

Special Steel

DE - Brand:

PMD23

Chemical composition:
(Typical analysis in %)

C	Cr	W	Mo	V			
1,30	4,20	6,40	5,00	3,10			

Steel properties:

Powder-metallurgical high-speed steel, fine distributed carbide structure, homogenous microstructure within whole cross-section, high bending and compressive strength, very good grindability.

Applications:

Machining tools like milling cutters, drills or broaches, cold-work tools for cutting, stamping or deep-drawing dies.

Condition of delivery:

Soft annealed to max. 260 HB

Physical properties:

Thermal expansion coefficient	$\left[\frac{10^{-6} \cdot \text{m}}{\text{m} \cdot \text{K}} \right]$	68-212°F	68-392°F	68-572°F	68-752°F
		11,1	11,6	11,9	12,1
Thermal conductivity	$\left[\frac{\text{W}}{\text{m} \cdot \text{K}} \right]$	68°F	662°F	1292°F	
		24,6	27,5	26,7	

Heat treatment:

Soft annealing
Annealing only in neutral atmosphere

Temperature	Cooling	Hardness
1600 - 1650°F	furnace	max. 260 HB

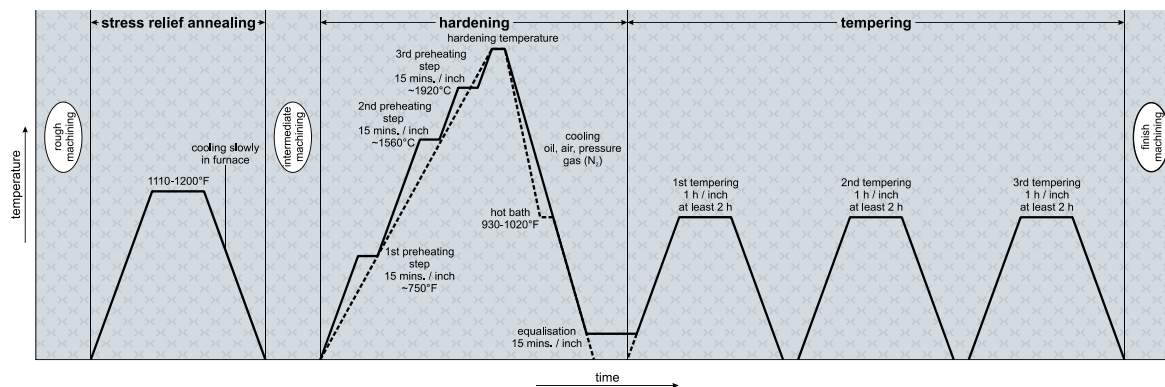
Stress relief annealing

Temperature	Cooling	
1110 - 1200°F	furnace	

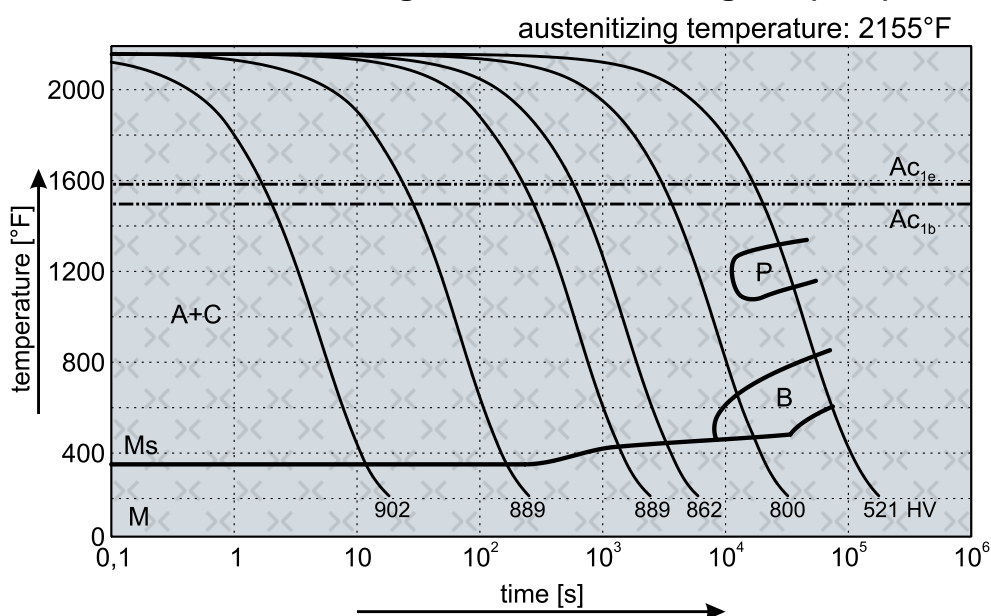
Hardening

Temperature	Cooling	Tempering
1920 - 2155°F	oil, pressure gas (N ₂), air or hot bath 930 - 1020°F	see tempering table

(PMD23) Thermal Cycle Diagram



Continuous Cooling Transformation Diagram (CCT)



DE-Brand PMD23 has to be tempered minimum three times with 1005-1040°F in any case.

Reference values for hardness after tempering three times, according to the austenitizing temperature (all datas ±1 HRC).

Tempering temperature	Austenitizing temperature			
	1920°F	2010°F	2100°F	2155°F
930°F	61,5 HRC	63,0 HRC	64,0 HRC	64,5 HRC
970°F	62,0 HRC	63,5 HRC	65,0 HRC	65,5 HRC
1005°F	61,5 HRC	63,0 HRC	65,0 HRC	66,0 HRC
1040°F	60,0 HRC	62,0 HRC	64,0 HRC	65,0 HRC
1075°F	58,0 HRC	60,5 HRC	63,0 HRC	64,0 HRC
1110°F	56,5 HRC	58,5 HRC	60,5 HRC	62,0 HRC

Remarks: All technical information is for reference only.