

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/mm<sup>2</sup> according to DIN EN ISO 18265 Table A.1)

### Physical properties

Thermal expansion coefficient

$\left[ \frac{10^{-6} \cdot \text{m}}{\text{m} \cdot \text{K}} \right]$	20-100°C	20-200°C	20-300°C	20-400°C
	12,1	12,7	13,2	13,6

Thermal conductivity

$\left[ \frac{\text{W}}{\text{m} \cdot \text{K}} \right]$	20°C	350°C
	39,6	39,2

### Heat treatment

Soft annealing

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

Stress relief annealing

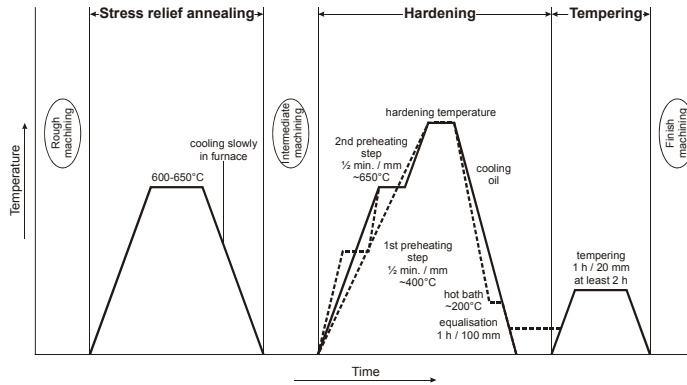
The recommendation 500 - 550°C is valid for quenched and tempered condition. In the soft annealed condition stress relieving between 600 - 650°C is possible.

Temperature	Cooling	
500 - 550°C	furnace	

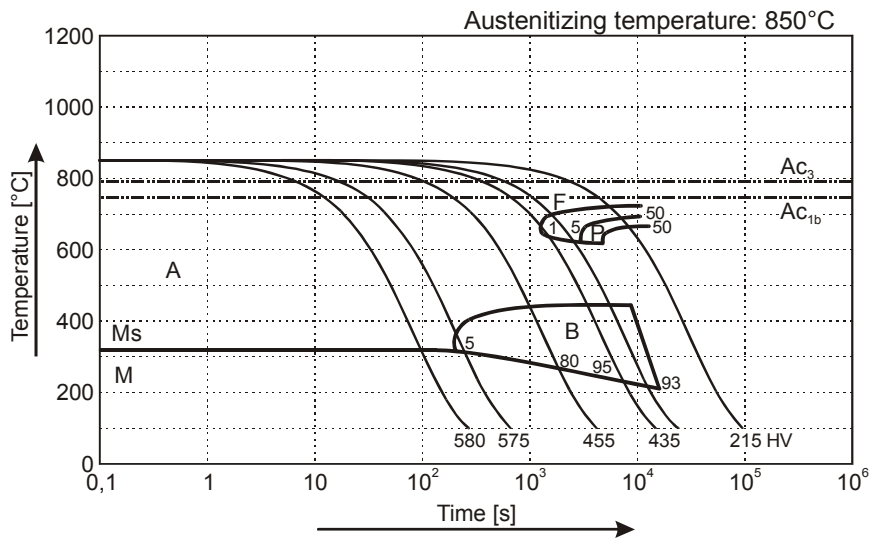
Hardening

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

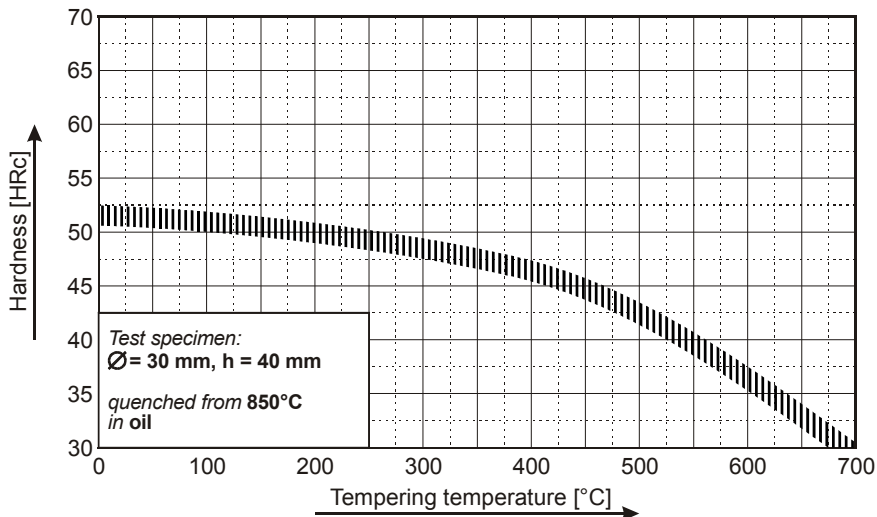
## (1.2311) Thermal Cycle Diagram



## Continuous Cooling Transformation Diagram (CCT)



## Tempering Diagram



Remarks: All technical information is for reference only.