



DE - Brand:

Special Steel

PMD9

Chemical composition:

(Typical analysis in %)

C	Cr	Mo	V				
1,80	5,25	1,30	9,00				

Steel properties:

Powder-metallurgical cold work tool steel with high V-content, very fine carbide distribution, homogenous microstructure within whole cross-section, higher toughness compared to PMD10.

Applications:

Stamping, cutting and deep drawing tools, screws and screw parts, sinterpress tools, precision blanking stamps and dies.

Condition of delivery:

Soft annealed to max. 280 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	11,2	11,4	11,6
Thermal conductivity	$\left[\frac{\text{W}}{\text{m} \cdot \text{K}} \right]$				

Heat treatment:

Soft annealing
Annealing only in neutral atmosphere

Temperature	Cooling	Hardness
870 - 900°C	furnace	max. 280 HB

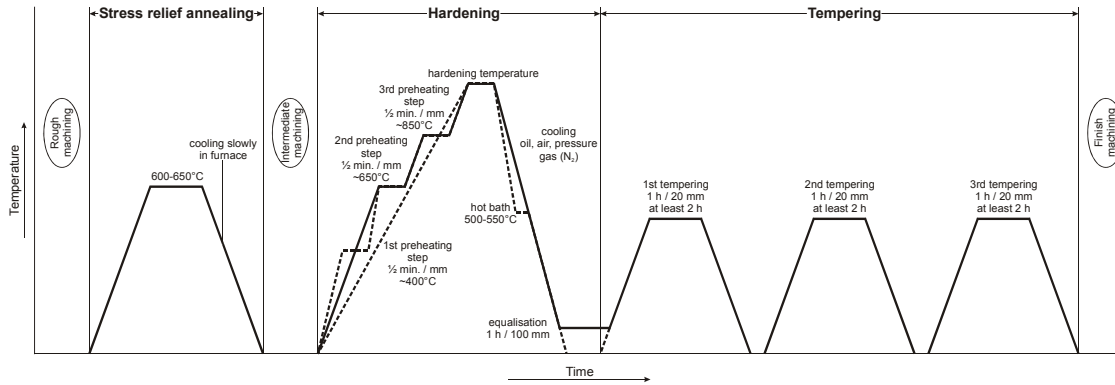
Stress relief annealing

Temperature	Cooling	
600 - 650°C	furnace	

Hardening

Temperature	Cooling	Tempering
1070 - 1180°C	oil, pressure gas (N ₂), air or hot bath 500 - 550°C	see tempering table

(PMD9) Thermal Cycle Diagram



DE-Brand PMD9 has to be tempered minimum three times in any case.

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

Tempering temperature	Austenitizing temperature		
	1070°C	1120°C	1180°C
540°C	54,0 HRC	56,0 HRC	58,0 HRC
560°C	53,0 HRC	54,0 HRC	55,0 HRC
590°C	49,0 HRC	50,0 HRC	52,0 HRC
620°C	43,0 HRC	45,0 HRC	46,0 HRC