

# HIGH SPEED STEELS

## Application Segments

Cutting Tools

## Available Product Variants

Wire

## Product Description

Cobalt-alloyed molybdenum high-speed steel with high hardness, excellent cutting performance, high compressive strength, and hot hardness, combined with good toughness.  
This HSS grade is used for bimetal saw bands and woodworking tools.

## Process Melting

Airmelted

## Properties

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

## Applications

- > Special Cutting Tools

## Chemical composition (wt. %)

| C    | Si  | Mn   | Cr  | Mo | V | W | Co |
|------|-----|------|-----|----|---|---|----|
| 0.75 | 0.3 | 0.25 | 4.1 | 5  | 1 | 1 | 8  |

## Material characteristics

|               | Compressive strength | Grindability | Red hardness | Toughness | Wear resistance | Edge Stability |
|---------------|----------------------|--------------|--------------|-----------|-----------------|----------------|
| BÖHLER S504SF | ★★★★                 | ★★★★★        | ★★★★         | ★★★★      | ★★              | ★★★★           |
| BÖHLER S500SF | ★★★★★                | ★★★★         | ★★★★★        | ★★        | ★★★★★           | ★★★★★          |

## Heat treatment

### Annealing

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

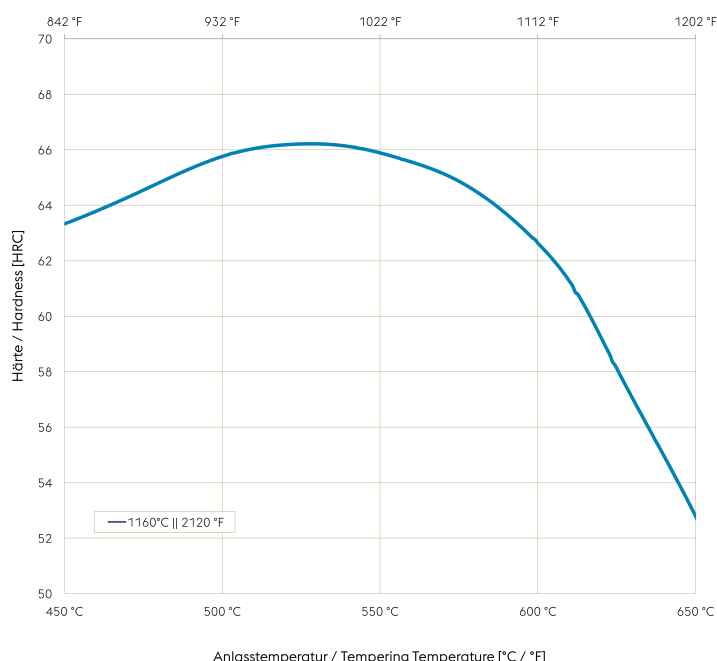
### Stress relieving

|             |               |                                                                                                                                                                                   |
|-------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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. |
|-------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Hardening and Tempering

|             |                   |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature | 1,140 to 1,180 °C | Salt bath, vacuum    Preheating: 1st stage ~ 500 °C, 2nd stage ~ 850 °C, 3rd stage ~1050 °C    Austenitising: 1140 - 1180 °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 In continuous heat treatment, temperatures and times may vary depending on the specific heat treatment process. |
| Temperature | 550 to 580 °C     | Slow heating to tempering temperature immediately after austenitising.    Dwell time in the furnace at least 2 hours    Slow cooling to room temperature    3 tempering cycles recommended    Hardness see tempering chart In continuous heat treatment, temperatures and times may vary depending on the specific heat treatment process.                                                                       |

## Tempering Chart



### Saltbath

Austenitising Temperature: 1160 °C || 2120 °F

Specimen size: Ø 5,5 mm

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.