



DE - Brand:

Special Steel

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	$\left[\frac{10^{-6} \cdot \text{m}}{\text{m} \cdot \text{K}} \right]$	20-100°C	20-200°C	20-300°C	20-400°C
		11,1	11,6	11,9	12,1
Thermal conductivity	$\left[\frac{\text{W}}{\text{m} \cdot \text{K}} \right]$	20°C	350°C	700°C	
		24,6	27,5	26,7	

Heat treatment:

Soft annealing
Annealing only in neutral atmosphere

Temperature	Cooling	Hardness
870 - 900°C	furnace	max. 260 HB

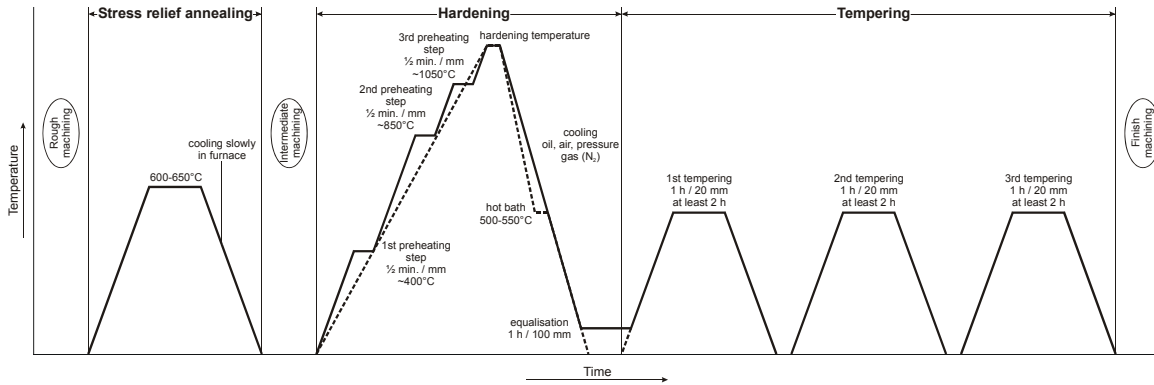
Stress relief annealing

Temperature	Cooling	
600 - 650°C	furnace	

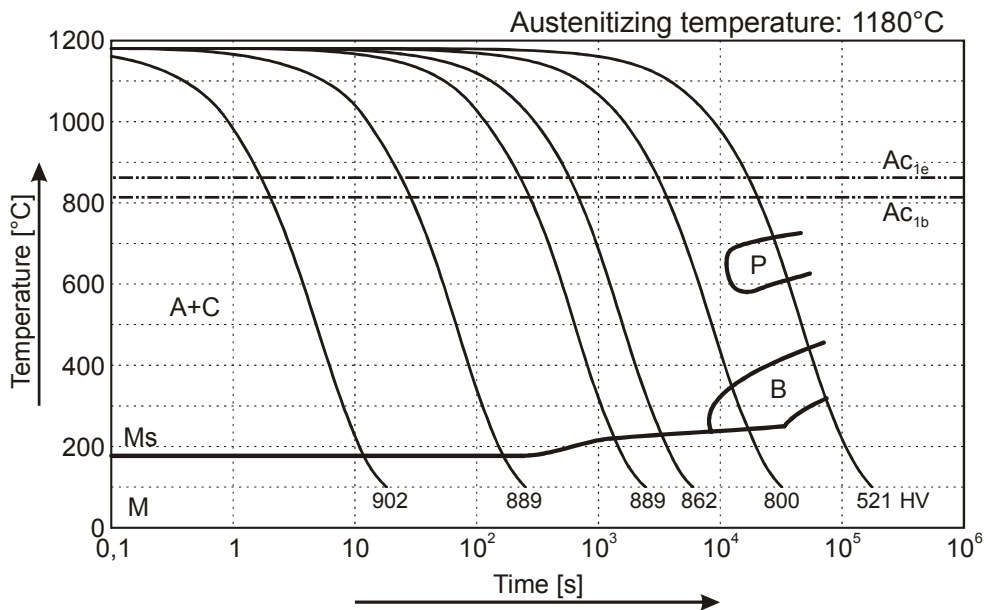
Hardening

Temperature	Cooling	Tempering
1050 - 1180°C	oil, pressure gas (N ₂), air or hot bath 500 - 550°C	see tempering table

(PMD23) Thermal Cycle Diagram



Continuous Cooling Transformation Diagram (CCT)



DE-Brand PMD23 has to be tempered minimum three times with 540-560°C in any case.

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

Tempering temperature	Austenitizing temperature			
	1050°C	1100°C	1150°C	1180°C
500°C	61,5 HRC	63,0 HRC	64,0 HRC	64,5 HRC
520°C	62,0 HRC	63,5 HRC	65,0 HRC	65,5 HRC
540°C	61,5 HRC	63,0 HRC	65,0 HRC	66,0 HRC
560°C	60,0 HRC	62,0 HRC	64,0 HRC	65,0 HRC
580°C	58,0 HRC	60,5 HRC	63,0 HRC	64,0 HRC
600°C	56,5 HRC	58,5 HRC	60,5 HRC	62,0 HRC

Remarks: All technical information is for reference only.