**MFR**

**Short name** 40CrMnMo7  
**No.** 1.2311  
**AISI** P20

**Typical chemical composition, %**  
- C: 0.38  
- Si: 0.30  
- Mn: 1.50  
- Cr: 1.90  
- Mo: 0.20

**PROPERTIES AND USES**

Low-sulfur mold steel supplied as heat-treated for service strength. Preferable if die sinking is to be done by spark erosion or photochemical machining or if excellent polishability is required. The usual service strength of MFR is approx. 1000 N/mm². If, in exceptional cases, a higher strength should be required, please refer to the following heat-treatment instructions.

**HOT WORKING AND HEAT TREATMENT**

- **Forging**: 1150–850 °C (2100–1560 °F)
- **Soft annealing**: 720–740 °C (1330–1360 °F) 2–4 hrs/furnace cooling
- **Brinell Hardness in the annealed condition**: Max. 220 HB
- **Stress relieving**: Approx. 600 °C (1110 °F) 2–4 hrs/furnace cooling
- **Preheating for hardening**: 450–650 °C (840–1200 °F)
- **Hardening temperature**: 840–860 °C (1540–1580 °F)
- **Quenching**: Oil or hot bath of 200–230 °C (390–450 °F) (for thin wall thickness)
- **Tempering**: To service hardness as shown in the tempering diagram (min. 1 hr/25 mm thickness)

**CONTINUOUS TTT CURVE**

**TEMPERING CURVE (APPROX. VALUES)**