

HIGH SPEED STEELS

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 S600 – "The high-speed steel"

Ideal for mills, twist drills, and taps, broaches, cold-work tools. BÖHLER S600 is the most commonly used high-speed steel and is the starting material for our customers who deal with high-speed steel.

Process Melting

Airmelted or Airmelted + ESR (ISORAPID)

Properties

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

Applications

- > Broaches and Reamers
- > Gear Cutting, Shaving and Shaping Tools
- > Powder Pressing
- > Special Cutting Tools
- > Wear parts
- > Cold Forming / Coining
- > Injection Components
- > Rolling
- > Standard Parts (Molds, Plates, Pins, Punches)
- > Thread rolling
- > Fine Blanking, Stamping, Blanking
- > Oth. Automotive components (Turbochargers, Piston Rings, Sensors, etc.)
- > Shearing / Machine Knives
- > Twist Drills and Taps
- > Blades for Sawing Machines

Technical data

Material designation		Standards	
1.3343	SEL	4957	EN ISO
HS6-5-2C	EN		

Chemical composition (wt. %)

C	Cr	Mo	V	W
0.9	4.1	5	1.8	6.2

Material characteristics

	Compressive strength	Grindability	Red hardness	Toughness	Wear resistance	Edge Stability
BÖHLER S600	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S200	★★★	★★	★★★	★★	★★★	★★
BÖHLER S400	★★★	★★★	★★★	★★★	★★	★★
BÖHLER S401	★★	★★★	★★	★★★	★★	★★★
BÖHLER S404	★★	★★★	★★	★★★	★★	★★
BÖHLER S405	★★★	★★★	★★	★★★	★★	★★
BÖHLER S430	★★	★★★	★★	★★★	★★	★★
BÖHLER S500	★★★★	★★★	★★★★	★★	★★★	★★★
BÖHLER S601	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S607	★★★	★★★	★★★	★★	★★★	★★★
BÖHLER S630	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S705	★★★	★★★	★★★★	★★	★★	★★★★
BÖHLER S730	★★★	★★★	★★★★	★★	★★	★★★★

Delivery condition

Annealed

Hardness (HB)	max. 280
Ultimate tensile strength (UTS) (MPa)	max. 950
Tensile Strength (MPa ksi)	max. 950 138

Hardened and Tempered

Hardness (HRC)	min. 62 bars hardened and tempered (BHT)
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Heat treatment

Annealing

Temperature	770 to 840 °C 1,418 to 1,544 °F	Controlled slow cooling in furnace (10 - 20°C / h (50 - 68°F / h)) to approx. 600°C (1110°F), air cooling.
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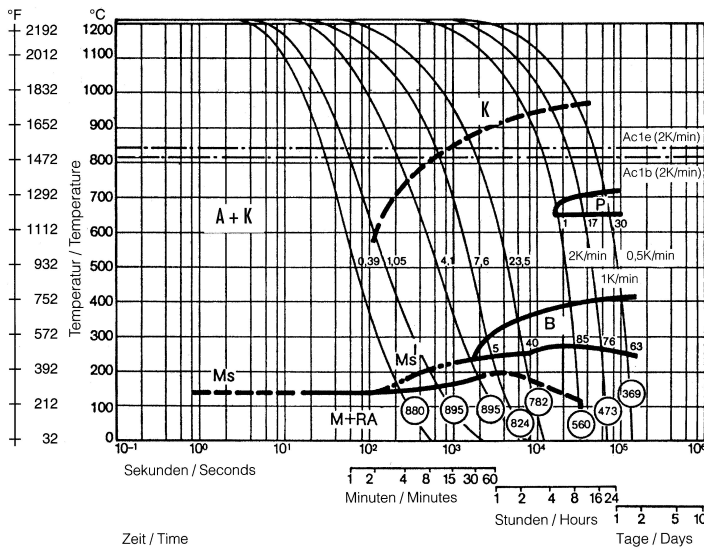
Stress relieving

Temperature	600 to 650 °C 1,112 to 1,202 °F	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	1,100 to 1,210 °C 2,012 to 2,210 °F	Salt bath, vacuum Preheating: 1st stage ~ 500 °C, 2nd stage ~ 850 °C, 3rd stage ~1050 °C Austenitising: 1180 - 1240 °C, holding time after complete heating 80 seconds, maximum 150 seconds, to avoid material damage due to overheating. Quenching: oil, warm bath (500 - 550 °C), gas
Temperature	550 to 570 °C 1,022 to 1,058 °F	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 3 tempering cycles recommended Hardness see tempering chart

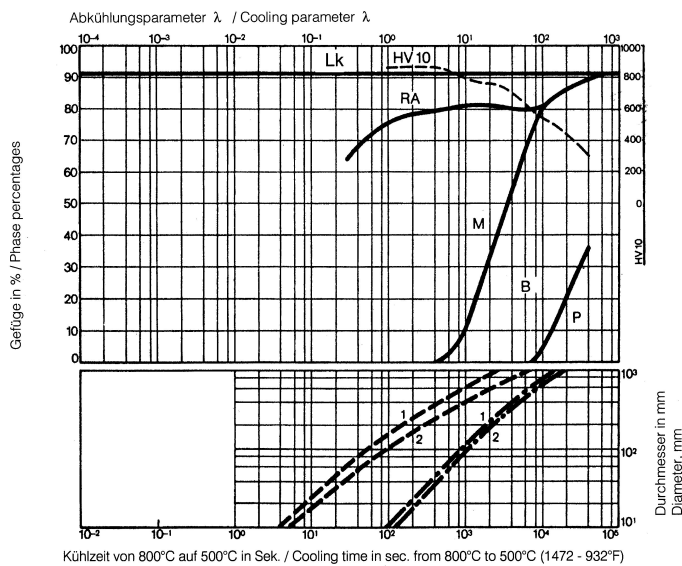
Continuous cooling CCT curves



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

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

Quantitative phase diagram

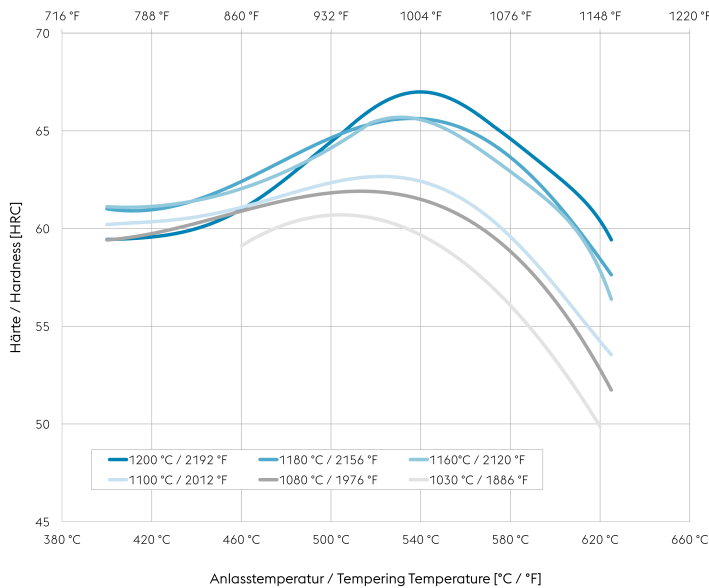


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- 1....Edge or Face
- 2....Core
- 3....Jominy test: distance from quenched end

- oilcooling
- .- aircooling

Tempering Chart



Vacuum

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

Physical Properties

Temperature (°C °F)	20 68
Density (kg/dm ³ lb/in ³)	8.07 0.29
Thermal conductivity (W/(m.K) BTU/ft h °F)	21.8 12.6
Specific heat (kJ/kg K BTU/lb °F)	0.433 0.1034
Spec. electrical resistance (Ohm.mm ² /m 10 ⁻⁴ Ohm.inch ² /ft)	0.47 2.22
Modulus of elasticity (10 ³ N/mm ² 10 ³ ksi)	219 31.7

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

Temperature (°C °F)	100 212	200 392	300 572	400 752	500 932	600 1,112	700 1,292
Thermal expansion (10 ⁻⁶ m/(m.K) 10 ⁻⁶ inch/inch.°F)	11.5 6.4	11.7 6.5	12.2 6.8	12.4 6.9	12.7 7.1	13 7.2	12.9 7.2

Long Products: For additional specifications and technical requirements, please contact our regional voestalpine BÖHLER sales companies.

Sheet & Plates: Product Variant may differ in terms of melting process, technical data, delivery, and surface condition as well as available product dimensions. Please contact voestalpine BÖHLER Bleche GmbH & Co KG.

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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