

# Special Steel

DE - Brand:

**PMD10****Chemical composition:**  
(Typical analysis in %)

C	Cr	Mo	V				
2,45	5,25	1,20	9,75				

**Steel properties:**

Powder-metallurgical cold work tool steel with high V-content, very fine carbide distribution, homogenous microstructure within whole cross-section, increased wear resistance compared to PMD9.

**Applications:**

Stamping, cutting and deep drawing tools, screws and screw parts, cold extrusion tools.

**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
		11,0	11,1	11,3	11,5
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

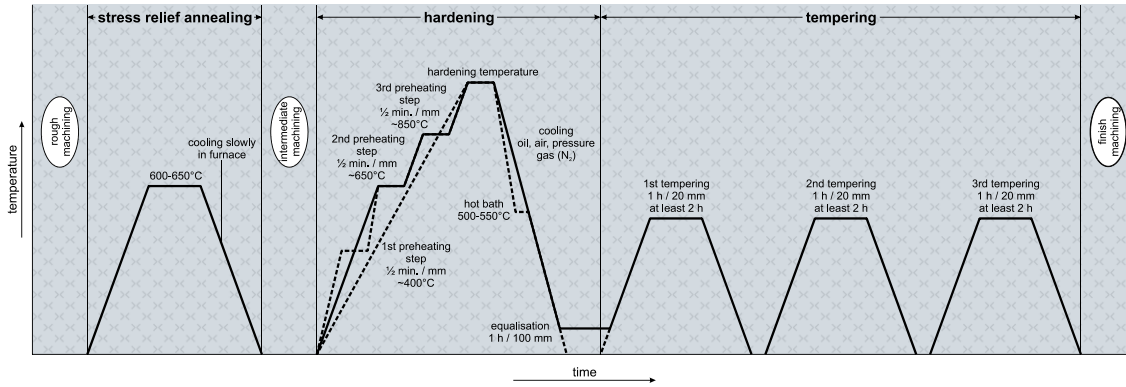
Stress relief annealing

Temperature	Cooling	
600 - 650°C	furnace	

Hardening

Temperature	Cooling	Tempering
1050 - 1170°C	oil, pressure gas (N <sub>2</sub> ), air or hot bath 500 - 550°C	see tempering table

## (PMD10) Thermal Cycle Diagram



**DE-Brand PMD10 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				
	1050°C	1080°C	1110°C	1140°C	1170°C
<b>470°C</b>	59,5 HRC	60,5 HRC	61,5 HRC	62,5 HRC	63,5 HRC
<b>490°C</b>	61,5 HRC	62,0 HRC	63,0 HRC	64,0 HRC	65,0 HRC
<b>510°C</b>	62,0 HRC	63,0 HRC	63,5 HRC	64,4 HRC	65,0 HRC
<b>530°C</b>	60,0 HRC	61,0 HRC	62,0 HRC	63,0 HRC	64,0 HRC
<b>550°C</b>	56,0 HRC	57,5 HRC	59,0 HRC	60,0 HRC	61,0 HRC
<b>570°C</b>	50,5 HRC	51,0 HRC	55,0 HRC	57,0 HRC	57,5 HRC

Remarks: All technical information is for reference only.