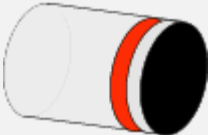


## D2 TOOL STEEL (X153CRMOV12)

D2 toolsteel is a 12% chrome steel, it has very high resistance against abrasive and adhesive wear due to a high volume of hard carbides in the steel matrix, good toughness, very good dimensional stability, high compressive strength, and has a very good base material for PVD/CVD coating as well as nitriding due to its secondary hardening properties. Similar to AISI D2. Applications: Cutting, punching, stamping tools, shear blades, thread rolling dies, cold extrusion dies, drawing and bending tools, flanging and straightening rolls, fine cutting tools, deep drawing tools, plastic moulds for abrasive polymers.

Colour Code	Stocked Sizes	
Black/Red 	Rounds: Squares: Flats:	16 mm - 413 mm Dia 25 mm - 250 mm AF 55 mm x 14 mm - 400 mm x 100 mm
	<b>Condition of Delivery</b> Soft annealed to max. 255 HB	

### Related Specifications

Germany	DIN 1.2379
USA	AISI D2

### Chemical Composition

	%
Carbon	1.55
Chromium	12.00
Molybdenum	0.80
Vanadium	0.90

### 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
		10,5	11,5	11,9	13,0
Thermal conductivity	$\left[ \frac{\text{W}}{\text{m K}} \right]$	20°C	350°C	700°C	
		16,7	20,5	24,2	

### Heat Treatment

#### Soft Annealing

Temperature	820 - 850°C
Cooling	furnace
Hardness	max 255 HB

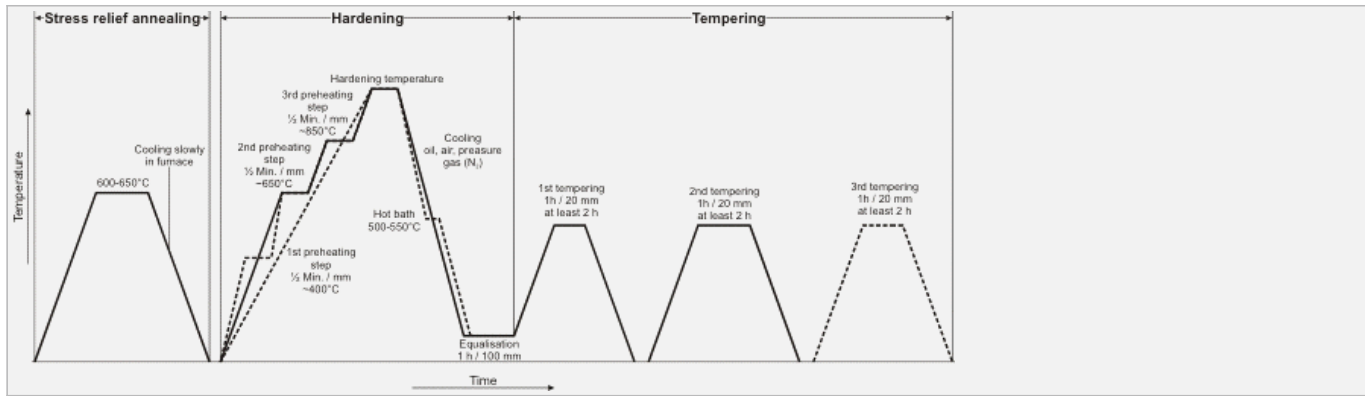
#### Stress Relief Annealing

Temperature	600 - 650°C
Cooling	furnace

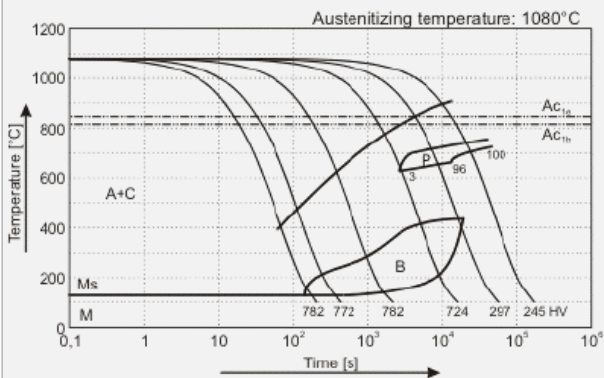
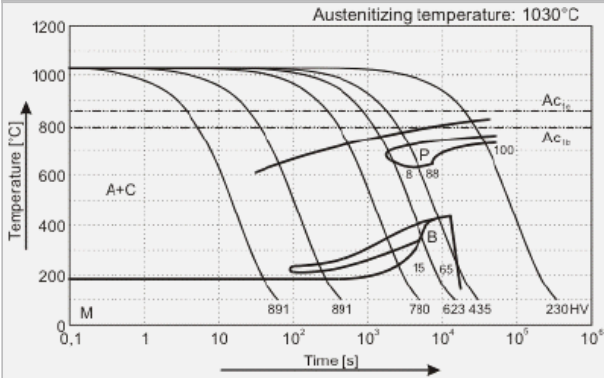
#### Hardening

Temperature	1020 - 1030°C	1040 - 1080°C
Cooling	oil, pressure (N <sub>2</sub> ) air or hot bath 500 - 550°C	see tempering diagram usually < 300°C
Hardness	oil, pressure (N <sub>2</sub> ) air or hot bath 500 - 550°C	see tempering diagram usually 500°C

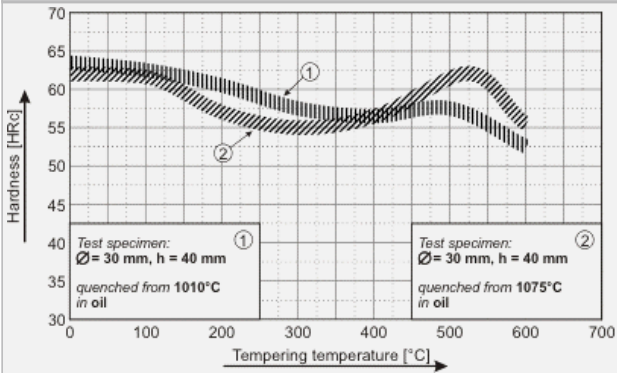
### Thermal Cycle Diagram



**Continuous Cooling Transformation Diagram (CCT)**



**Tempering Diagram**



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