Material No.: 1.3247  
Code: HS2-9-1-8  
DE - Brand: EMo9CoH

### Chemical composition:
(Typical analysis in %)

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>Cr</th>
<th>Mo</th>
<th>V</th>
<th>W</th>
<th>Co</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.10</td>
<td>4.10</td>
<td>9.50</td>
<td>1.20</td>
<td>1.50</td>
<td>8.00</td>
</tr>
</tbody>
</table>

### Steel properties:
High Co-Mo-alloyed high-speed steel, high secondary hardness maximum, high wear resistance with good toughness. Similar to AISI M42.

### Applications:
Die and engraver’s milling cutters, tools for machining of aerospace material (for example Ti-alloys), cold extrusion punches, thread rolling dies and rolls.

### Condition of delivery:
Soft annealed to max. 277 HB

### Physical properties:

<table>
<thead>
<tr>
<th>Thermal expansion coefficient</th>
<th>10^-6 m/m.K</th>
<th>20-100°C</th>
<th>20-200°C</th>
<th>20-300°C</th>
<th>20-400°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.5</td>
<td>9.8</td>
<td>10.8</td>
<td>11.1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermal conductivity</th>
<th>W/m.K</th>
<th>20°C</th>
<th>350°C</th>
<th>700°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27.2</td>
<td>26.8</td>
<td>25.9</td>
<td></td>
</tr>
</tbody>
</table>

### Heat treatment:

#### Soft annealing
<table>
<thead>
<tr>
<th>Temperature</th>
<th>Cooling</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>820 - 860°C</td>
<td>furnace</td>
<td>max. 277 HB</td>
</tr>
</tbody>
</table>

#### Stress relief annealing
<table>
<thead>
<tr>
<th>Temperature</th>
<th>Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 - 650°C</td>
<td>furnace</td>
</tr>
</tbody>
</table>

#### Hardening
<table>
<thead>
<tr>
<th>Temperature</th>
<th>Cooling</th>
<th>Tempering</th>
</tr>
</thead>
<tbody>
<tr>
<td>1130 - 1190°C</td>
<td>oil, pressure gas (N₂), air or hot bath</td>
<td>see tempering diagram</td>
</tr>
</tbody>
</table>
(1.3247) Thermal Cycle Diagram

- Stress relief annealing
- Rough machining
- Intermediate machining
- Finish machining
- 1st preheating step
  - ½ min./mm
  - ~400°C
- Hot bath
  - 500-550°C
- Cooling
  - Oil, air, pressure gas (N₂)
- 2nd preheating step
  - ½ min./mm
  - ~850°C
- 3rd preheating step
  - ½ min./mm
  - ~1050°C
- 1st tempering
  - 1 h / 20 mm
  - At least 2 h
- 2nd tempering
  - 1 h / 20 mm
  - At least 2 h
- 3rd tempering
  - 1 h / 20 mm
  - At least 2 h

Time Temperature Transformation Diagram (TTT)

- Austenitizing temperature: 1180°C
- Ac₁₁₁, Ac₁ₑ
- Ms
- A+C
- B
- P

Tempering Diagram

- Test specimen:
  - Ø = 30 mm, h = 40 mm
  - Quenched from 1190°C in oil

Remarks: All technical information is for reference only.