

## P20 TOOL STEEL (40CRMNNIMO8-6-4)

P20 is a plastic mould steel that is usually supplied in a hardened and tempered condition. Exhibiting good machinability with better polishability, compared to 1.2312 (AISI P20+S).

Applications: Plastic moulds, frames for plastic pressure dies, hydroforming tools.

Colour Code	Stocked Sizes	
	Rounds	20.5 mm - 180 mm Dia
	Flats	50 mm x 12 mm - 100 mm x 30 mm
	<b>Condition of Delivery</b>	
	Hardened & tempered, 900 - 1050 N/mm <sup>2</sup>	

### Related Specifications

Germany	DIN 1.2311
USA	AISI P20

### Chemical Composition

	%
Carbon	0.40
Manganese	1.50
Chromium	1.90
Molybdenum	0.20

### Physical Properties

Thermal expansion coefficient	$\left[ \frac{10^{-6} \text{ m}}{\text{m K}} \right]$ $\frac{20-100^{\circ}\text{C}}{12,1}$ $\frac{20-200^{\circ}\text{C}}{12,7}$ $\frac{20-300^{\circ}\text{C}}{13,2}$ $\frac{20-400^{\circ}\text{C}}{13,6}$
Thermal conductivity	$\left[ \frac{\text{W}}{\text{m K}} \right]$ $\frac{20^{\circ}\text{C}}{39,6}$ $\frac{350^{\circ}\text{C}}{39,2}$

### Heat Treatment

#### Soft Annealing

Temperature	710 - 740°C
Cooling	furnace
Hardness	max 235 HB

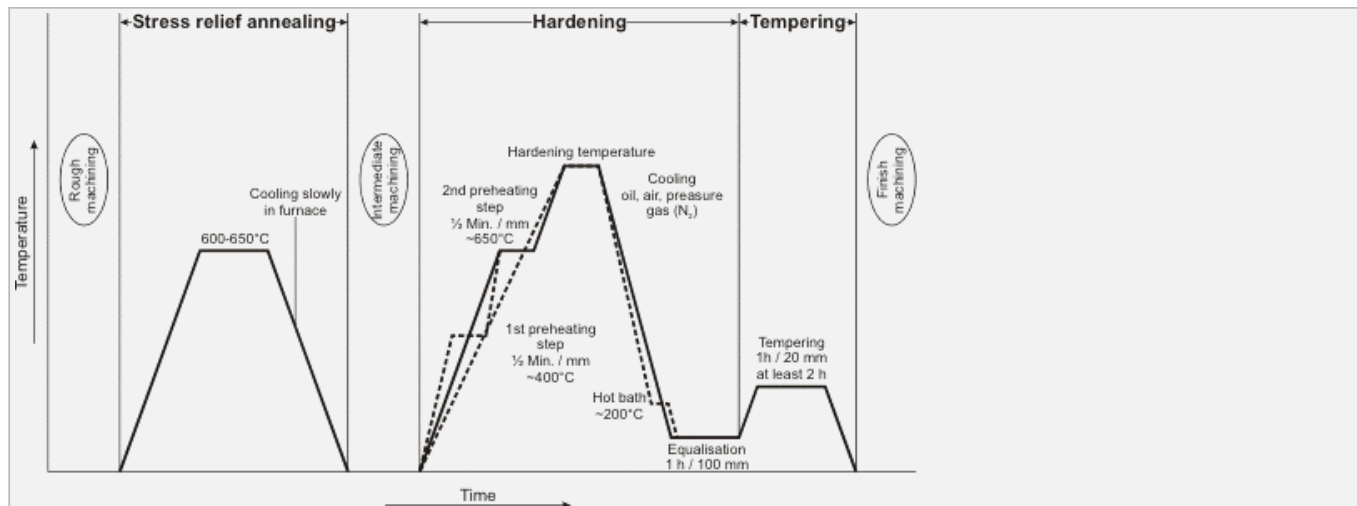
#### Stress Relief Annealing

Temperature	500 - 550°C
Cooling	furnace

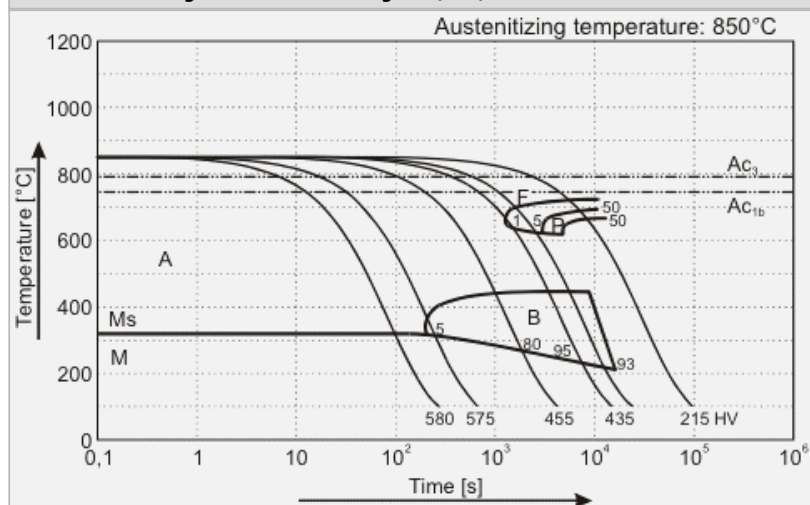
#### Hardening

Temperature	830 - 870°C
Cooling	oil or hot bath 180 - 220°C
Hardness	see tempering diagram

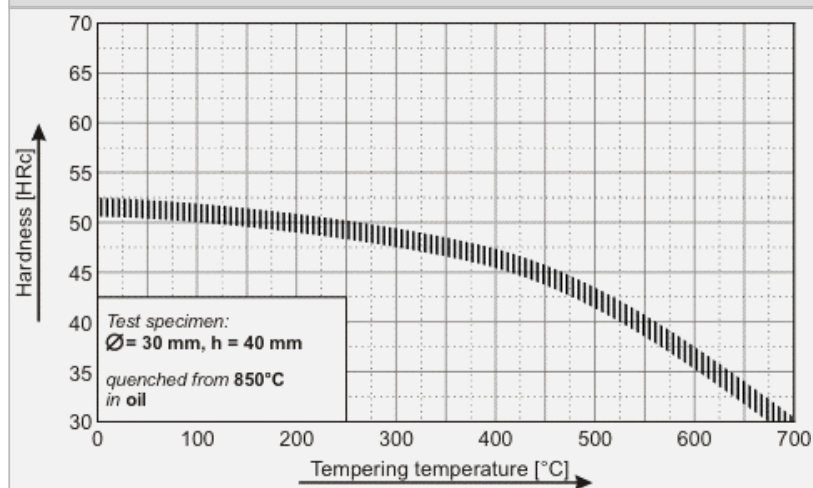
### Thermal Cycle Diagram



Continuous Cooling Transformation Diagram (CCT)



Tempering Diagram



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