

# 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 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

[Airmelted](#)

## Properties

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

## Applications

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

## Technical data

| 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 | 0,50 |

### Material characteristics

|                    | Compressive strength | Grindability | Red hardness | Toughness | Wear resistance | Edge Stability |
|--------------------|----------------------|--------------|--------------|-----------|-----------------|----------------|
| <b>BÖHLER S630</b> | ★★★                  | ★★★          | ★★★          | ★★        | ★★              | ★★★            |
| <b>BÖHLER S200</b> | ★★★                  | ★★           | ★★★          | ★★        | ★★★             | ★★             |
| <b>BÖHLER S400</b> | ★★★                  | ★★★          | ★★★          | ★★★       | ★★              | ★★             |
| <b>BÖHLER S401</b> | ★★                   | ★★★          | ★★           | ★★★       | ★★              | ★★★            |
| <b>BÖHLER S404</b> | ★★                   | ★★★          | ★★           | ★★★       | ★★              | ★★             |
| <b>BÖHLER S430</b> | ★★                   | ★★★          | ★★           | ★★★       | ★★              | ★★             |
| <b>BÖHLER S500</b> | ★★★★                 | ★★★          | ★★★★         | ★★        | ★★★             | ★★★            |
| <b>BÖHLER S600</b> | ★★★                  | ★★★          | ★★★          | ★★        | ★★              | ★★★            |
| <b>BÖHLER S607</b> | ★★★                  | ★★★          | ★★★          | ★★        | ★★★             | ★★★            |
| <b>BÖHLER S705</b> | ★★★                  | ★★★          | ★★★★         | ★★        | ★★              | ★★★★           |
| <b>BÖHLER S730</b> | ★★★                  | ★★★          | ★★★★         | ★★        | ★★              | ★★★★           |

### Delivery condition

#### Annealed

|                              |                |
|------------------------------|----------------|
| Hardness (HB)                | max. 280       |
| Tensile Strength (MPa   ksi) | max. 950   138 |

### 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 7 h) to approx. 600°C (1110°F), air cooling. |
|-------------|-----------------------------------|---|

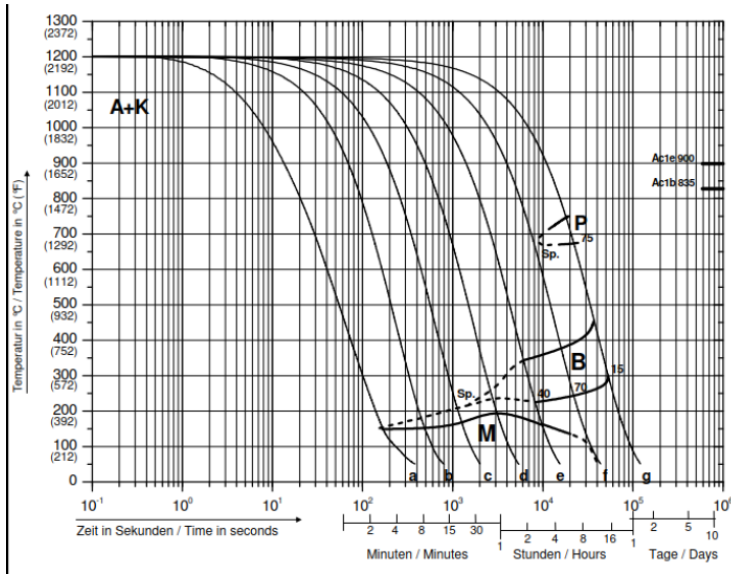
#### Stress relieving

|             |                                   |   |
|-------------|-----------------------------------|---|
| 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 | 1,050 to 1,200 °C   1,922 to 2,192 °F | 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   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 after each tempering step   3 tempering cycles recommended    Hardness see tempering chart  |

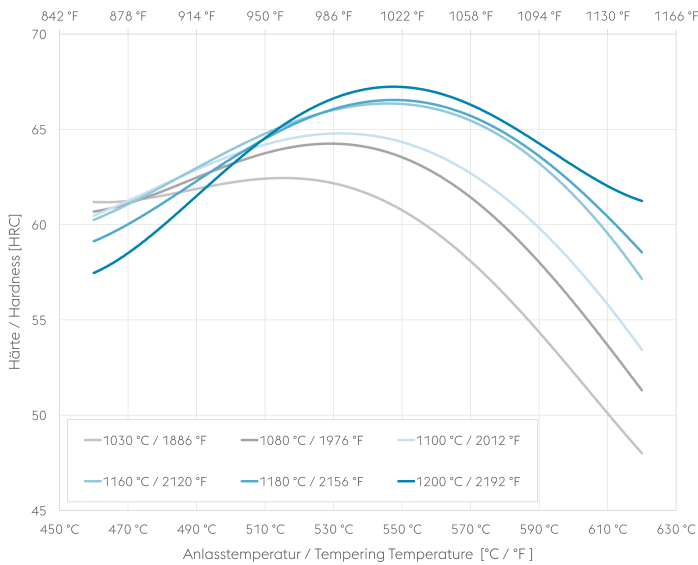
Continuous cooling CCT curves



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

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

Tempering Chart



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

## Physical Properties

| Temperature (°C   °F)   | 20   68        |
|---|----------------|
| Density (kg/dm <sup>3</sup>   lb/in <sup>3</sup> )  | 7.88   0.28    |
| Thermal conductivity (W/(m.K)   BTU/ft h °F)  | 18.8   10.86   |
| Specific heat (kJ/kg K   BTU/lb °F)   | 0.432   0.1032 |
| Spec. electrical resistance (Ohm.mm <sup>2</sup> /m   10 <sup>-4</sup> Ohm.inch <sup>2</sup> /ft) | 0.56   2.65    |
| Modulus of elasticity (10 <sup>3</sup> N/mm <sup>2</sup>   10 <sup>3</sup> ksi)                   | 217   31.47    |

**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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