td>
</tr>
<tr>
<td>Molybdenum 1.30%</td>
</tr>
<tr>
<td>Vanadium 9.25%</td>
</tr>
</tbody>
</table>

**Tool Steel Properties Comparison**

- Toughness
- Wear Resistance
- Corrosion Resistance

**Physical Properties**

- **Modulus of Elasticity**: \( 30 \text{ psi} \times 10^6 \) \((207 \text{ GPa})\)
- **Density**: \( 0.275 \text{ lb/in}^3 \)
- **Annealed Hardness**: 230-255 Brinell Hardness (BHN)
- **Machinability**: Similar to PM A11 Tool Steel
Technical Information: PM 420-CW

**Heat Treatment**

**Annealing**
Heat to 1600°F, hold two hours
Slow cool 20°F/hour to 600°F
Then air or furnace cool to room temperature

**Stress Relieving**
Performed prior or after machining to minimize distortion in heat treating
800-900°F, hold two hours
Then air cool to room temperature

**Hardening**
Salt bath, protective atmosphere, or vacuum furnace equipment preferred.

**High Heat (Austenitizing)**
1850/2050°F for 30 minutes at heat.

**Quench**
Salt bath quench to 1000-1100°F, equalize, then air cool to 150°F.
Vacuum or atmosphere quench rate of a minimum 50 degrees F per minute down to 1200°F is critical to achieve best heat treat response.
Temper immediately following quench

**Tempering**
Minimum 400°F tempering temperature required.
Double tempering is required, triple tempering recommended.
Air cool to room temperature between tempers.

**Typical Heat Treat Response**

<table>
<thead>
<tr>
<th>Hardening Temp</th>
<th>Tempering Temp</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000°F/1093°C</td>
<td>400°F/205°C</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>500°F/260°C</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>600°F/315°C</td>
<td>59</td>
</tr>
</tbody>
</table>

*Note: Tempering between 800 F and 1000 F is not recommended for stainless steels*

**Thermal Conductivity**
Room T

| W/m°K          | 16.25          |

**Thermal Expansion**
Room T-100°C

| 10.8 m/m°K     | 11.0           | 11.5  |

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