PSF 27 is a premium powdered metal tool steel. Supplied by DanSpray. PSF 27 has an enhanced D2 chemical composition making it ideal for many cold work applications requiring higher toughness and higher wear resistance than D2. The PM structure results in improved toughness and chip resistance compared to conventionally produced tool steels.

**Typical Chemical Composition**

<table>
<thead>
<tr>
<th>Element</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td>1.55%</td>
</tr>
<tr>
<td>Chromium</td>
<td>12.00%</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>0.75%</td>
</tr>
<tr>
<td>Silicon</td>
<td>0.40%</td>
</tr>
<tr>
<td>Vanadium</td>
<td>1.00%</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.40%</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>0.07%</td>
</tr>
</tbody>
</table>

**SBSM Tool Steel Properties Comparison**

- **Relative Wear Resistance**
- **Chipping Resistance**

**Physical Properties**

- Modulus of Elasticity: $30 \times 10^6$ psi ($207 \text{ GPa}$)
- Density: $0.283 \text{ lb/in}^3$
- Annealed Hardness: 215-255 Brinell Hardness (BHN)
- Machinability: Similar to D2 Tool Steel

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Technical Information: PSF 27

**Heat Treatment**

**Annealing**
Heat to 1600°F, hold two hours
Slow cool 25°F/hour to 1000°F
Then air or furnace cool to room temperature

**Stress Relieving**
Performed prior or after machining to minimize distortion in heat treating
1100/1200°F, hold two hours
then air cool to room temperature

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

**High Heat (Austenitizing)**
1870/1900°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.
Cool to 150°F.
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 °F °C</th>
<th>Tempering Temp °F °C</th>
<th>Hardness HRC</th>
<th>Longitudinal Size Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900 1038</td>
<td>500 260</td>
<td>60.5</td>
<td>+0.03 %</td>
</tr>
<tr>
<td>950 510</td>
<td></td>
<td>62</td>
<td>+0.04 %</td>
</tr>
</tbody>
</table>

**Thermal Conductivity**
Room T 200°F  
BTU/hr/ft/Degree F 15