COLD WORK TOOL STEELS

Application Segments

Cold Work

Available Product Variants

Long Products* | Plates

* Presented data refer exclusivly to long products. Please observe the detailed explanations at the end of the data sheet (pdf).

Product Description

BÖHLER K455 corresponds approximately to the material 1.2550 (~60WCrV7, ~S1) in terms of the alloy concept. This classic matrix steel is characterized by high toughness, good machinability and polishability. BÖHLER K455 offers the advantage of simple heat treatment with low hardening temperatures and single tempering. BÖHLER K455 is widely used in the field of punching and cutting tools as well as in the field of embossing tools.

Process Melting

Airmelted

Properties

- Toughness & Ductility : very high
- Compressive strength : high
- Dimensional stability : good

Applications

- Cold Forming
- Standard Parts (Molds, Plates, Pins, Punches)
- Powder Pressing

Technical data

Material designation	
~1.2550	SEL
~60WCrV7	EN
~60WCrV8	
~S1	AISI

Chemical composition (wt. %)

C	Si	Mn	Cr	V	W
0.63	0.60	0.30	1.10	0.18	2.00

Material characteristics

	Compressive strength	Dimensional stability during heat treatment	Toughness	Wear resistance abrasive
BÖHLER K455	★★★	★	★★★★★	★
BÖHLER K245	★★	★	★★★★★	★
BÖHLER K460	★★★★	★	★★★★	★★
BÖHLER K720	★★	★	★★★★	★

Delivery condition

Annealed

Hardness (HB)	max. 225

Heat treatment

Annealing

Temperature	710 to 750 °C	Slow controlled cooling in furnace at a rate of 10 to 20 °C/hr (18 to 36 °F/hr) down to approximately 600 °C (1112 °F) || Further cooling in air.

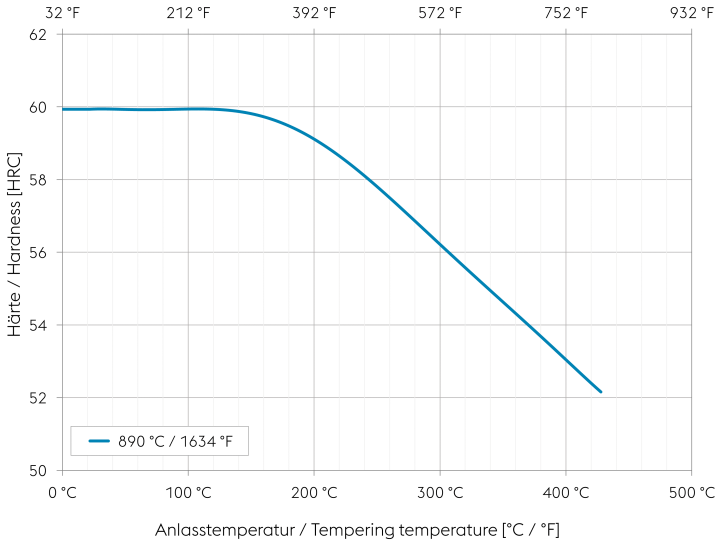
Stress relieving

Temperature	650 °C	After through heating, hold in neutral atmosphere for 1-2 hours. || Slow cooling in furnace || Intended to relieve stresses caused by extensive machining or in complex shapes.

Hardening and Tempering

Temperature	870 to 900 °C	Quenching in Oil || Holding time after temperature equalization: 15 to 30 minutes. || After hardening, tempering to the desired working hardness according to the tempering chart.

Tempering chart



Specimen size: square 20 mm (0,787 inch)

Slow heating to tempering temperature immediately after hardening.

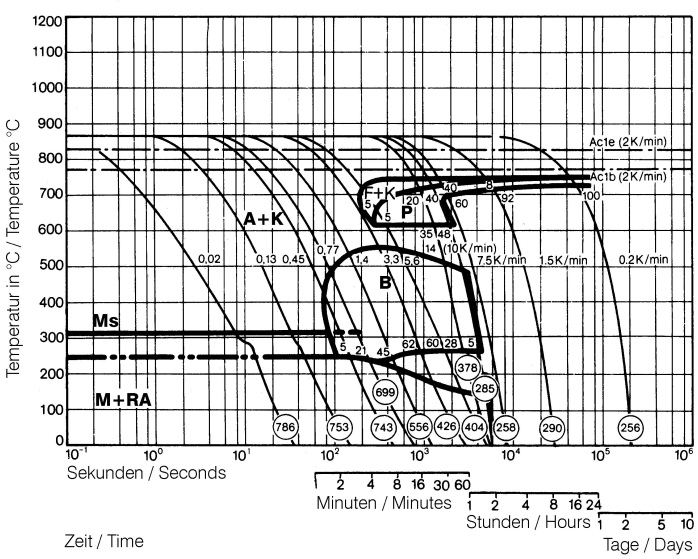
Time in furnace 1 hour for each 20 mm (0,787 inch) of workpiece thickness but at least 2 hours.

Please refer to the tempering chart for guide values for the achievable hardness after tempering.

Tempering for stress relieving 30 to 50 °C (86 to 122 °F) below the highest tempering temperature.

Cooling in air after each tempering step is recommended.

Continuous cooling CCT curves



Austenitising temperature: 880 °C (1616 °F)
Holding time: 15 minutes

O Vickers hardness

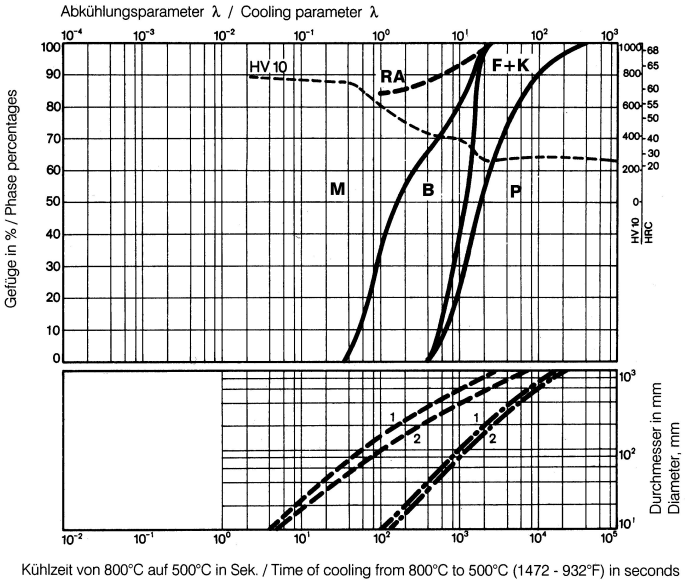
2...100 phase percentages

0.02...14 cooling parameter λ, i.e. duration of cooling from 800 to 500 °C (1472 to 932 °F) in s x 10^{-2}

0.2...10 K/min... cooling rate in the range of 800 to 500 °C (1472 to 932 °F)

A... Austenite
K... Carbide
P... Perlite
B...Bainite
M... Martensite
RA... Retained austenite
Ms... Martensite starting temperature

Quantitative phase diagram

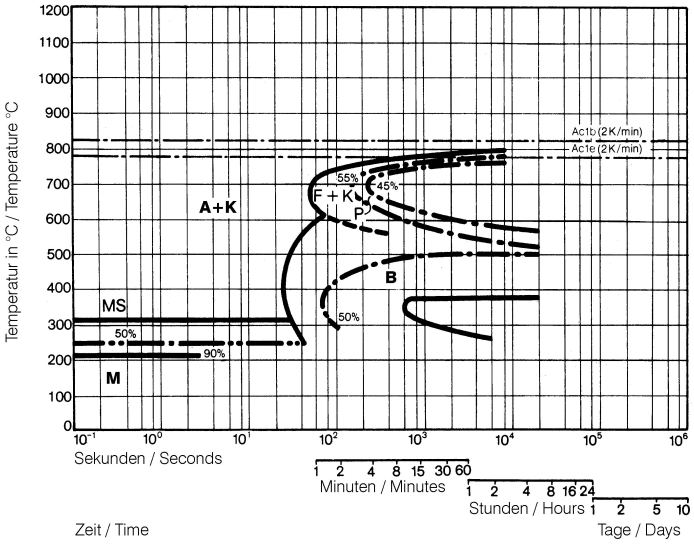


HV10... Vickers Hardness
RA... Retained austenite
F... Ferrite
K... Carbide
M... Martensite
B... Bainite
P... Perlite

- - - Oil cooling
- • - Air cooling

1... Edge or face
2... Core

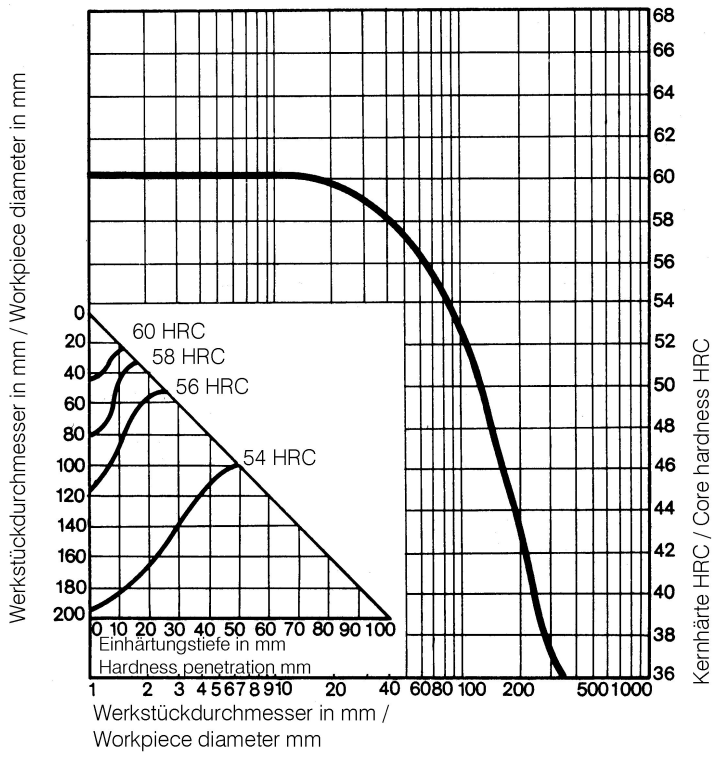
Isothermal TTT curves



Austenitising temperature: 880 °C / 1616 °F
Holding time: 15 minutes

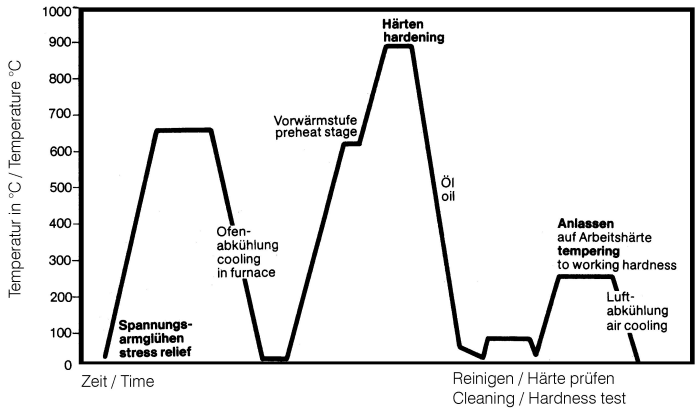
A... Austenite
K... Carbide
P... Perlite
B... Bainite
M... Martensite
Ms... Martensite starting temperature

Influence of work diameter on core hardness and hardness penetration



Quenched from: 890 °C / 1634 °F
Quenchant: Oil

Heat treatment sequence



Physical Properties

Temperature (°C)	20
Density (kg/dm^3)	8
Thermal conductivity (W/(m.K))	25
Specific heat (kJ/kg K)	0.46
Spec. electrical resistance (Ohm.mm^2/m)	0.3
Modulus of elasticity (10^{3}N/mm^2)	210

Thermal Expansions between 20°C | 68°F and ...

Temperature (°C)	100	200	300	400	500
Thermal expansion (10^{-6} m/(m.K))	11	12.5	13	13.5	14

If other available product variants are listed in addition to long products, please note that these may differ in terms of melting process, technical data, delivery and surface condition as well as available product dimensions. For mandatory technical specifications, other requirements and dimensions, please contact our regional voestalpine BÖHLER sales companies. The data contained in this brochure is merely for general information and therefore shall not be binding on the company. We may be bound only through a contract explicitly stipulating such data as binding. Measurement data are laboratory values and can deviate from practical analyses. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.

voestalpine BÖHLER Edelstahl GmbH & Co KG
Mariazeller Straße 25
8605 Kapfenberg, AT
T. +43/50304/20-0
E. info@bohler-edelstahl.at
https://www.voestalpine.com/bohler-edelstahl/de/

voestalpine
ONE STEP AHEAD.