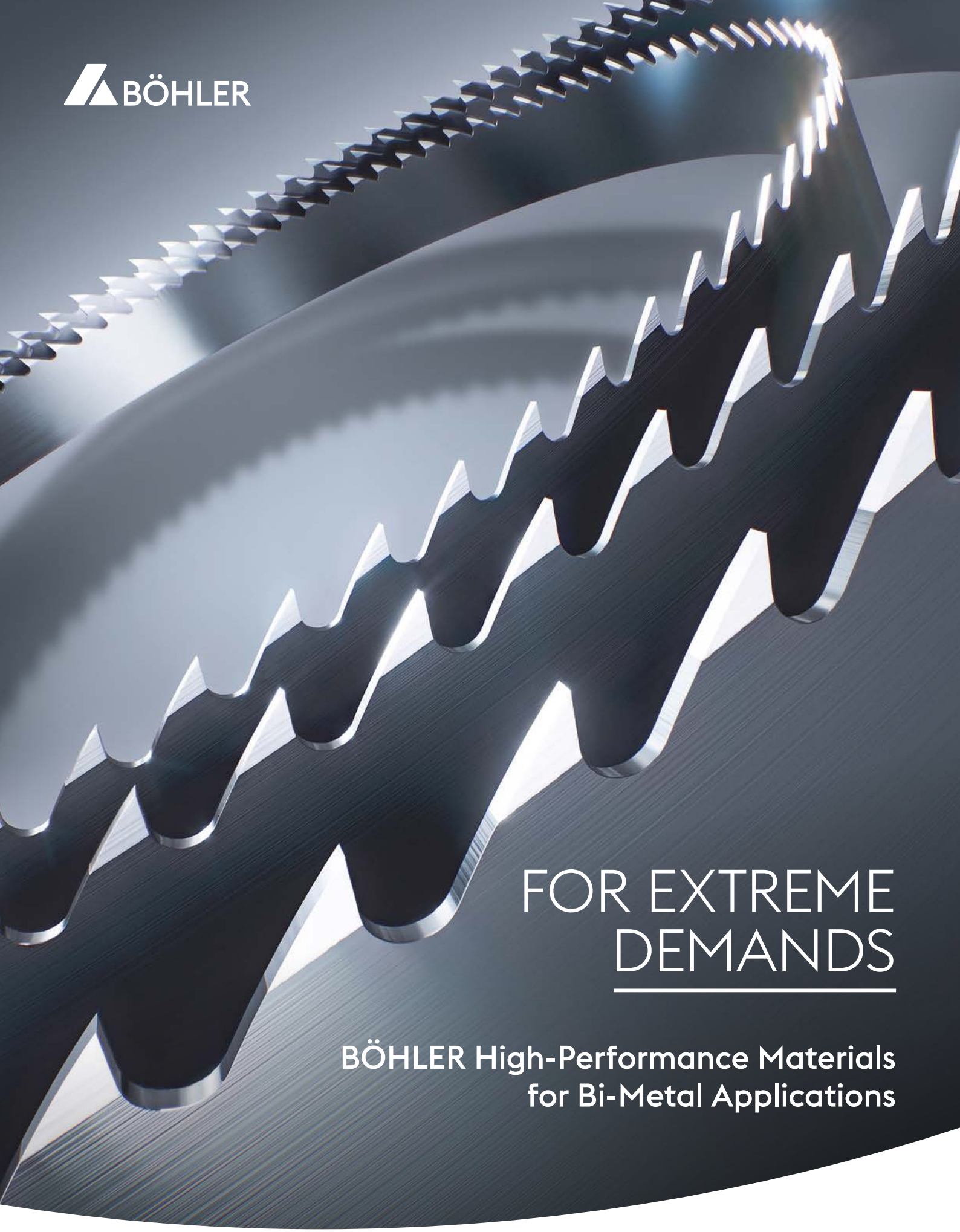


BÖHLER

FOR EXTREME DEMANDS

BÖHLER High-Performance Materials for Bi-Metal Applications

voestalpine BÖHLER Edelstahl GmbH & Co KG
www.voestalpine.com/bohler-edelstahl

voestalpine
ONE STEP AHEAD.





TAKEN TO THE EXTREME

BÖHLER High Speed Steel for Bi-Metal Applications

THE PERFECT MATCH

Bi-metal saw blades combine two metallurgically different materials to ensure optimum cutting performance and maximum operational safety. BÖHLER High Speed Steel plays a key role as the material is used for the cutting edge of the teeth.



Metallurgically optimized bi-metal composite

Manufacturing is carried out by electron-beam or laser-beam welding an HSS flat wire onto a high-strength spring steel backing material.

The combination of both materials provides an optimal balance between hardness and flexibility, an essential factor in fully and semi-automatic metal band sawing processes.

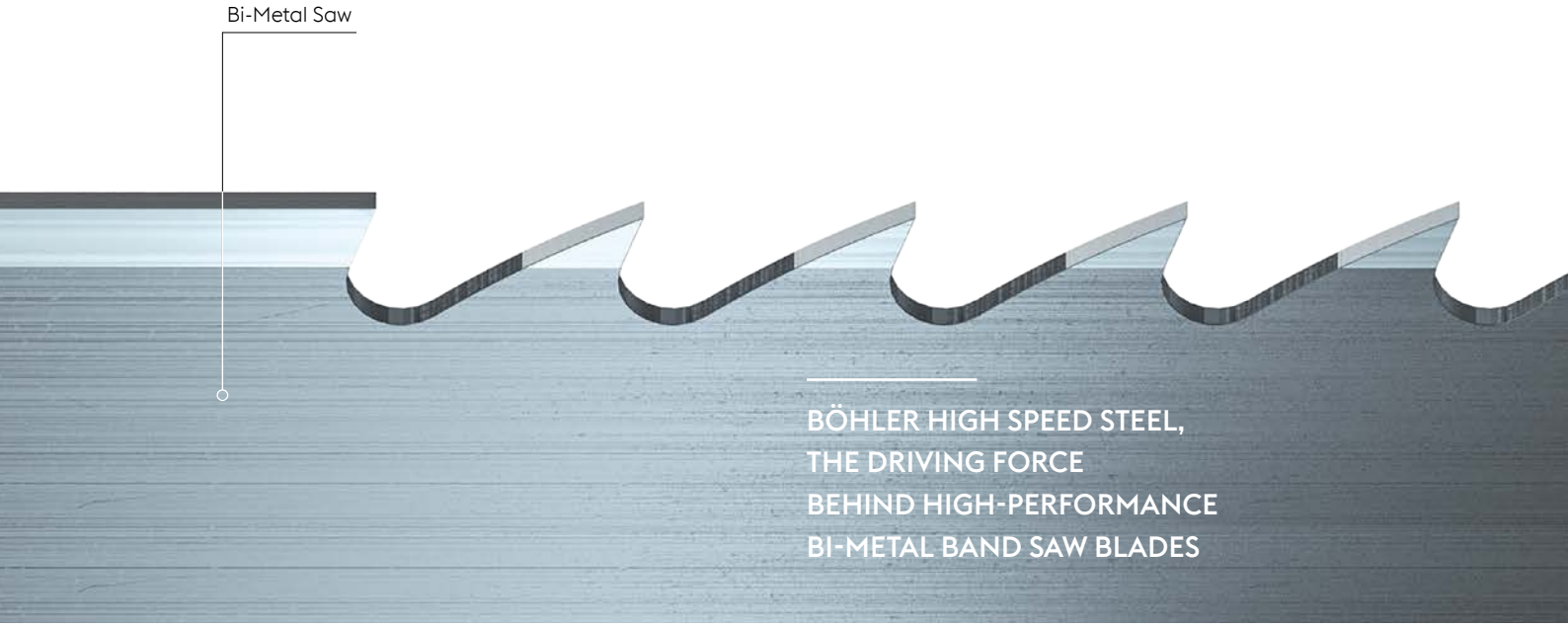
Advantages of this design

- HSS teeth for long service life
- Tough, elastic backing material prevents blade breakage
- High fatigue strength under alternating loads during sawing operations

The performance of a bi-metal saw blade is influenced by the quality of the material used. This steel determines the hardness, hot strength, and service life of the saw band.
To ensure that the saw band precisely matches the intended operating conditions, various HSS base materials are available. Depending on the saw band type, tooth geometry, and level of stress, different HSS steels are used, tailored to:

What makes a high-quality bi-metal saw blade

- Temperature resistance
- Wear behavior
- Toughness
- Cutting edge stability



BÖHLER HIGH SPEED STEEL, THE DRIVING FORCE BEHIND HIGH-PERFORMANCE BI-METAL BAND SAW BLADES

APPLICATIONS

DEPENDING ON THE APPLICATION, DIFFERENT HSS ALLOYS CAN BE SELECTED. RANGING FROM CLASSIC STANDARD GRADES TO HIGH ALLOYED PREMIUM GRADES.

- RECIPROCATING SAWS
- BAND SAWS
- HAND SAWS
- JIG SAWS
- SKATE BLADES
- PERFORATING KNIVES
- INDUSTRIAL KNIVES





EVERY BI-METAL SAW BEGINS WITH A DECISION: CHOOSING THE RIGHT STEEL

BECAUSE IN THE END, IT'S NOT JUST ABOUT CUTTING — IT'S ABOUT HOW IT CUTS, HOW LONG IT LASTS, AND HOW RELIABLY IT PERFORMS.

voestalpine BÖHLER Edelstahl offers a unique portfolio of high-speed steels specifically developed to meet the demands of sawing applications.
Whether for standard applications or high-end performance, our HSS portfolio covers the entire spectrum. From classic conventionally produced grades to highly precise powder-metallurgical MICROCLEAN® materials.

The goal: The perfect balance of toughness, wear resistance, and hot hardness—individually tailored to each sawing application.

BÖHLER High Speed Steels for Bi-Metal Saws at a Glance

BÖHLER Grade	Standards				Chemical composition (Content Values in %)					
	SEL	AISI	DIN / EN	UNS	C	Cr	Mo	V	W	Co
BÖHLER S600	1.3343	~ M2 reg.C	HS 6-5-2C	~T11302	0.90	4.10	5.00	1.80	6.20	–
BÖHLER S504SF	–	MATRIX II	–	–	0.75	4.10	5.00	1.00	1.00	8.00
BÖHLER S500SF	1.3247	~M42	HS 2-9-1-8	~T11342	1.10	3.80	9.50	1.20	1.50	8.00
BÖHLER S594 MICROCLEAN	1.3247 PM	~M42 PM	HS 2-9-1-8 PM	~T11342 PM	1.12	3.90	9.50	1.20	1.50	8.00
BÖHLER S590 MICROCLEAN	1.3244	–	HS 6-5-3-8	–	1.29	4.20	5.00	3.00	6.30	8.40
BÖHLER S793 MICROCLEAN	~1.3207	–	HS 10-4-2-10	–	1.30	4.00	3.20	3.10	9.30	10.00
BÖHLER S390 MICROCLEAN	–	–	–	–	1.64	4.80	2.00	4.80	10.40	8.00





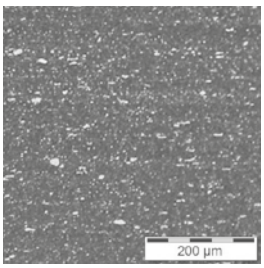
HSS GRADES

WHEN TOP PERFORMANCE IS THE NORM

Conventional Production

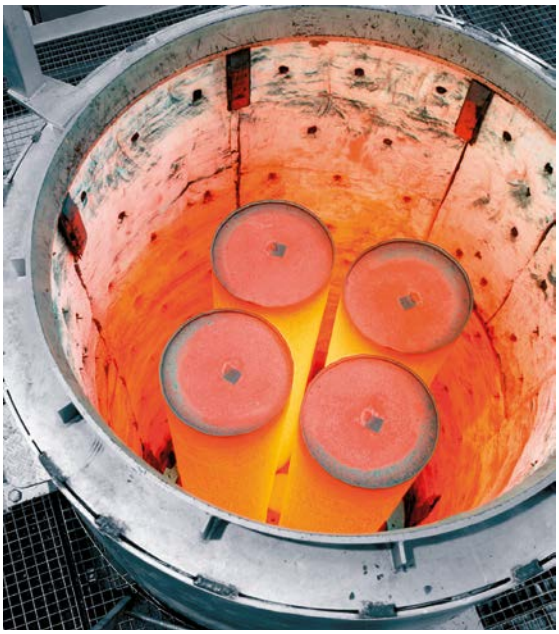
The products manufactured in the electric arc furnace are described as conventionally melted materials and represent the “basic materials” for normal use with the following main properties:

- Linear carbide distribution
- High degree of purity thanks to state-of-the-art systems in the conventional process route



Microstructure of conventional 8 % Co HSS – edge wire





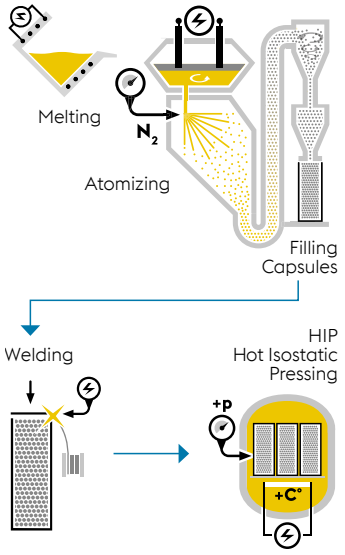
MICROCLEAN® GRADES

WHEN TOP PERFORMANCE IS TAKEN TO THE EXTREME

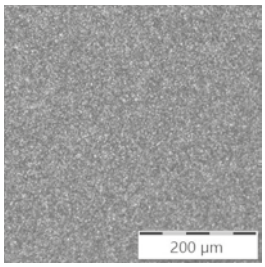
Powder Metallurgical (PM) Production

In order to meet the highest requirements in the various processing methods, materials are increasingly being used that are produced by powder metallurgy. These materials offer properties at a sophisticated, high level:

Powder Metallurgy (PM) Route



- Segregation free
- Finest carbide distribution
- Homogeneous properties
- High wear resistance
- High toughness with high hardness



Microstructure of PM material





CONVENTIONAL HSS GRADES – RELIABLE, PROVEN, ECONOMICAL

For applications where toughness and cost-effectiveness are the top priorities, our conventional HSS grades– with controlled gas content for better weldability– provide the ideal choice.

BÖHLER S600

BÖHLER S504SF

BÖHLER S500SF



BÖHLER Conventional HSS Grades	Compressive strength	Grindability	Red Hardness	Toughness	Wear Resistance	Edge Stability
BÖHLER S600	★★★	★★★	★★★	★★	★★	★★★
BÖHLER S504SF	★★★	★★★★	★★★	★★★	★★	★★★
BÖHLER S500SF	★★★★	★★★	★★★★	★★	★★★★	★★★★

BÖHLER S600

THE UNIVERSAL CLASSIC

BÖHLER S600 is the classic standard grade in the BÖHLER HSS portfolio. As a standard high-speed steel, it combines robust properties with good cost-effectiveness.
It is the first choice for less demanding cutting operations.

TYPICAL APPLICATIONS

Machining of softer and medium-hard materials

Universal band saw applications under moderate loading

Ideal for users seeking process stability at the best possible price

BÖHLER S504SF

THE TOUGH PERFORMER FOR SOFTER MATERIALS

BÖHLER S504SF is a cobalt-alloyed high-speed steel with 8% Co, particularly distinguished by its high toughness. It features good—but deliberately reduced—hot hardness, making it ideal for applications where the saw band must operate stably, reliably, and with high resistance to impact loads.

TYPICAL APPLICATIONS

Machining of softer and medium-hard steels

Applications, where toughness is more important than maximum hardness

Band saws for universal cutting operations with lower thermal stress

BÖHLER S500SF

THE WELL-BALANCED ALL-ROUND HSS

BÖHLER S500SF is also an 8% cobalt high-speed steel, but it exhibits a completely different property profile compared to **BÖHLER S504SF**. While **BÖHLER S504SF** is optimized for toughness, **BÖHLER S500SF** stands out for its harmonious balance: a well-matched combination of toughness, wear resistance, and hot hardness.

TYPICAL APPLICATIONS

Machining of materials with higher hardness

Materials requiring increased wear resistance

Band saw blades for higher cutting speeds and moderate thermal loads





BÖHLER MICROCLEAN® PM MATERIALS – TOP PERFORMANCE FOR EXTREME DEMANDS

When the task becomes more demanding, our MICROCLEAN® grades come into play.

BÖHLER S594 MICROCLEAN

BÖHLER S590 MICROCLEAN

BÖHLER S793 MICROCLEAN

BÖHLER S390 MICROCLEAN


voestalpine
BÖHLER

SAME CHEMISTRY – A DIFFERENT WORLD

Although **BÖHLER S500SF** and **BÖHLER S594** MICROCLEAN show the identical chemical composition—both are based on an 8% Co / 9.5% Mo HSS alloy—their performance differs fundamentally.

The reason lies in the manufacturing process:
BÖHLER S500SF → conventionally produced by melt metallurgy
BÖHLER S594 MICROCLEAN **→ produced by powder metallurgy (PM)**

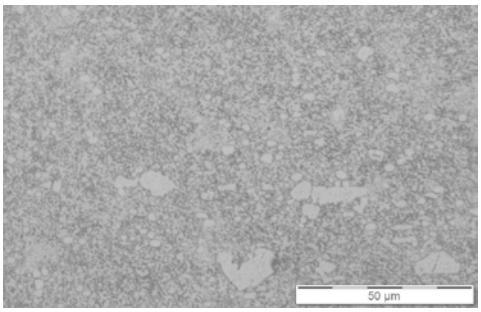
These different production routes result in completely different internal steel structures—and this is precisely what creates a significant difference in their property profiles.

BÖHLER S500SF

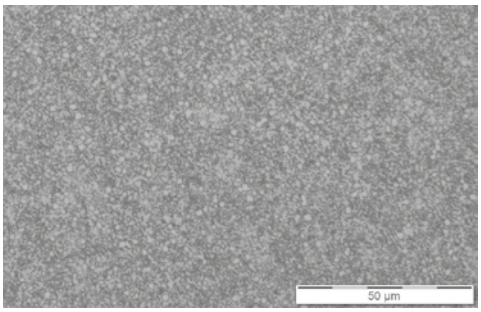
- Larger, unevenly distributed hard phases
- Inhomogeneous microstructure
- Higher risk of micro-segregations / carbide clusters
- Lower material purity

BÖHLER S594 MICROCLEAN

- Extremely fine-grained, homogeneous microstructure
- Very evenly distributed hard phases
- Significantly higher material purity
- No coarse carbides
- Superior isotropic properties



Microstructure **BÖHLER S500SF**



Microstructure **BÖHLER S594** MICROCLEAN

BÖHLER MICROCLEAN® PM MATERIALS FOR BI-METAL APPLICATIONS

Produced by powder metallurgy, PM materials feature ultra-fine microstructures and maximum material purity. The result: Significantly longer tool life, excellent hot hardness, and maximum cutting performance—even when machining the most challenging materials.



BÖHLER S594 MICROCLEAN

THE TOUGH PM SPECIALIST

BÖHLER S594 MICROCLEAN is a powder-metallurgical high-speed steel with 8% Co and 9.5% Mo—a combination specifically developed for cutting conditions that require both extreme toughness and high performance. It serves as the bridge between robustness and high-end capability.

APPLICATIONS

Machining of hard and tough materials that generate high cutting temperatures

Larger cross-sections and fluctuating loads

Ideal for heavily loaded bi-metal band saw blades in industrial use

BÖHLER MICROCLEAN HSS Grades	Compressive strength	Grindability	Red Hardness	Toughness	Wear Resistance	Edge Stability
BÖHLER S594 MICROCLEAN	★★★	★★★	★★★★	★★★★	★★★	★★★
BÖHLER S590 MICROCLEAN	★★★★	★★★	★★★★	★★★	★★★	★★★
BÖHLER S793 MICROCLEAN	★★★★	★★★	★★★★	★★★★	★★★★	★★★★
BÖHLER S390 MICROCLEAN	★★★	★★★	★★★★	★★★	★★★	★★★

BÖHLER S590 MICROCLEAN

FOR EXTREME HARDNESS AND HIGH PERFORMANCE

BÖHLER S590 MICROCLEAN is a powder-metallurgical high-speed steel with 8% Co and 5% Mo, developed to meet the highest performance demands. It combines outstanding wear resistance with excellent hot hardness—making it ideal for materials that significantly exceed the demands of typical structural or tool steels.

APPLICATIONS

Machining of high-strength and highly alloyed materials

Continously loaded industrial sawing systems High-speed cutting under elevated thermal loads

Applications requiring superior wear resistance and hot hardness

BÖHLER S793 MICROCLEAN

TOP-LEVEL HOT HARDNESS & WEAR RESISTANCE

BÖHLER S793 MICROCLEAN is a powder-metallurgical alloy with 10% Co and a high tungsten content. It was developed for extreme thermal and mechanical loads—when cuts run hot and every grain matters.

APPLICATIONS

Machining of titanium alloys, highly alloyed stainless steels, and heat-resistant steels

Continuously loaded industrial sawing systems

Applications where the saw band must withstand extreme temperatures and very high cutting speeds

BÖHLER S390 MICROCLEAN

MAXIMUM HARDNESS FOR THE TOUGHEST APPLICATIONS

BÖHLER S390 MICROCLEAN is the absolute top-performance grade in the portfolio. With very high contents of cobalt, tungsten, and vanadium, it is optimized for maximum wear resistance and the highest hot hardness. It delivers outstanding performance when cutting the most difficult, abrasive, and hardest materials.

APPLICATIONS

Machining of titanium alloys, superalloys, and high-temperature-resistant steels

Small and medium cross-sections with the highest performance demands

Applications where maximum tool life is critical

Ideal for premium bi-metal band saw blades in high-end industrial applications

THE COMPLETE PORTFOLIO

OPTIMALLY MATCHED FOR EVERY BI-METAL BAND SAW BLADE

BÖHLER Grade	Type	Properties	Applications
BÖHLER S390 MICROCLEAN	10% Co, 5 % V, 9 % W HSS powder metallurgical product	Toughness ↔ wear resistance ↑ red hardness ↑	For materials with extremely high hardness, Nickel alloys Titanium Alloys Hard steels
BÖHLER S793 MICROCLEAN	10% Co, 9 % W HSS powder metallurgical product	Toughness ↔ wear resistance ↑ red hardness ↑	
BÖHLER S590 MICROCLEAN	8% Co, 5 % Mo HSS powder metallurgical product	Toughness ↑ wear resistance ↓ red hardness ↑	
BÖHLER S594 MICROCLEAN	8% Co, 9 % Mo HSS powder metallurgical product	Toughness ↑ wear resistance ↑ red hardness ↑	For materials with high hardness and high toughness
BÖHLER S500SF	8% Co HSS	Toughness ↔ wear resistance ↑ red hardness ↑	
BÖHLER S504SF	8 % Co, W, V, Mo ↓	Toughness ↑ wear resistance ↓ red hardness ↑	For softer materials
BÖHLER S600	Standard HSS		

HIGHER PERFORMANCE

The combination of conventional and PM HSS grades enables BÖHLER customers to tailor the bi-metal saw precisely to the specific application. This results in a bi-metal saw that delivers exactly what modern manufacturing demands: Performance. Precision. Tool life.

Every BÖHLER HSS grade embodies decades of materials expertise in every cut. Our steels enable:

» **More stable processes**

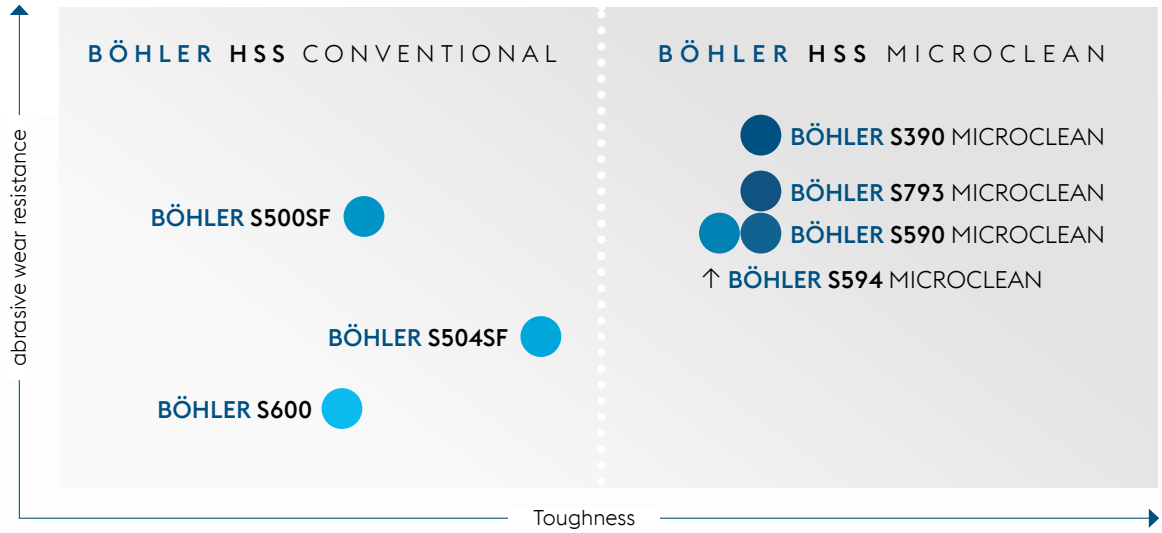
» **Longer operating times**

» **Higher cutting speeds**

» **Improved economical production**

From standard to high-end, BÖHLER delivers the performance that makes sawing successful.

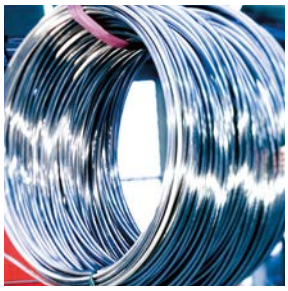
Portfolio of HSS for sawing

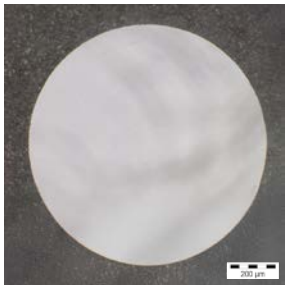






GREAT VARIETY ACCORDING TO YOUR NEEDS



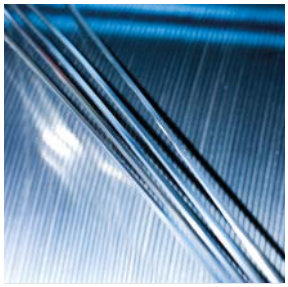


Rolled Wire

DIMENSION	Ø 12.5 mm – Ø 5.0 mm
SURFACE CONDITION	Unmachined (black)
	Blasted
	Pickled
TOLERANCE	+ 0.15 mm / - 0.1 mm

Rollalloy

DIMENSION	Ø 4.05 mm
	Ø 3.30 mm
	Ø 2.70 mm
SURFACE CONDITION	Unmachined (black)
TOLERANCE	± 0.15 mm

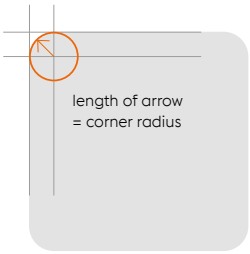




Flat Wire

DIMENSION	Width: 1.0 mm – 6.0 mm
	Thickness: 0.7 mm – 3.0 mm
SURFACE CONDITION	Peeled and rolled
	Rolled
EDGE RADIUS*	max. 0.08 mm
TOLERANCE	Width: 0.02 mm
	Thickness: 0.02 mm

*Note: The edge of the flat wire is a natural edge; therefore, the edge radius cannot be specified directly. The radius shall be determined geometrically by constructing a tangent to the side surface and a parallel line intersecting the end of the rounding (see drawing).



OUR CUSTOMERS BENEFIT FROM:

More than 125 years of metallurgical HSS expertise

For generations, the name BÖHLER has stood worldwide for premium-quality steel and technological excellence. With more than 125 years of experience in the field of High Speed Steel, we set benchmarks in the production of high-performance materials for bi-metal applications.

State-of-the-art technology

With the world's most advanced fully automated steel plant in Austria and our advanced melting technologies, we ensure the highest product quality.

Continuous product analysis through testing laboratories

The state-of-the-art laboratories of voestalpine BÖHLER Edelstahl provide essential data and product parameters that support process control and stability throughout production. This consistently outstanding quality enables efficient processing and minimizes the need for parameter adjustments.

Reliable delivery

Our secure production location in Austria, exceptional product quality, process reliability, and global logistics expertise ensure market-leading delivery performance in all major international markets.

We provide our customers with expert knowledge in development, consulting, and production at the highest level of customer-specific service, delivering precise solutions for today's complex requirements and tomorrow's challenges.




MADE IN
AUSTRIA

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. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.

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