

# HIGH SPEED STEELS

## Application Segments

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Cutting Tools

## Available Product Variants

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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

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BÖHLER S630 - "The economical one"

Tungsten-molybdenum high-speed steel with aluminum alloy for great toughness and good machinability. Universally usable for taps and twist drills, reamers, metal saws, mills of all types, and woodworking tools.

## Process Melting

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Airmelted

## Properties

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- > Toughness & Ductility : high
- > Wear Resistance : high
- > Compressive strength : high
- > Edge Stability : very high
- > Grindability : good
- > Hot Hardness (red hardness) : high

## Applications

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- > Cold Forming / Coining
- > Rolling
- > Standard Parts (Molds, Plates, Pins, Punches)
- > Thread rolling
- > Fine Blanking, Stamping, Blanking
- > Shearing / Machine Knives
- > Twist Drills and Taps
- > Powder Pressing
- > Special Cutting Tools
- > Wear parts

## Technical data

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Material designation	
1.3330	SEL
HS 4-4-2 Al	EN

**Chemical composition (wt. %)**

C	Cr	Mo	V	W	Al
0,95	4,00	4,00	2,00	4,00	+

**Material characteristics**

	Compressive strength	Grindability	Red hardness	Toughness	Wear resistance	Edge Stability
BÖHLER S630	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S200	★★★	★★	★★★	★★	★★★	★★
BÖHLER S400	★★★	★★★	★★★	★★★	★★	★★
BÖHLER S401	★★	★★★	★★	★★★	★★	★★★
BÖHLER S404	★★	★★★	★★	★★★	★★	★★
BÖHLER S430	★★	★★★	★★	★★★	★★	★★
BÖHLER S500	★★★★	★★★	★★★★	★★	★★★	★★★
BÖHLER S600	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S607	★★★	★★★	★★★	★★	★★★	★★★
BÖHLER S705	★★★	★★★	★★★★	★★	★★	★★★★
BÖHLER S730	★★★	★★★	★★★★	★★	★★	★★★★

**Delivery condition**

**Annealed**

Hardness (HB)	max. 280
Tensile Strength (MPa)	max. 950

**Heat treatment**

**Annealing**

Temperature	770 to 840 °C	Controlled slow cooling in furnace (10 - 20°C / h / (50 - 68°F 7 h) to approx. 600°C (1110°F), air cooling.
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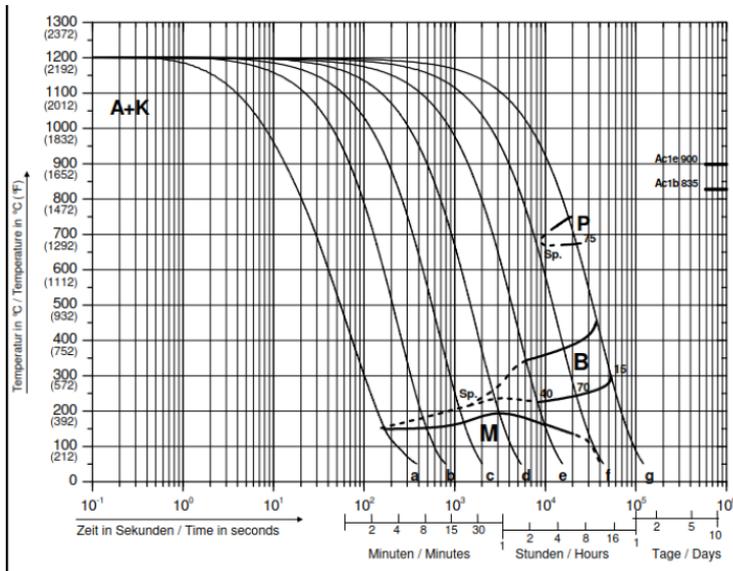
**Stress relieving**

Temperature	600 to 650 °C	Slow cooling furnace.    To relieve stresses set up by extensive machining or in tools of intricate shape.    After through heating, hold in neutral atmosphere for 1 to 2 hours.
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**Hardening and Tempering**

Temperature	1,050 to 1,200 °C	Salt bath, vacuum    Preheating: 1st stage ~ 500 °C, 2nd stage ~ 850 °C, 3rd stage ~1050 °C (for higher austenitising temperature)    Austenitising: for cutting applications at higher austenitising temperatures (>1130 °C), holding time after complete heating 80 seconds, maximum 150 seconds, to avoid material damage due to overtime.    Austenitising: for cold work applications at lower austenitising temperatures (<1100°C). Holding time after complete heating 15 to 30 min    Quenching: oil, warm bath (500 - 550 °C), gas.
Temperature	550 to 570 °C	Slow heating to tempering temperature immediately after austenitising.    Dwell time in the furnace 1 hour per 20 mm material thickness (at least 1 hour)    Slow cooling to room temperature after each tempering step   3 tempering cycles recommended    Hardness see tempering chart

Continuous cooling CCT curves

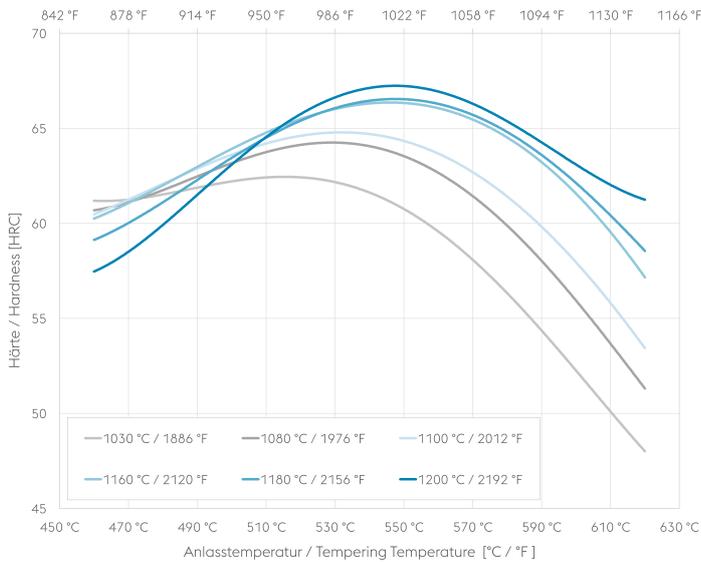


Austenitising temperature: 1210°C (2210°F)  
Holding time: 180 seconds

A....Austenite  
B....Bainite  
K....Carbide  
P....Pearlite  
M....Martensite  
RA...Retained Austenite

Sample	λ	HV10	Sample	λ	HV10
a	0,34	780	f	65,0	570
b	1,1	780	g	180,0	360
c	3,0	790			
d	8,0	790			
e	23	680			

Tempering Chart



Holding time 3 x 2 hours  
Specimen size: square 25 mm

## Physical Properties

Temperature (°C)	20
Density (kg/dm <sup>3</sup> )	7.88
Thermal conductivity (W/(m.K))	18.8
Specific heat (kJ/kg K)	0.432
Spec. electrical resistance (Ohm.mm <sup>2</sup> /m)	0.56
Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup> )	217

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.