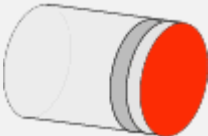


## D3 TOOL STEEL (X210CR12)

D3 toolsteel is a 12% chrome steel, it has very high wear resistance against abrasive and adhesive wear due to the high volume of hard carbides in the steel matrix, medium toughness, dimensionally stable, high compressive strength, not secondary hardenable. Applications: Highly stressed cutting and punching tools for thin sheets, profile rolls, drawing and deep drawing tools, stone processing tools, knives for paper and plastics, shear knives for thin sheets.

Colour Code	Stocked Sizes	
Red/Grey 	Rounds	60 mm - 262.5 mm Dia
	Flats	80 mm x 50 mm - 150 mm x 30 mm
<b>Condition of Delivery</b>		
Soft annealed to max. 248 HB		

### Related Specifications

Germany	DIN 1.2080
USA	AISI D3

### Chemical Composition

	%
Carbon	2.10
Chromium	12.0

### Physical Properties

Thermal expansion coefficient	$\left[ \frac{10^{-6} \text{ m}}{\text{m K}} \right]$	20-100°C	20-200°C	20-300°C	20-400°C
		10,8	11,6	12,3	12,5
Thermal conductivity	$\left[ \frac{\text{W}}{\text{m K}} \right]$	20°C	350°C	700°C	
		16,7	20,5	24,1	

### Heat Treatment

#### Soft Annealing

Temperature	800 - 840°C
Cooling	furnace
Hardness	max 248 HB

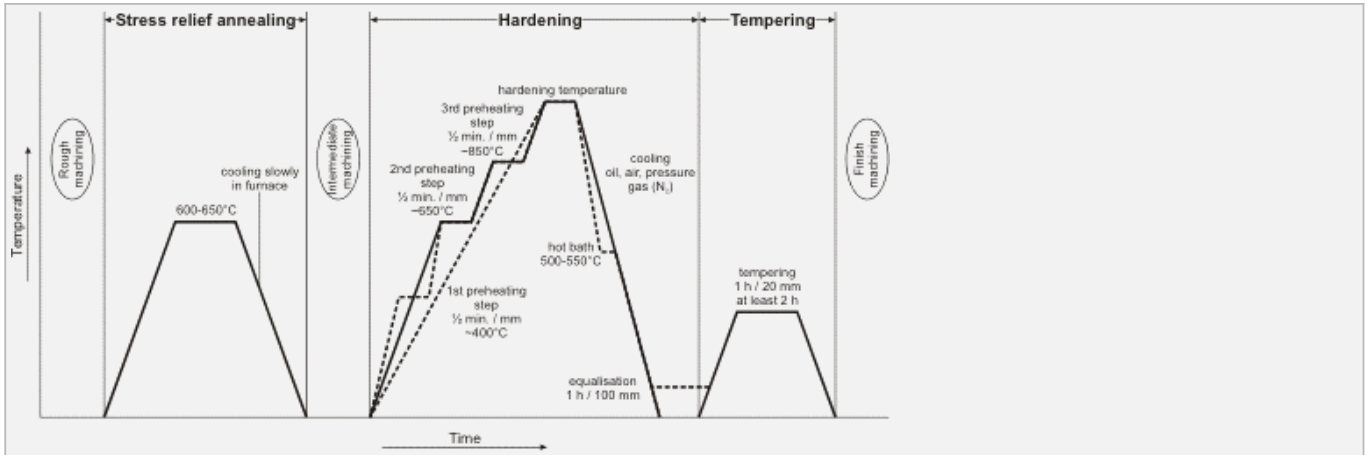
#### Stress Relief Annealing

Temperature	600 - 650°C
Cooling	furnace

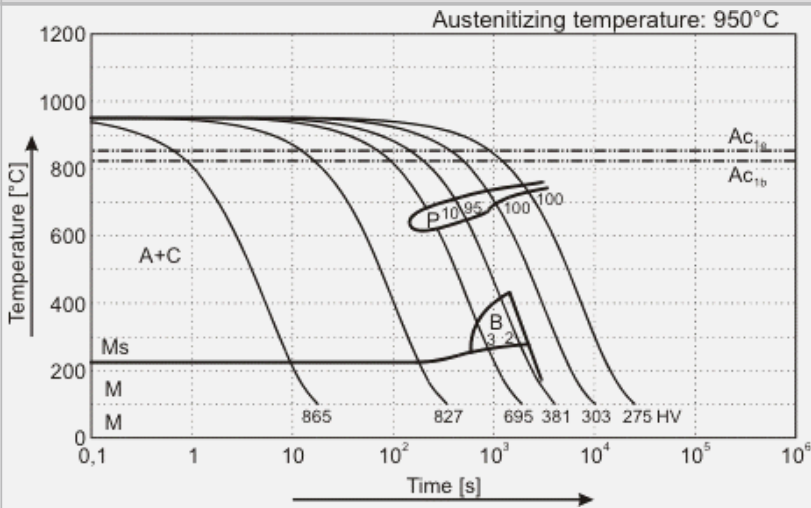
#### Hardening

Temperature	950 - 980°C
Cooling	oil, pressure (N <sub>2</sub> ) air or hot bath 500 - 550°C
Hardness	see tempering diagram

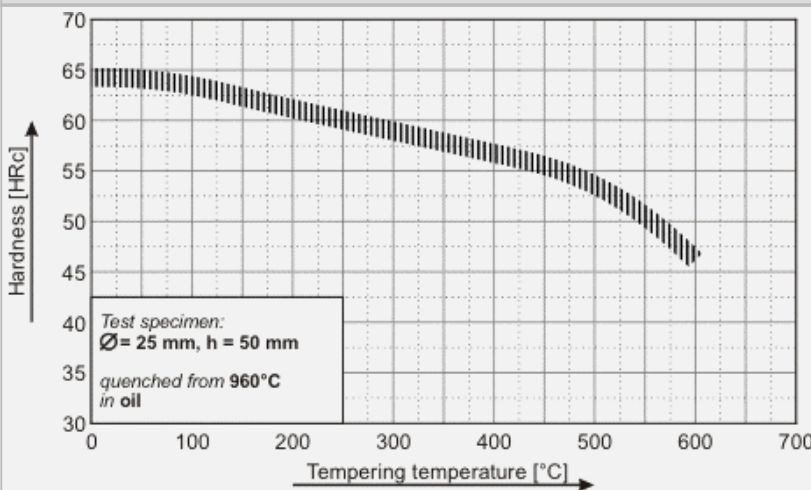
### Thermal Cycle Diagram



**Continuous Cooling Transformation Diagram (CCT)**



**Tempering Diagram**



Interlloy believes the information provided is accurate and reliable. However no warranty of accuracy, completeness or reliability is given, nor will any responsibility be taken for errors or omissions.