HIGH SPEED STEELS

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 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	
1.3343	SEL
HS6-5-2C	EN

Standards	
4957	EN ISO

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 S500	★★★★	★★★	★★★★	★★	★★★	★★★
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)

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.

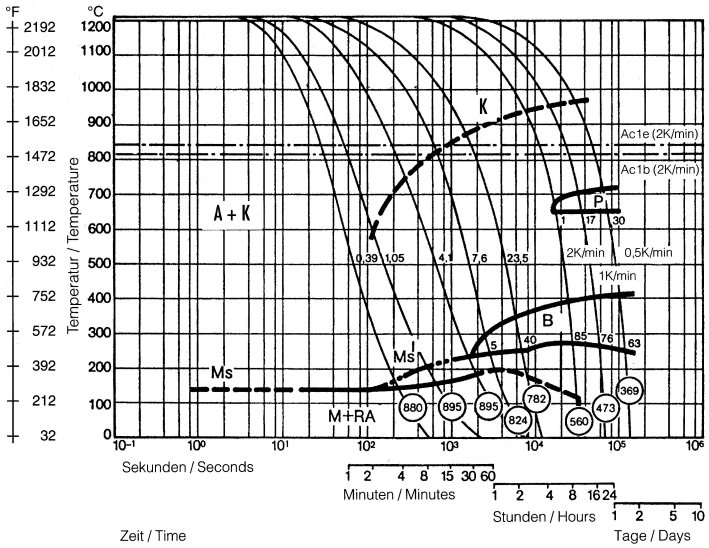
Stress relieving

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.

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

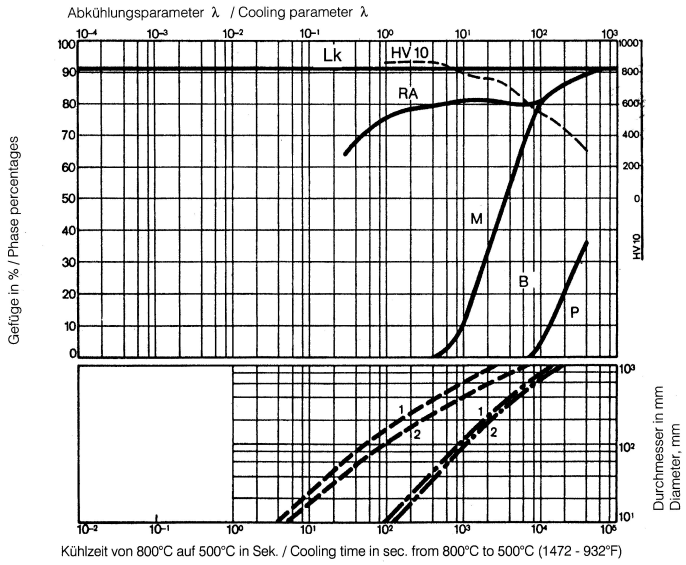
Continuous cooling CCT curves



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

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

Quantitative phase diagram



A....Austenite
B....Bainite
K....Carbide
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M....Martensite
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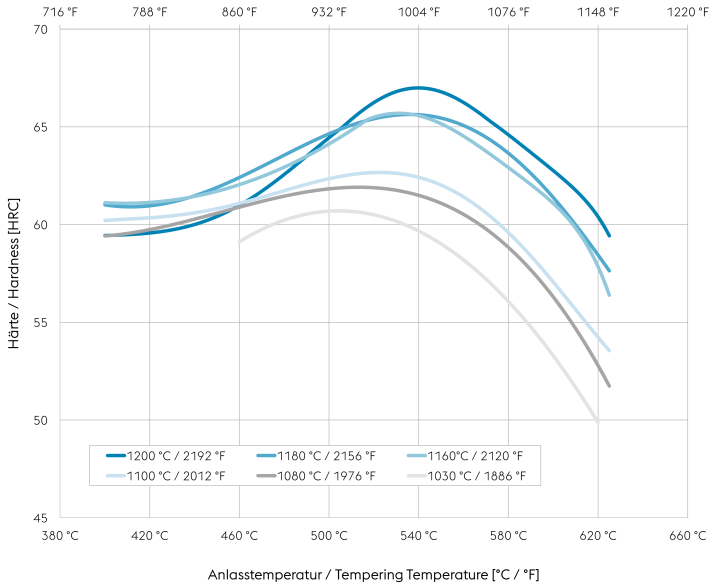
1....Edge or Face
2....Core
3....Jominy test: distance from quenched end

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.

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voestalpine
ONE STEP AHEAD.