ExELL 2714 was developed by Ellwood Specialty Steel as a special tooling quality nickel-chromium-molybdenum-vanadium steel from international standards for use in mostly hot work tools.

ExELL 2714 is characterized by excellent through hardening properties, good toughness and ductility, good hot strength and good hot hardness.

**APPLICATIONS**

ExELL 2714 is specifically manufactured for forging applications and a general upgrade to the more traditional die block steel grades and is recommended for:

- Die blocks
- Inserts
- Sow blocks
- Piston rods/heads
- Hammer rams
- Bolster plates
- Holders
- Trim dies

ExELL 2714 is generally supplied prehardened at a hardness of 331-375 HB. However, other temper hardness ranges are readily available.

**TYPICAL ANALYSIS**

<table>
<thead>
<tr>
<th>Element</th>
<th>C</th>
<th>Ni</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mn</td>
<td>0.55</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td>Si</td>
<td>0.80</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>0.25</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Mo</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This information is intended to provide general data on our products and their uses and is based on our knowledge at the time of publication. No information should be construed as a guarantee of specific properties of the products described or suitability for a particular application. Ellwood Specialty Steel reserves the right to make changes in practices which may render some information outdated or obsolete. Ellwood Specialty Steel should be consulted for current information and/or capabilities.
**Physical Properties**

- **Coefficient of Thermal Expansion, in/in/°F**
  - 70-400 °F...0.0000070
  - 70-600 °F...0.00000725
  - 70-800 °F...0.0000075

- **Thermal Conductivity, BTU in/ft²·hr·°F**
  - 70 °F...202
  - 650 °F...210
  - 1300 °F...215

**Machinability**: In the annealed condition, ExELL 2714 exhibits a machinability rating of 80% compared to a 1% carbon tool steel. This rating shows the material is easier to machine than AISI H-13.

**Critical Temperatures**

- Ac1 - 1350 °F
- Ac3 - 1420 °F
- Ms - 445 °F

**STRESS TREATMENT (General Recommendations)**

**HEAT TREATMENT**

To minimize movement during service or heat treatment, a stress relieving can be used between the rough finish machining operations of tool making for prehardened material or annealed material before heat treatment.

After rough machining, heat the part to 950°F (for prehardened material) or 1200°F (annealed material), equalize and hold 1-2 hours. Furnace cool to 800°F and then air cool.

**HARDENING AND QUENCHING**

- **Preheating**: Heat to 1200-1250°F and equalize. Continue heating to hardening temperature.

- **Hardening**: Protect against oxidation and decarburization. Austenitizing (hardening) temperature is adjusted to accommodate quenching medium and required hardness response, temper-resistance, etc.

(Oil quenching increases the risk of cracking. Avoid thin and heavy sections and use very generous fillets and radii).

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- Ac3 - 1420 °F
- Ms - 445 °F

**SURFACE TREATMENTS**

If a locally higher hardness is required, ExELL 2714 lends itself readily to flame or induction hardening to 54 - 58 HRC (air cooling). Surfaces of ExELL 2714 can also be easily chrome plated or nitrided by typical or standard methods.

**MECHANICAL PROPERTIES**

Approximate tensile strength versus hardness at room temperature:

<table>
<thead>
<tr>
<th>Test Temp °F</th>
<th>Yield Strength psi</th>
<th>Tensile Strength psi</th>
<th>RA %</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>158,000</td>
<td>185,000</td>
<td>45</td>
</tr>
<tr>
<td>700</td>
<td>145,000</td>
<td>172,000</td>
<td>50</td>
</tr>
<tr>
<td>950</td>
<td>90,000</td>
<td>130,000</td>
<td>65</td>
</tr>
<tr>
<td>1100</td>
<td>32,000</td>
<td>72,000</td>
<td>85</td>
</tr>
</tbody>
</table>

**TOOLMAKING**

For any additional information including welding, machining, grinding or EDM processing, please contact Ellwood Specialty Steel direct at: 800-932-2188