Doerrenberg

DE - Brand:

Special Steel

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	$\left[\frac{10^{-6} \cdot m}{m \cdot K}\right]$	68-212°F	68-392°F	68-572°F	68-752°F
		10,1	10,3	10,6	10,8

Thermal conductivity	$\left[\frac{W}{m \cdot K}\right]$	68°F	662°F	1292°F
		24,5	27,9	27,4

Heat treatment:

Soft annealing
Annealing only in neutral atmosphere

Temperature	Cooling	Hardness
1600 - 1650°F	furnace	max. 340 HB

Stress relief annealing

Temperature	Cooling	
1110 - 1200°F	furnace	

Hardening

Temperature	Cooling	Tempering
2010 - 2175°F	oil, pressure gas (N_2), air or hot bath 930 - 1020°F	see tempering table

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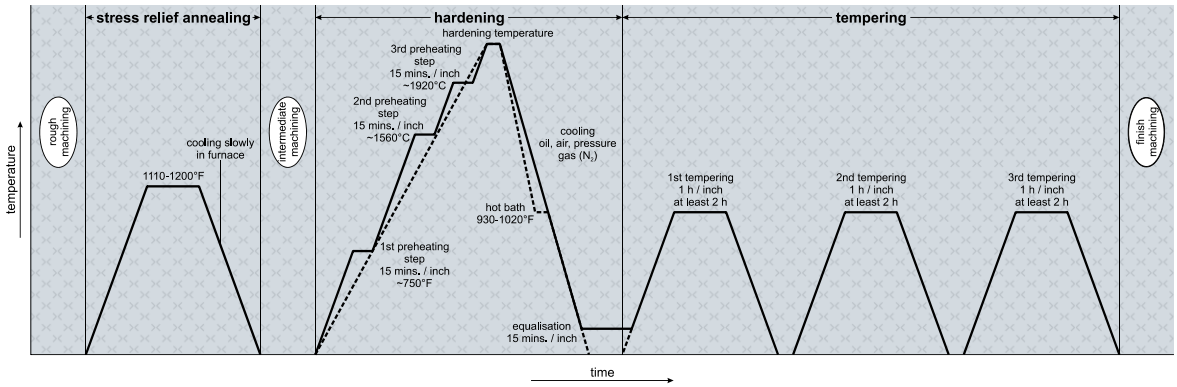
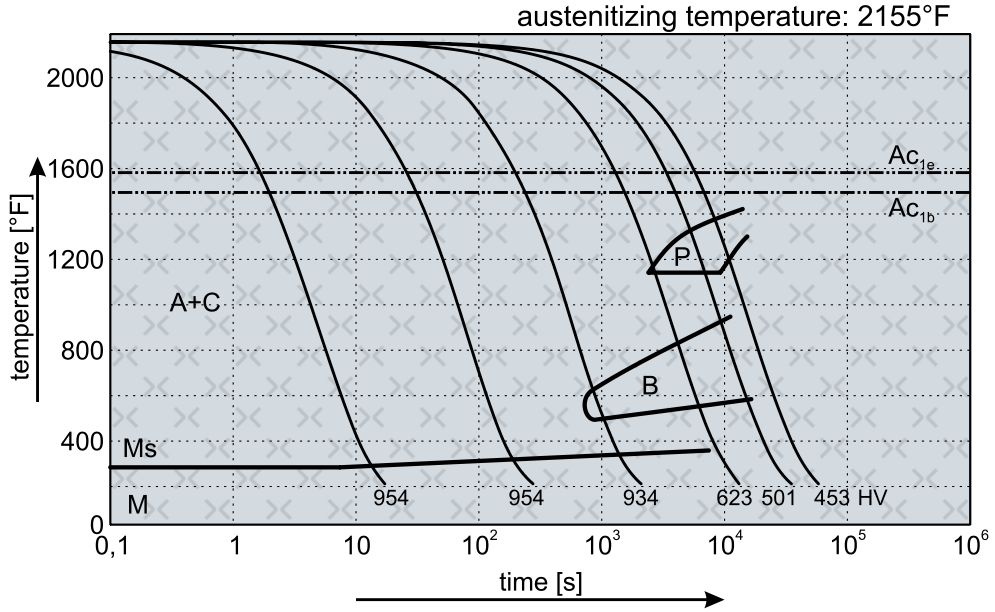
(PMD60) Thermal Cycle Diagram



Continuous Cooling Transformation Diagram (CCT)



DE-Brand PMD60 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		
	2010°F	**2100°F**	**2175°F**
930°F	68,0 HRC	68,5 HRC	69,0 HRC
970°F	68,5 HRC	69,0 HRC	69,5 HRC
1005°F	67,5 HRC	68,5 HRC	69,0 HRC
1040°F	66,5 HRC	67,5 HRC	68,0 HRC
1075°F	64,5 HRC	65,5 HRC	66,0 HRC
1110°F	62,0 HRC	63,0 HRC	64,0 HRC

Remarks: All technical information is for reference only.