

# Special Steel

DE - Brand:

## PMD60

### Chemical composition: (Typical analysis in %)

C	Cr	W	Mo	V	Co		
2,30	4,20	6,50	7,00	6,50	10,50		

### Steel properties:

Powder-metallurgical high-speed steel with high Co and carbide content, very fine carbide distribution, homogenous microstructure within whole cross-section, high hardness and wear resistance at elevated temperatures.

### Applications:

Machining tools with high thermal load, cutting and deep drawing tools with excellent wear resistance.

### Condition of delivery:

Soft annealed to max. 340 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
		10,1	10,3	10,6	10,8
Thermal conductivity	$\left[ \frac{\text{W}}{\text{m} \cdot \text{K}} \right]$	20°C	350°C	700°C	
		24,5	27,9	27,4	

### Heat treatment:

Soft annealing  
Annealing only in neutral atmosphere

Temperature	Cooling	Hardness
870 - 900°C	furnace	max. 340 HB

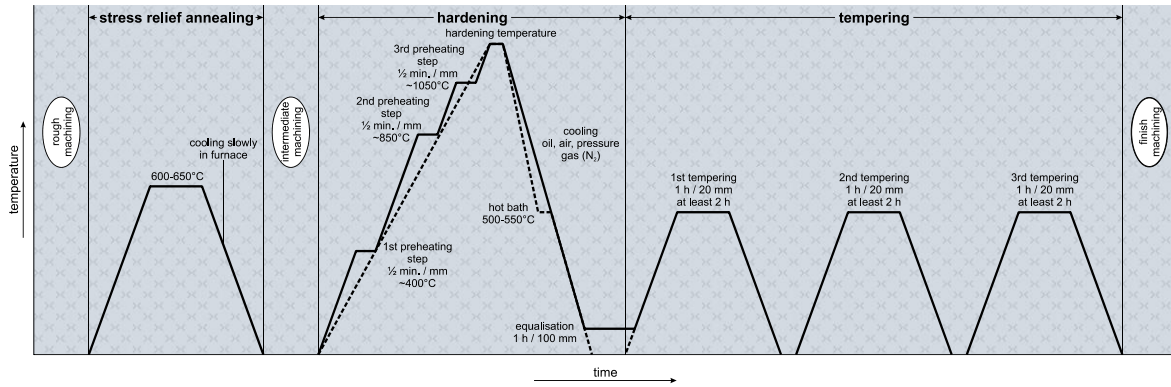
Stress relief annealing

Temperature	Cooling	
600 - 650°C	furnace	

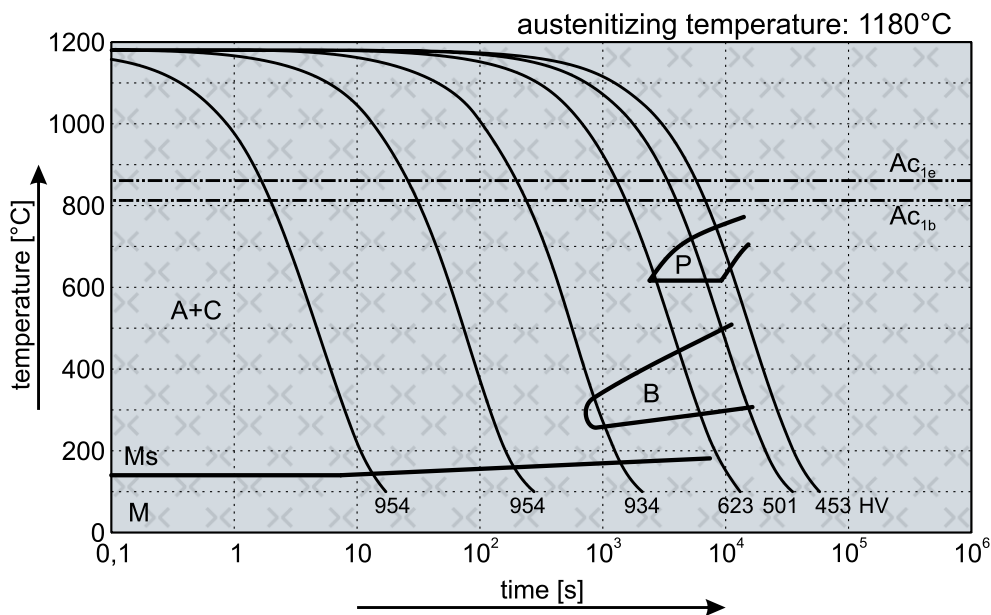
Hardening

Temperature	Cooling	Tempering
1100 - 1190°C	oil, pressure gas (N <sub>2</sub> ), air or hot bath 500 - 550°C	see tempering table

## (PMD60) Thermal Cycle Diagram



## Continuous Cooling Transformation Diagram (CCT)



**DE-Brand PMD60 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		
	1100°C	1150°C	1190°C
500°C	68,0 HRC	68,5 HRC	69,0 HRC
520°C	68,5 HRC	69,0 HRC	69,5 HRC
540°C	67,5 HRC	68,5 HRC	69,0 HRC
560°C	66,5 HRC	67,5 HRC	68,0 HRC
580°C	64,5 HRC	65,5 HRC	66,0 HRC
600°C	62,0 HRC	63,0 HRC	64,0 HRC

Remarks: All technical information is for reference only.