

HIGH SPEED STEELS

Application Segments

Cutting Tools

Product Description

BÖHLER S130 "The HSS-Light"

This new generation of high-speed steel combines reduced alloying with enhanced performance in machining and beyond.

Process Melting

Airmelted

Properties

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

Applications

- > **Twist Drills and Taps**

Technical data

Material designation	
HS 1-1-1 Al	Market grade
1.3320	SEL

Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V	W	Al
0.7	0.8	0.3	5	1	1	1	+

Material characteristics

	Compressive strength	Grindability	Red hardness	Toughness	Wear resistance	Edge Stability
BÖHLER S130	★	★★★★★	★	★★★★★	★	★
BÖHLER S404	★★	★★★	★★	★★★	★★	★★
BÖHLER S430	★★	★★★	★★	★★★	★★	★★
BÖHLER S401	★★	★★★	★★	★★★	★★	★★★
BÖHLER S500	★★★★★	★★★	★★★★★	★★	★★★	★★★
BÖHLER S600	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S630	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S607	★★★	★★★	★★★	★★	★★★	★★★
BÖHLER S705	★★★	★★★	★★★★★	★★	★★	★★★★★
BÖHLER S730	★★★	★★★	★★★★★	★★	★★	★★★★★
BÖHLER S200	★★★	★★	★★★	★★	★★★	★★

Delivery condition

Annealed

Hardness (HB)	max. 262
Tensile Strength (MPa)	max. 890

Heat treatment

Annealing

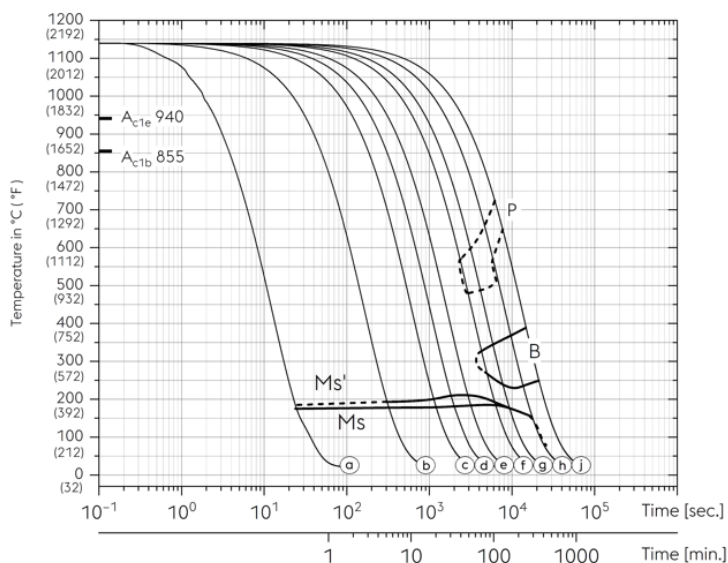
Temperature	770 to 840 °C	Controlled slow cooling in furnace (10 - 20°C / h / (50 - 68°F 7 h) to approx. 600°C (1110°F), air cooling.
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Stress relieving

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	1,080 to 1,180 °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 (>1100 °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	530 to 550 °C	Slow heating to tempering temperature immediately after austenitising. Dwell time in the furnace at least 2 hours Slow cooling to room temperature after each tempering step Tempering behind the secondary hardening peak 3 tempering cycles recommended Hardness see tempering chart



Austenitising temperature: 1140 °C (2084 °F)

Holding time: 360seconds

O Vickers hardness

a ... j cooling parameter λ , 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

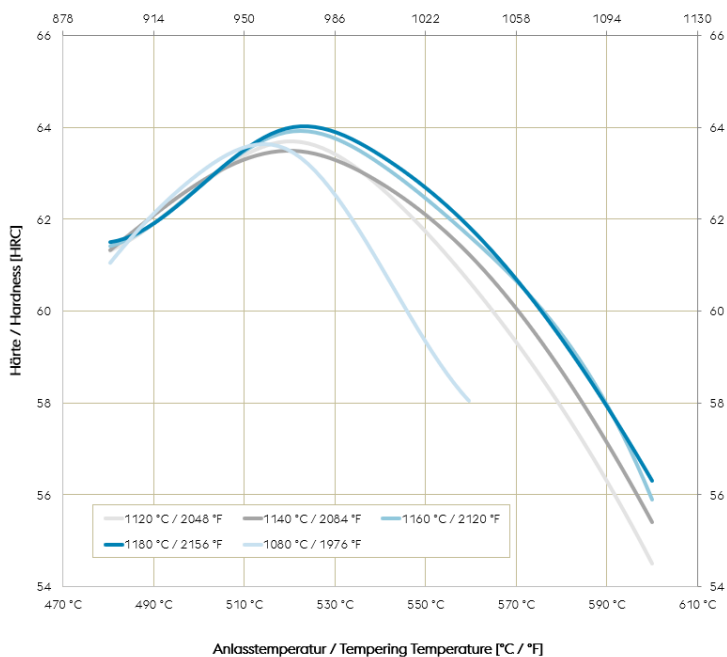
B... Bainite

M... Martensite

Ms... Martensite starting temperature

Probe Sample	λ	Härte Hardness (HV10)	Probe Sample	λ	Härte Hardness (HV10)
a	0,06	770	f	16	775
b	0,8	770	g	23	730
c	3	785	h	40	595
d	5	795	j	65	500
e	8	780			

Tempering Chart



Holdingtime 3x2 hours

Specimensize: square 25mm

Austenitising in vacuum

Physical Properties

Temperature (°C)	20
Density (kg/dm ³)	7.74
Thermal conductivity (W/(m.K))	25.2
Specific heat (kJ/kg K)	0.451
Spec. electrical resistance (Ohm.mm ² /m)	0.47
Modulus of elasticity (10 ³ N/mm ²)	-

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

Temperature (°C)	100	200	300	400	500	600	700
Thermal expansion (10 ⁻⁶ m/(m.K))	11.5	12.2	12.6	12.9	13.2	13.4	13.6

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.