# 1.2714

## Hot working steel

Reference Standard UNI EN ISO 4957

## Main characteristics and applications

Ni - Cr - Mo steel characterized by high level hardenability and toughness, good resistance to repeated shocks, fairly good insensitivity to thermal shocks and good wear resistance.

Main applications:
- blocks for dies, hammers and pile drivers
- rams for power hammers
- hot mill rolls
- very hard cold work dies and punches

It is advisable to use the blocks for dies treated at various hardness limits according to the etching depth complying with the indications given below.

<table>
<thead>
<tr>
<th>Etching depth (mm)</th>
<th>HRC</th>
<th>R (N/mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>39 ± 43</td>
<td>1200/1350</td>
</tr>
<tr>
<td>50</td>
<td>36 ± 42</td>
<td>1100/1320</td>
</tr>
<tr>
<td>100</td>
<td>32 ± 38</td>
<td>980/1170</td>
</tr>
</tbody>
</table>

Before starting machining, preheat the tools to temperatures between 250 - 300 °C.

## Supply Conditions

### Annealed

HB max 250

### Hardened and tempered

HB 360 - 410

## Heat treatments

### Isothermal annealing

- Heat to 800 °C, hold at temperature for 1/2 h to 1 h
- Furnace cooling to 670 °C and hold at temperature for at least 10 hours
- Cool by 10 °C/h to 630 °C
- Cooling in air
- Maximum hardness 240 HB

### Stress relieving

- To be carried out after machining before final heat treatment
- Heat to 600 - 650 °C hold for 4 ÷ 6 hours
- Cooling in furnace to 300 - 350 °C
- Cooling in air

### Hardening

- Initial preheating to 350 - 450 °C
- Second preheating to 650 - 750 °C
- Heat to hardening temperature 860 - 890 °C and hold at temperature
- Cooling in hot oil (40 -°C) Oil quenched hardness: 54 ÷ 59 HRC
- Cooling in ventilator air (for parts ≤ 200 mm)
- The hardness that can be obtained after hardening in air can be found in the diagrams
- The average hardness values that can be obtained with hardening in oil in the range 840 - 920 °C are given below:

<table>
<thead>
<tr>
<th>°C</th>
<th>840</th>
<th>860</th>
<th>880</th>
<th>900</th>
<th>920</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRC</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>59.5</td>
<td>60</td>
</tr>
</tbody>
</table>

### Tempering

- Tempering must be carried out within one hour from hardening (warm part) in the 550 - 630 °C for 4 ÷ 6 hours according to hardness requirements, the dimension of the parts and operating conditions
- Cooling in still air
- Tempering must be repeated a second time at a temperature equal to or 20°C lower than the previous
- Before tempering, the parts must be preheated to 200 - 300 °C
### 7 C.C.T. curve

**Austenitizing temperature: 850°C**

**Hardening penetration diagram**

- Diameter 200 mm
- Hardening 890° C
- Forced air

- + rinv. 280° C x 3' mm
- + rinv. 400° C x 3' mm
- + rinv. 500° C x 3' mm
- + rinv. 600° C x 3' mm

### 8 Tempering curve

**Test specimen hardened and tempered on 1400 N/mm²**

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