

# COLD WORK TOOL STEELS

## Application Segments

Cold Work

## Available Product Variants

Long Products\*

Plates

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

## Product Description

BÖHLER K329 belongs to the group of 8% chromium steels and is a modified 1.2360 (AISI A8) type. BÖHLER K329 is the classic among the chipper steels and is mainly used for machining knives in the woodworking industry, but also for knives in the paper and recycling industries. BÖHLER K329 is popular among knife customers worldwide not only on account of its excellent properties, but also because BÖHLER is able to supply customized solutions thanks to its broad product portfolio.

## Process Melting

Airmelted

## Properties

- > Toughness & Ductility : good
- > Wear Resistance : high
- > Compressive strength : good
- > Dimensional stability : good

## Applications

- > Machine knife (for producers)
- > Industrial Knives
- > Packaging industry

## Technical data

| Material designation |      |
|----------------------|------|
| ~1.2360              | SEL  |
| ~A8                  | AISI |

## Chemical composition (wt. %)

| C    | Si   | Mn   | Cr   | Mo   | V    |
|------|------|------|------|------|------|
| 0.52 | 0.95 | 0.40 | 8.00 | 1.40 | 0.35 |

## Material characteristics

|             | Compressive strength | Dimensional stability during heat treatment | Toughness | Wear resistance abrasive | Wear resistance adhesive |
|-------------|----------------------|---------------------------------------------|-----------|--------------------------|--------------------------|
| BÖHLER K329 | ★ ★ ★                | ★ ★ ★                                       | ★ ★ ★ ★   | ★ ★ ★ ★                  |                          |
| BÖHLER K305 | ★ ★ ★ ★ ★            | ★ ★ ★                                       | ★ ★       | ★ ★ ★ ★ ★                |                          |
| BÖHLER K306 | ★ ★ ★ ★              | ★ ★ ★                                       | ★ ★ ★ ★   | ★ ★ ★                    |                          |
| BÖHLER K313 | ★ ★ ★ ★              | ★ ★ ★                                       | ★ ★ ★     | ★ ★ ★                    |                          |
| BÖHLER K320 | ★ ★ ★                | ★ ★ ★                                       | ★ ★ ★     | ★ ★ ★                    |                          |
| BÖHLER K600 | ★                    | ★ ★ ★                                       | ★ ★ ★ ★ ★ | ★                        |                          |
| BÖHLER K601 | ★                    | ★ ★ ★                                       | ★ ★ ★ ★   | ★ ★                      |                          |
| BÖHLER K605 | ★ ★                  | ★ ★ ★                                       | ★ ★ ★ ★   | ★                        |                          |

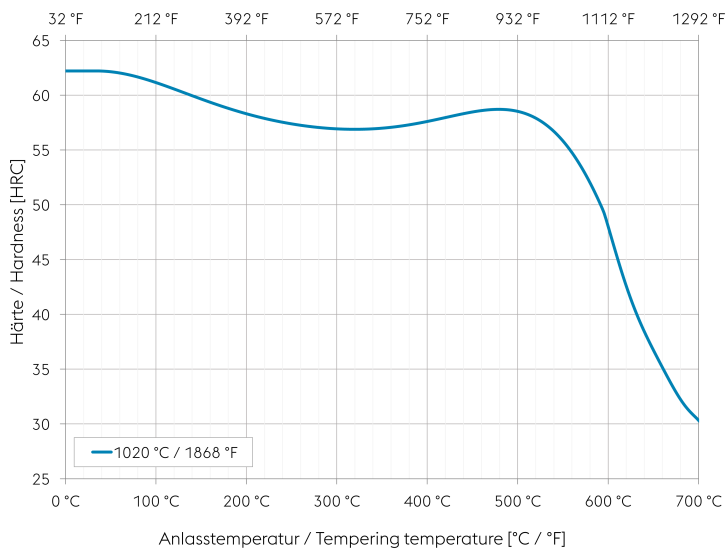
## Delivery condition

|               |          |
|---------------|----------|
| Annealed      |          |
| Hardness (HB) | max. 240 |

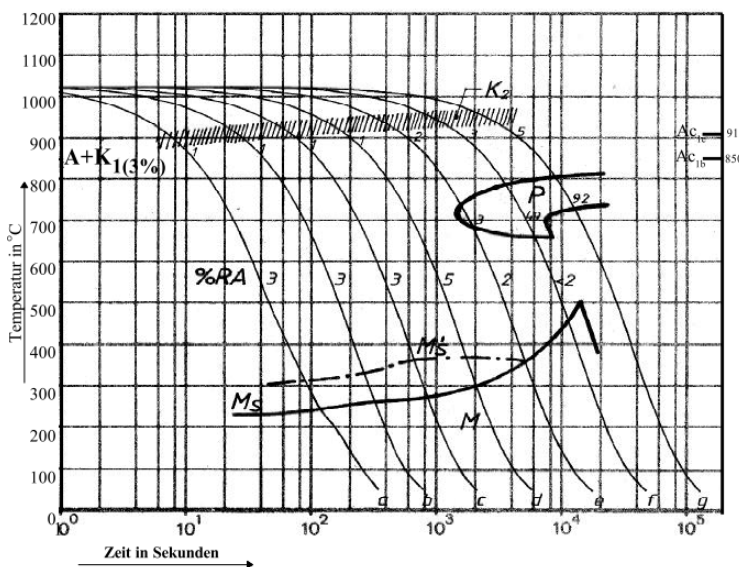
## Heat treatment

|                         |                   |                                                                                                                                                                                                                                    |
|-------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Annealing               |                   |                                                                                                                                                                                                                                    |
| Temperature             | 800 to 850 °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             | 1,000 to 1,040 °C | Quenching: Oil, salt bath (500 to 550 °C   932 to 1022 °F), air.    Holding time after temperature equalization: 15 to 30 minutes.    After hardening, tempering to the desired working hardness according to the tempering chart. |

## Tempering chart



## Continuous cooling CCT curves



Austenitising temperature: 1020 °C / 1868 °F

Holding time: 30 minutes

○ Vickers hardness

3...92 phase percentages

1...5 cooling parameter  $\lambda$ , i.e. duration of cooling from 800 to 500 °C (1472 to 932 °F) in  $s \times 10^{-2}$

A... Austenite

K... Carbide

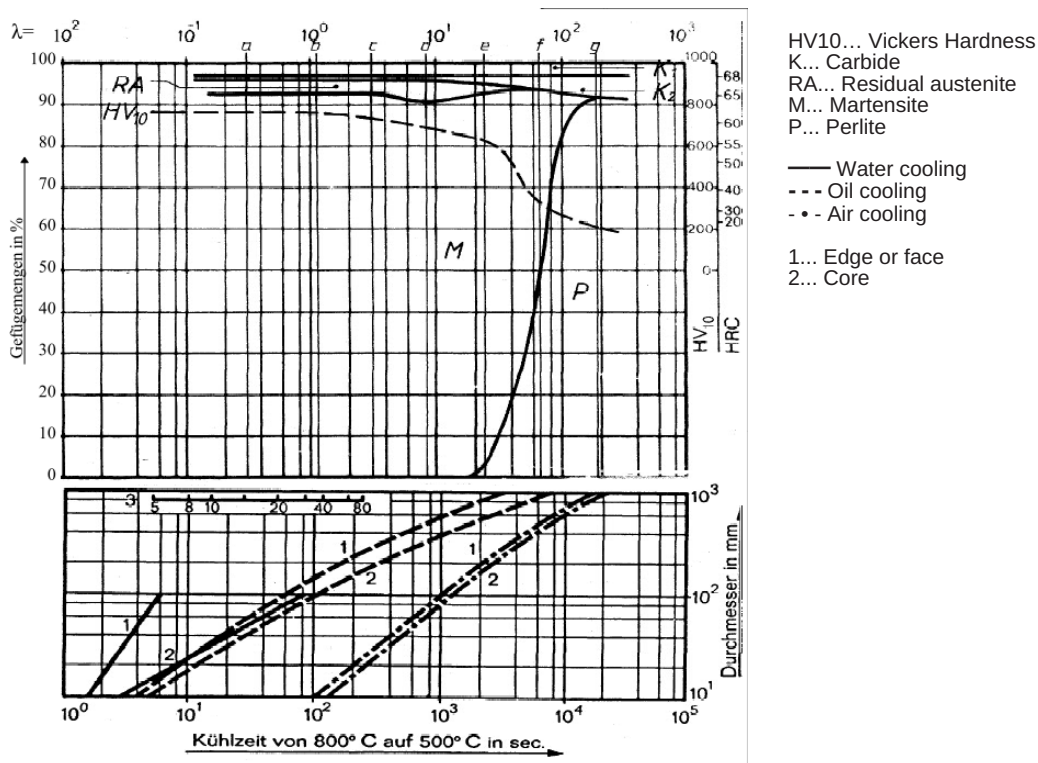
P... Pearlite

RA... Retained austenite

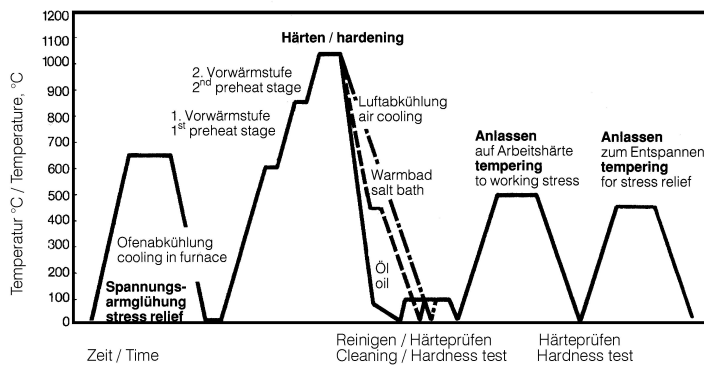
M... Martensite

Ms... Martensite starting temperature

## Quantitative phase diagram



## Heat treatment sequence



## Physical Properties

|                                                            |      |
|------------------------------------------------------------|------|
| Temperature (°C)                                           | 20   |
| Density (kg/dm <sup>3</sup> )                              | 7.7  |
| Thermal conductivity (W/(m.K))                             | 26   |
| Specific heat (kJ/kg K)                                    | 0.46 |
| Spec. electrical resistance (Ohm.mm <sup>2</sup> /m)       | 0.6  |
| Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup> ) | 210  |

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

| Temperature (°C)                             | 100  | 200 | 300  | 400  | 500  |
|----------------------------------------------|------|-----|------|------|------|
| Thermal expansion (10 <sup>-6</sup> m/(m.K)) | 11.5 | 12  | 12.2 | 12.5 | 12.8 |

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.

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ONE STEP AHEAD.