

## I Buderus Plastic Mould Steel Efficient®

	C	Si	Mn	P	S	Cr	Ni	Mo
Typical analysis	0.36	0.30	1.50	0.020	0.003	2.00	0.50	0.20

Figures in % by mass

Register of European Steels (SEL)	~ 40 CrMnMo 7 + Ni
DIN EN ISO 4957	~ 40 CrMnMo 7 + Ni
AFNOR	~ 40 CMD 8 + Ni
AISI	~ P 20 + Ni
BS	~ P 20 + Ni

### Characteristics

Mould steel for thickness  $\leq 600$  mm (width upon request). Properties as for grade 2311 ISO-BM, but with improved through-hardening.

Nitridable, hard chrome plateable, flame hardenable, polishable, grain-reliable as delivered.

In an extreme dimensional range, and where there is a requirement for

- I Higher hardness and better through-hardenableity
- I Polishability > 320 grit
- I Sensitive etch-graining designs (e.g. HNO<sub>3</sub>, fine or textile graining)
- I Higher thermal conductivity

we recommend grade 2738mod.TS(HH).

### Applications

Small and medium-sized injection moulds, press moulds and mould frames up to 600 mm thick.

### Delivered condition

Quenched and tempered to 280–325 HB ( $\Delta$  approx. 950–1100 MPa)\*

### Physical properties (reference values)

Thermal expansion coefficient (10 <sup>-6</sup> /K)	20–100 °C	20–250 °C	20–500 °C
	11.6	12.8	14.3
Thermal conductivity (W/mK)	20 °C	250 °C	500 °C
	34.0	33.5	33.0
Young's modulus (GPa)	20 °C	250 °C	500 °C
	212	197	175

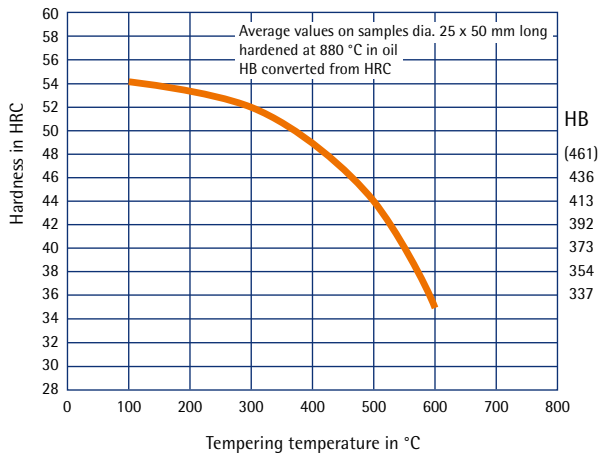
\* Surface hardness in Brinell, converted to DIN EN ISO 18265, Table A.1; we offer no quality guarantee with higher hardness requirements

## Efficient®

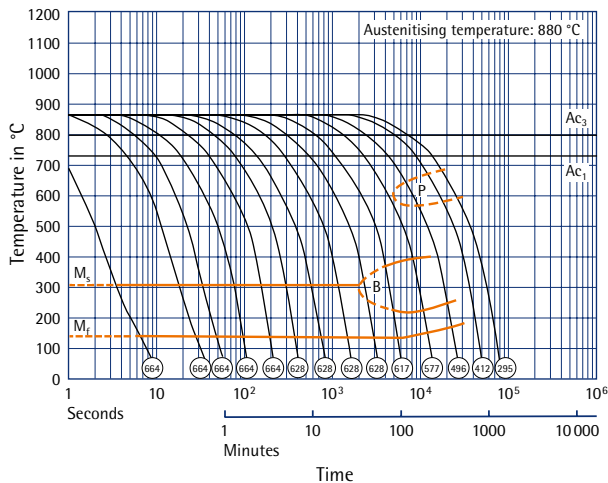
### Heat treatment

Stress relieving	Temperature: Approx. 550 °C in the quenched and tempered state Duration: 1 hour per 50 mm wall thickness Cooling: Furnace
Soft annealing	Temperature: 720 °C Duration: 1 hour per 25 mm wall thickness Cooling: Furnace
Hardening	Temperature: 880 °C Duration: 1 minute per mm wall thickness
Quenching hardness	Max. 54 HRC in oil, hot bath or vacuum
Tempering	Temperature: See tempering curve Duration: 1 hour per 25 mm wall thickness Cooling: Air
Working hardness	280–325 HB

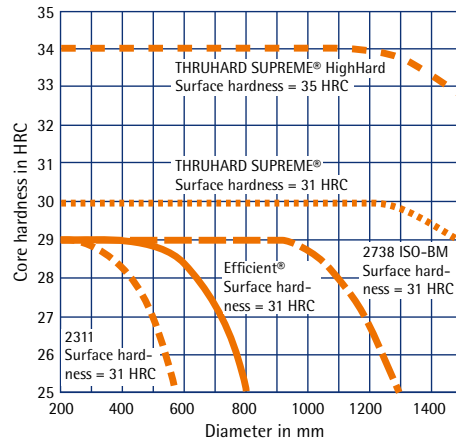
### Tempering curve



### TTT curve (continuous)



### Through-hardability (schematic)



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