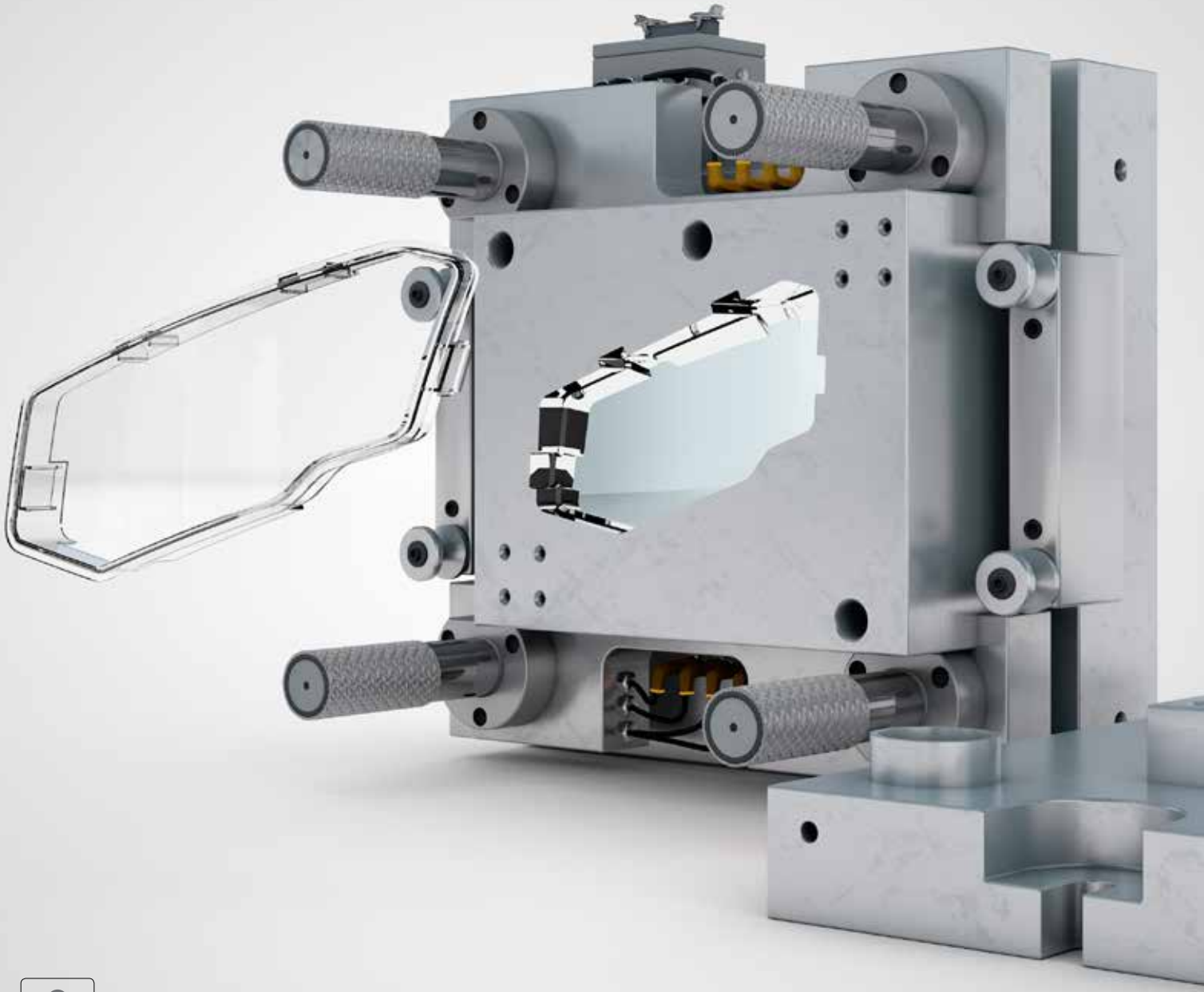
BÖHLER

EDRO



PLASTIC
MOULD STEEL

PLASTIC MOLD STEEL

BÖHLER M268
VMR®

ONE STEEL GRADE FOR SPECIAL REQUIREMENTS

BÖHLER M268 VMR is a hardened and tempered plastic mould steel with excellent cleanliness for best polishability. The hardness is constant over the entire cross-section of the steel block, even at large sizes, due to the addition of nickel.

APPLICATIONS

Moulds for plastics processing, components for general mechanical engineering and tool manufacture where highest polishability and fatigue strength are required headlights in the automotive industry, transparent parts for household appliances, etc.

CONDITION OF SUPPLY

Hardened and tempered to 355 – 395 BHN, High-hard. Generally, no heat treatment is required. If heat treatment is carried out, e.g. to obtain an increase in strength, the instructions given in this brochure should be observed.

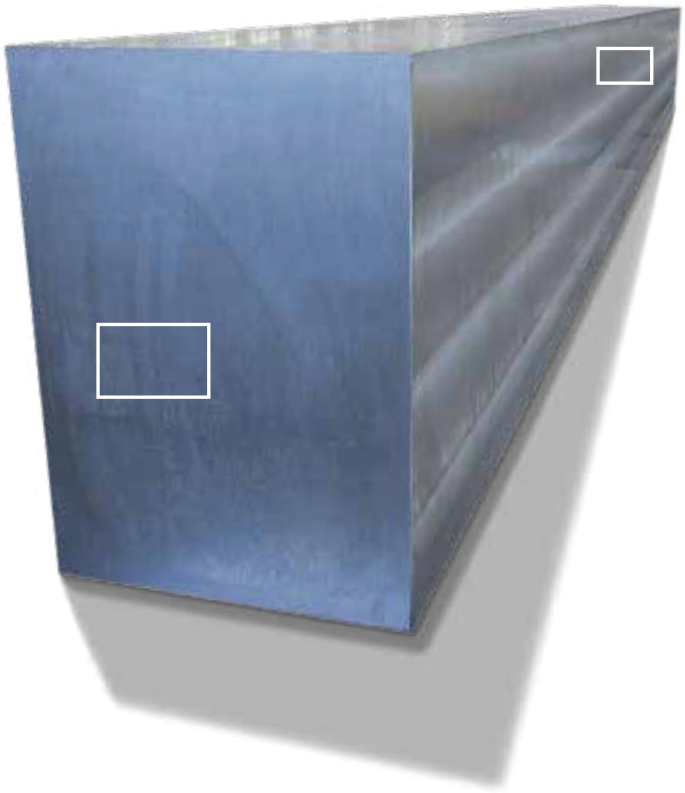
Chemical composition (average %)

C	Si	Mn	Cr	Mo	Ni
0.38	0.30	1.50	2.00	0.20	1.10

Standards

DIN / EN
< 1.2738 > 40CrMnNiMo8-6-4

HOMOGENEOUS
STRUCTURE
OVER THE ENTIRE
STEEL BLOCK!



ADVANTAGES AND BENEFITS

The economic and technological advantages of **BÖHLER M268 VMR** at a glance:

Higher quality
» Uniformly high strength and toughness, even at larger sizes
» High through hardenability
» Excellent thermal conductivity

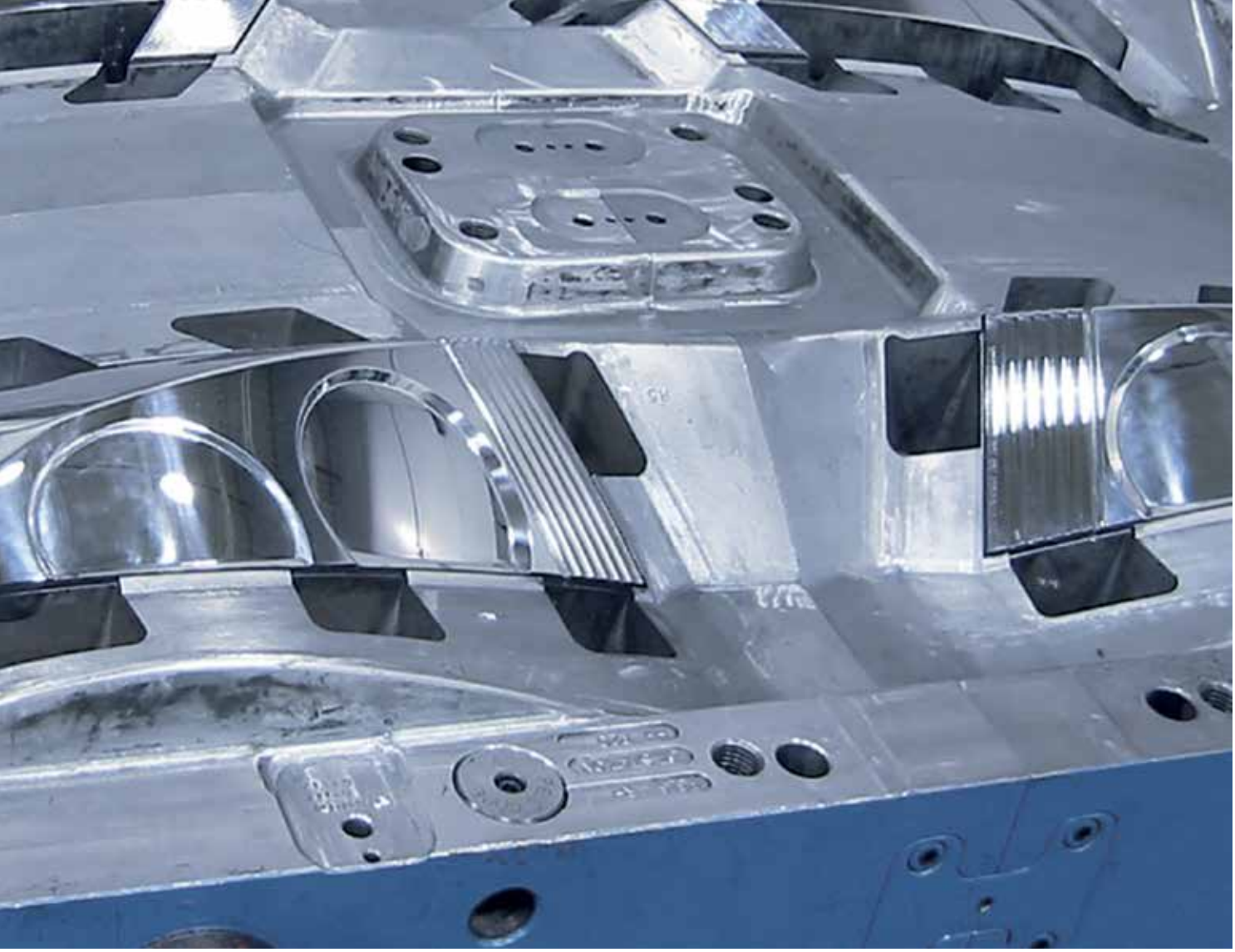
Efficient tool making
» No heat treatment required
» Excellent, high polishability
» Good texturing properties
» Good electrical discharge machining properties

Reliability
» The material does not require heat treatment, reducing the risk of errors
» The good toughness decreases the risk of cracking during service

= Improved productivity and cost reduction

Further advantages of our hardened and tempered plastic mould steel **BÖHLER M268 VMR**:

» Suitable for all nitriding processes to improve wear resistance
» Can be hard chromium plated. Suitable for every type of galvanic surface treatment used to optimize hardness and corrosion resistance
» Suitable for PVD coating, providing excellent adhesion conditions for the TiN-layer
» The material can be induction-hardened if necessary
» Suitable for photo-etching



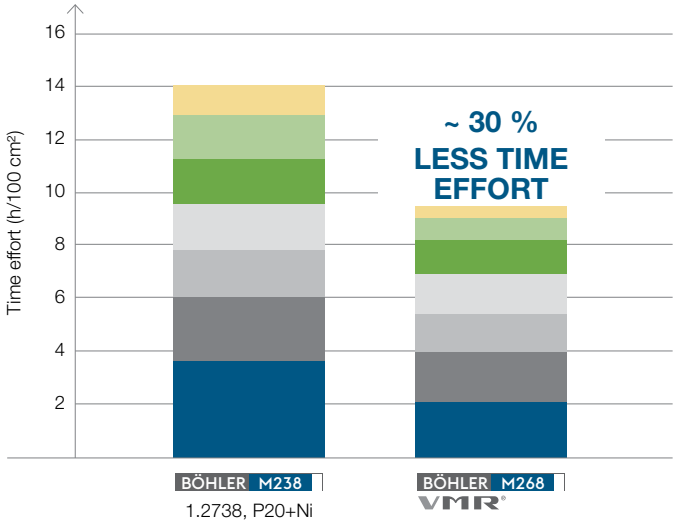
POLISHING

The juxtaposition represents the **time required to reach high-gloss surface** with Ra = 0.04 microns from a pre-ground surface. For more details, please see the voestalpine BÖHLER special steel polishing brochure.

MIRROR POLISHABILITY

The excellent cleanliness of BÖHLER M268 VMR, achieved by the vacuum remelting technology, has a positive impact on the polishability of large moulds and complex geometries.

Fast and high-quality polishing in less time (Results from laboratory and practice)



Polishing steps

K400 | K600 | 25 µm | 14 µm | 9 µm | 6 µm | 3 µm

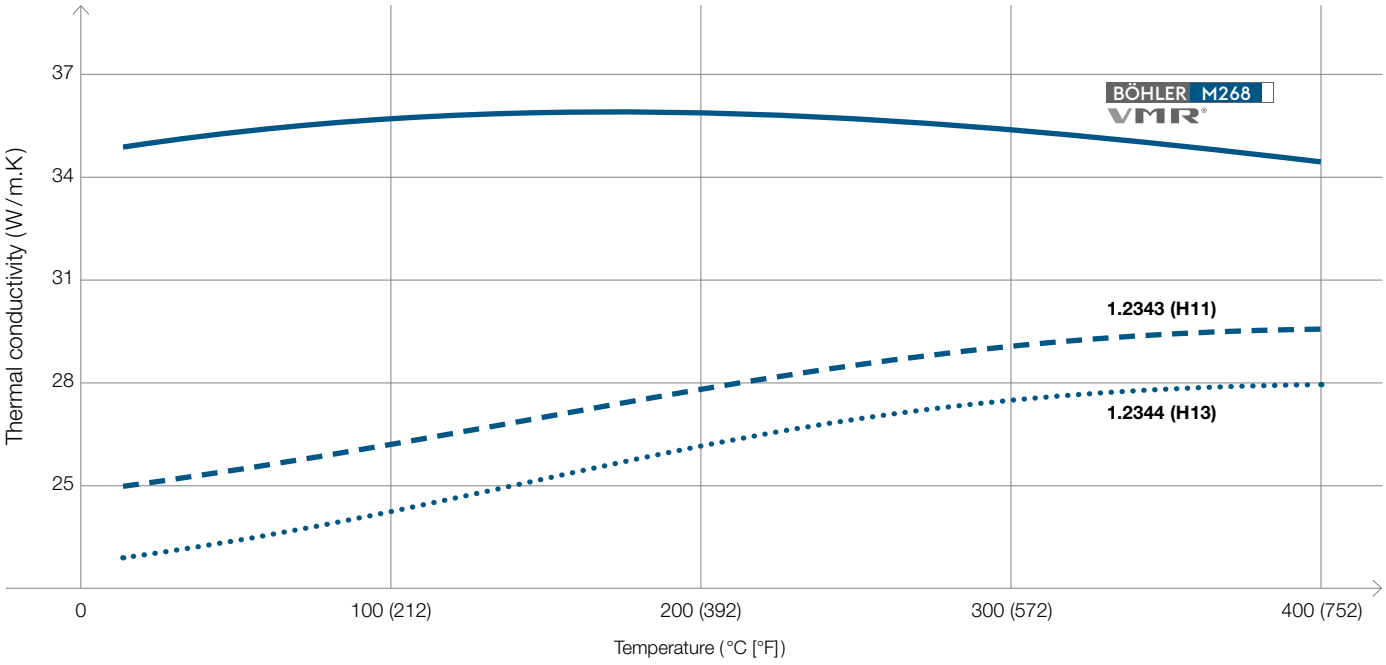
coarse → fine

EXCELLENT PROPERTIES

OPTIMIZING OF CYCLE TIMES

The high thermal conductivity guarantees a reduction of cycle time and increases the efficiency of the production process.

Thermal conductivity



METALLURGICAL CLEANLINESS FOR BEST QUALITY

The metallurgical cleanliness of the tool steel is a deciding factor in the quality and surface finish of the manufactured products. One way of achieving a high cleanliness level is to use **VACUUM REMELTING TECHNOLOGY**.

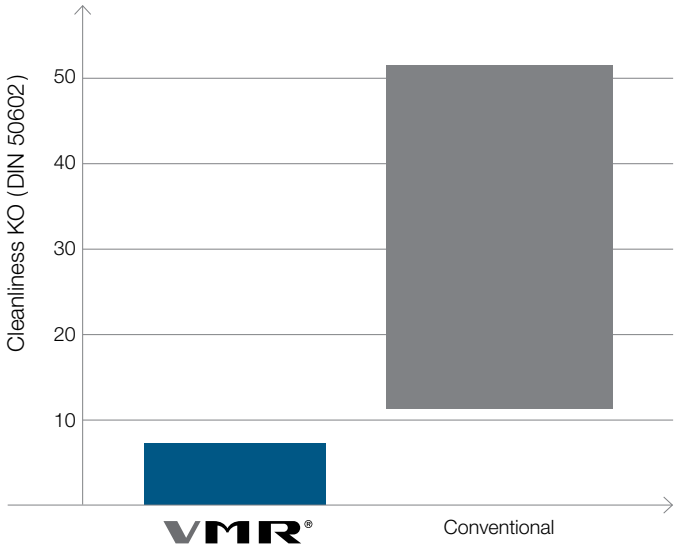
The vacuum remelting technology results in:

- Minimum gas contents
- Reduction of trace elements such as Pb, Bi, Te, As, Sn, Sb
- Minimum microsegregations at the center of ingot
- Low susceptibility to the formation of freckles (segregation)
- Highly precise chemical analysis

BÖHLER M268
VMR®

1.2738 conventional

Micro-Cleanliness



HEAT TREATMENT RECOMMENDATIONS

Since **BÖHLER M268 VMR** is supplied in the hardened and tempered condition, no heat treatment is generally required. If a subsequent heat treatment is carried out the following information must be taken into account.

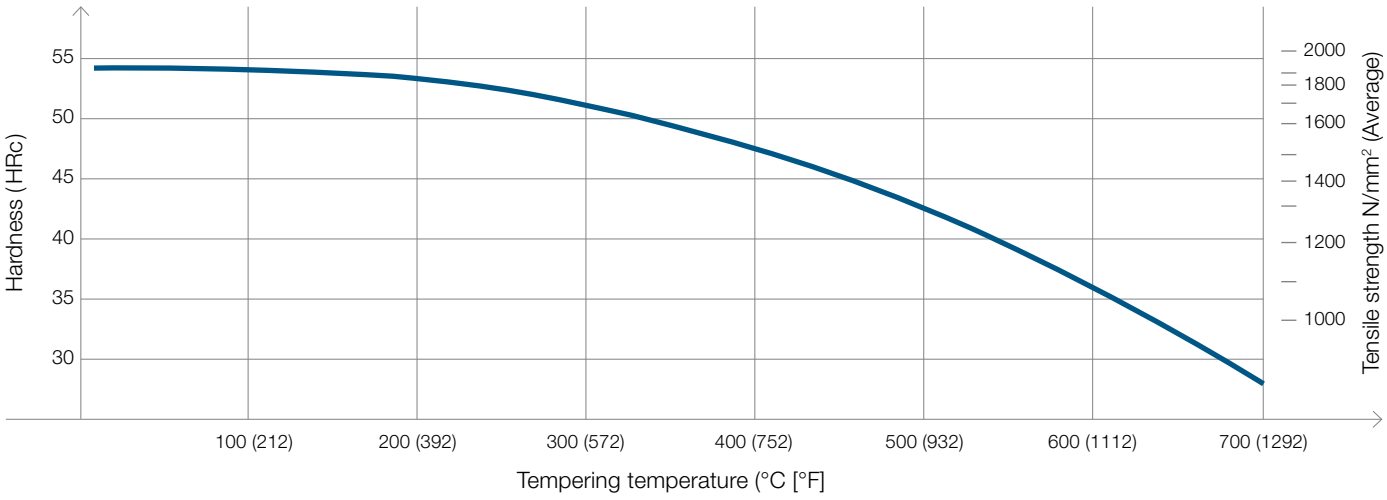
Annealing
» 720 to 740 °C (1328 to 1364 °F)
» Slow, controlled cooling in furnace at a rate of 10 – 20 °C/hr (18 to 36 °F) down to approx. 600 °C (1112 °F), further cooling in air.
» Hardness after annealing: max. 240 BHN

Stress relieving
» appr. 450 °C (842 °F)
» In hardened and tempered condition approx. 30 to 50 °C (86 to 122 °F) below the tempering temperature. After through-heating, hold at temperature in a neutral atmosphere for 1 to 2 hours.
» Cool slowly in furnance.

Hardening
» 840 to 880 °C (1544 to 1616 °F)/Oil, N_2
» After through-heating, hold for 15 – 30 minutes.

Tempering
Slow heating to tempering temperature immediately after hardening. Time in furnace: 1 hour for each 20 mm of work-piece thickness, but at least 2 hours. Cool in air. For average hardness values after tempering please refer to the tempering chart.

Tempering chart



Hardening temperature: 840 °C (1544 °F)
Specimen size: square 50 mm


Genkinger
HUBTEX

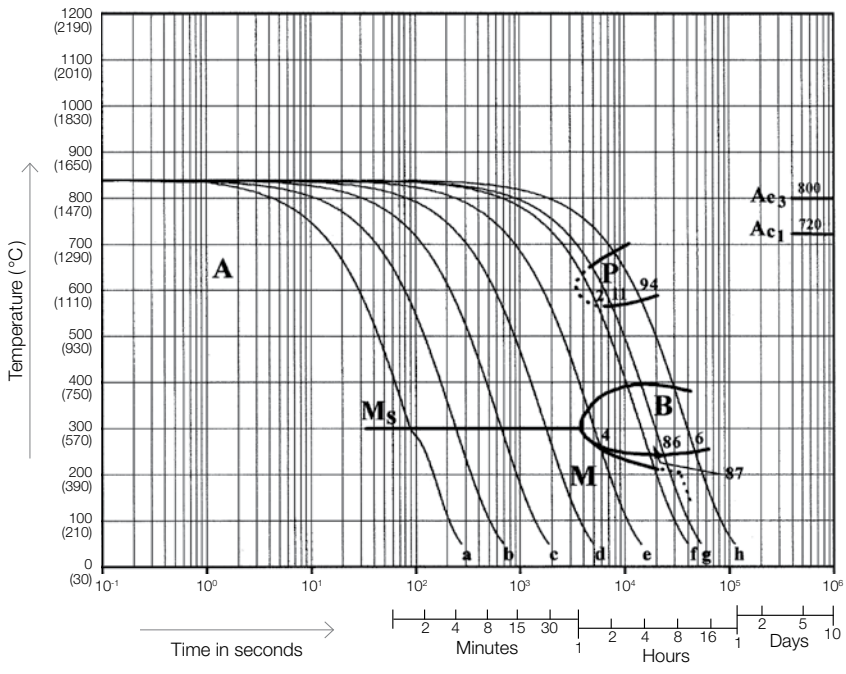
HEAT TREATMENT

Continuous cooling CCT curves

Austenitization temperature: 840 °C (1544 °F)
Soak time: 15 minutes

A	Austenite
M	Martensite
P	Perlite
B	Bainite

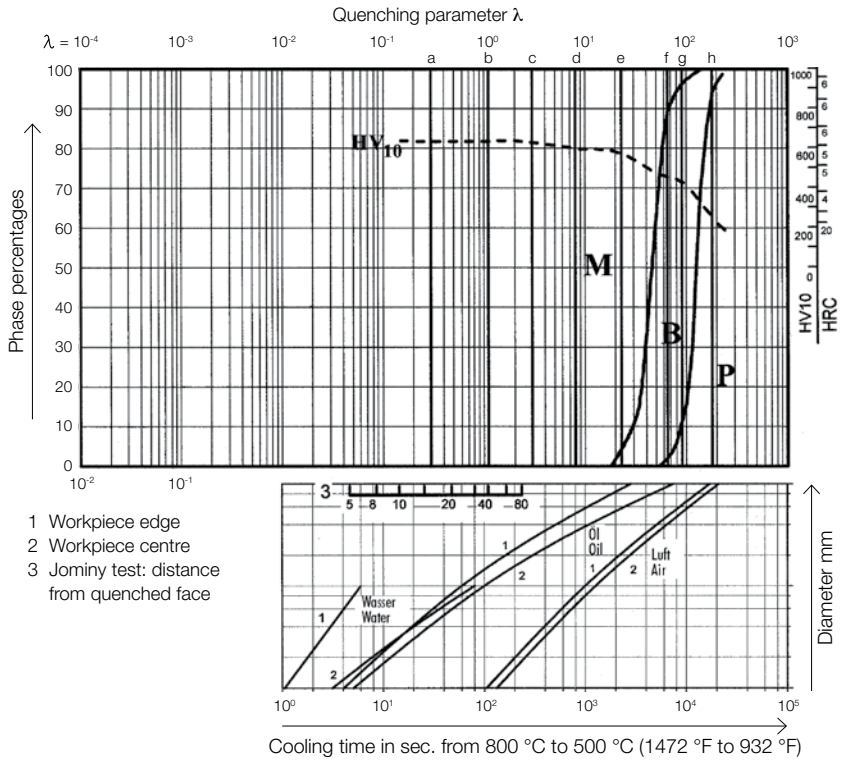
Sample	λ	HV10
a	0.30	634
b	1.10	632
c	3.00	620
d	8.00	599
e	23.00	572
f	65.00	455
g	90.00	433
h	180.00	254



Quantitative phase diagram

Austenitising temperature: 840 °C (1544 °F)
Holding time: 15 minutes

M Martensite
P Perlite
B Bainite



1 Workpiece edge
2 Workpiece centre
3 Jominy test: distance from quenched face

NUMBERS, FIGURES AND FACTS

Physical properties at 20 °C (68 °F)		
Density at	20 °C 68 °F	7.85 kg/dm^3 0.284 lbs/in^3
Modulus of elasticity at	20 °C 68 °F	210 x 10^3 N/mm^2 30.4 x 10^3 psi
Specific heat capacity at	20 °C 68 °F	~ 460 J/(kg.K) 0.11 Btu/lb °F

Condition: hardened and tempered

Thermal expansion between 20 °C (68 °F) and ... °C (°F)							
100 °C	**200 °C**	**300 °C**	**400 °C**	**500 °C**	**600 °C**	**700 °C**	
12.80	13.00	13.80	14.00	14.20	14.20	14.50	10^{-6} m/(m.K)
212 °F	**392 °F**	**572 °F**	**752 °F**	**932 °F**	**1112 °F**	**1292 °F**	
7.11	7.22	7.67	7.78	7.89	7.89	8.06	10^{-6}in/(in.°F)

Thermal conductivity at						
20 °C	**100 °C**	**200 °C**	**300 °C**	**400 °C**	**500 °C**	
35.2	35.7	35.9	35.6	34.8	33.6	in W/(m.K)
68 °F	**212 °F**	**392 °F**	**572 °F**	**752 °F**	**932 °F**	
20.34	20.63	20.74	20.57	20.11	19.41	Btu/ft h°F

Regarding applications and processing steps that are not expressly mentioned in this product description/data sheet, the customer shall in each individual case be required to consult us.

MATERIALS | MOLD BASES | PVD COATINGS | ADDITIVE

EDRO

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