



Material No.: Code:

1.2311 40CrMnNiMo8-6-4

DE - Brand:

MCM

In the DIN EN ISO 4957 the grades 1.2311 (AISI P20), 1.2312 (AISI P20+S) and 1.2738 (AISI P20+Ni) covered by the above mentioned code were amalgamated. The grade 1.2311 does not contain additional quantities of Sulphur or Nickel

Chemical composition:
(Typical analysis in %)

C	Mn	Cr	Mo				
0,40	1,50	1,90	0,20				

Steel properties:

Plastic mould steel that is usually supplied in a quenched and tempered condition. Good machinability, better polishability, compared to 1.2312 (AISI P20+S). Similar to AISI P20.

Applications:

Plastic moulds, frames for plastic pressure dies, hydro-forming tools.

Condition of delivery:

Quenched and tempered, 280 - 325 HB
(950 - 1100 N/mm² according to DIN EN ISO 18265 Table A.1)

Physical properties:

Thermal expansion coefficient	$\left[\frac{10^{-6} \cdot \text{m}}{\text{m} \cdot \text{K}} \right]$	$\frac{20-100^{\circ}\text{C}}{12,1}$	$\frac{20-200^{\circ}\text{C}}{12,7}$	$\frac{20-300^{\circ}\text{C}}{13,2}$	$\frac{20-400^{\circ}\text{C}}{13,6}$
Thermal conductivity	$\left[\frac{\text{W}}{\text{m} \cdot \text{K}} \right]$	$\frac{20^{\circ}\text{C}}{39,6}$	$\frac{350^{\circ}\text{C}}{39,2}$		

Heat treatment:

Soft annealing

Temperature	Cooling	Hardness
710 - 740°C	furnace	max. 235 HB

Stress relief annealing

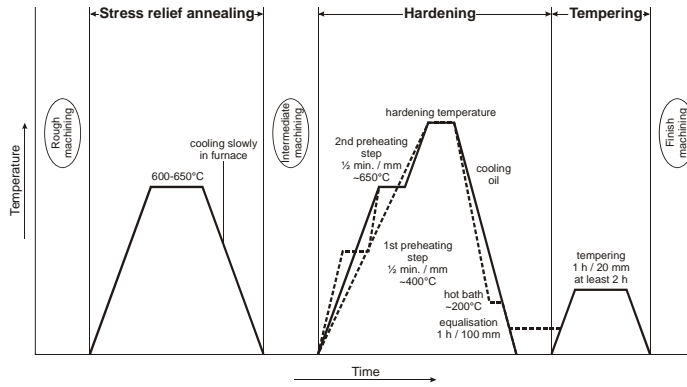
The recommendation 500 - 550°C is valid for quenched and tempered condition. In the soft annealed condition stress relieving between 600 - 650°C is possible.

Temperature	Cooling	
500 - 550°C	furnace	

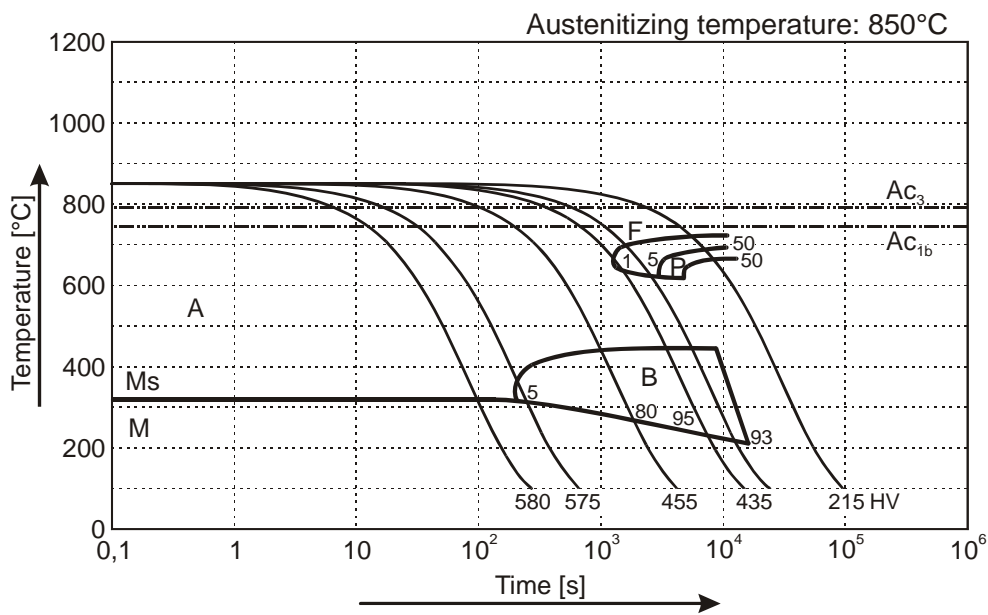
Hardening

Temperature	Cooling	Tempering
830 - 870°C	oil or hot bath 180 - 220°C	see tempering diagram

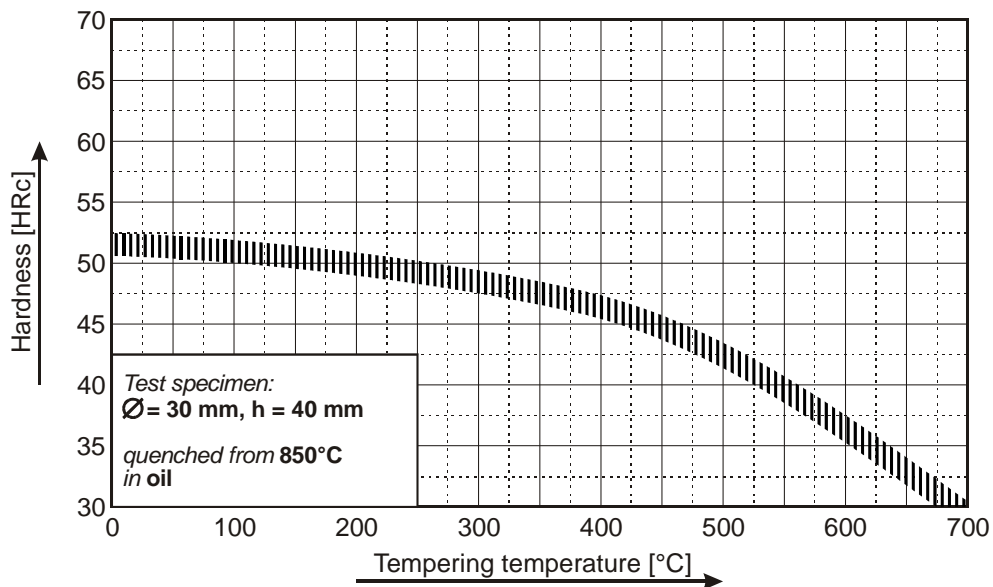
(1.2311) Thermal Cycle Diagram



Continuous Cooling Transformation Diagram (CCT)



Tempering Diagram



Remarks: All technical information is for reference only.