



HIGH PERFORMANCE METALS  
FOR RACING APPLICATIONS



**Faster, lighter, stronger** – terms of our time which must be taken literally, especially in the racing industry. Fulfilling these requirements demands everything of materials. BÖHLER provides the materials that racing engineers need – in the grade and dimension they want.

Each and every step of production – from melting to delivery – is in our own hands and means the highest, most consistent quality for you. This is why BÖHLER is one of the most reliable partners for the racing industry.

**No limits, high performance materials for**

- Formula 1
- Indy Racing League
- CART
- Rally Cars
- Motor Cycles

**Applications**

- Gears
- Crankshafts
- Driveshafts
- Bearings
- Conrods
- Camshafts
- Differentials

**A wide range of grades**

**Heat treatable steels**

Martensitic hardened steels with carbide forming elements for highest strength, best fatigue resistance and the possibility of various surface treatments.

**Case carburising steels**

Low alloyed steels for highest toughness and ductility and a very good carburising behaviour for highest wear resistance on the surface.

**Bearing steels**

High alloyed materials for high hardness and strength to minimize wear and contact fatigue in combination with different levels of corrosion resistance.

**Maraging steels**

Intermetallic hardened steels especially alloyed with Ni, Co and Mo for highest strength and fatigue resistance. Simple heat treatment with low distortion.

**PH grades (Stainless steels)**

Precipitation hardened steels with excellent corrosion resistance delivered in fully heat treated or solution annealed condition.

**Superalloys (Ni/Fe-base)**

Ni-base-alloyed grades with best mechanical properties, oxidation and corrosion resistance at service temperatures above 650 °C.

**PM grades**

High alloyed martensitic powder metallurgical steels with highest strength and excellent wear resistance in a very homogeneous structure.

**Melted and remelted materials for racing applications**

An extremely high degree of purity with enhanced mechanical properties can only be achieved by the use of one or more remelting steps.

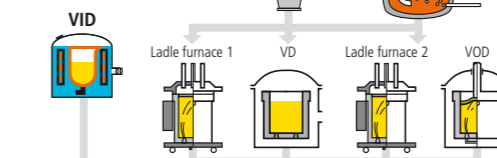
The necessary equipment for melting, remelting and casting to achieve such properties are all available at the BÖHLER Edelstahl plant in Kapfenberg.

**Flow of materials**

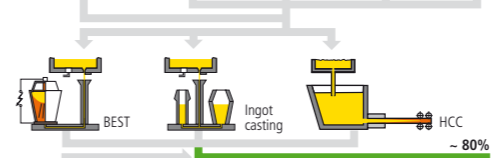
**Melting**



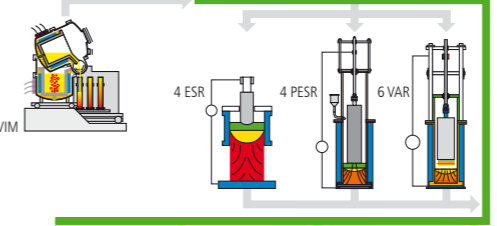
**Secondary Metallurgy**



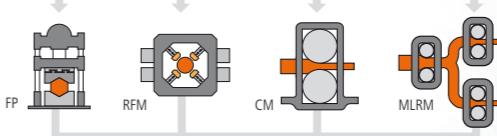
**Casting**



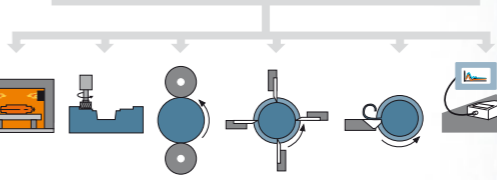
**Special Melting and Remelting**



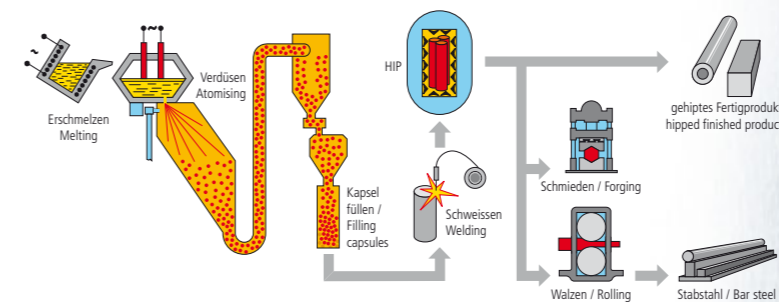
**Hot Forming**



**Heat treatment, Machining, Testing**



**BÖHLER MICROCLEAR – Production process**



BÖHLER grade	Market grade	Airmelted	Melting Route (P)ESR	VMR	AMS	Standards		Typical applications	Chemical composition in %											BÖHLER grade			
						BS	Others		C	Si	Mn	Cr	Mo	Ni	V	W	Co	Ti	Al		Others		
<b>Heat treatable steels</b>																							
<b>BÖHLER V124SC</b>	4340	–	■	■	6414	–	1.6944 ~ 40NiCrMo6	Control rods, Crankshafts, Bolts, Con rods, Tappets	0.42	0.30	0.80	0.85	0.30	1.90	0.08	–	–	–	0.03	–	<b>BÖHLER V124SC</b>		
<b>BÖHLER V132</b>	300M	–	–	■	6257, 6419	S155	SAE 4340M	Drift shafts, Transition shafts, Bolts, Gudgeon pins, Con rods	0.42	1.65	0.80	0.80	0.40	1.80	0.08	–	–	–	–	–	<b>BÖHLER V132</b>		
<b>BÖHLER V145</b>	30CDN8	■	–	–	–	–	1.6604 30CrNiMo8	Bolts, Crankshafts, Con rods, Gudgeon pins	0.30	0.30	0.50	2.00	0.35	2.00	–	–	–	–	–	–	<b>BÖHLER V145</b>		
<b>BÖHLER V180</b>		–	–	■	–	–	–	Drift shafts, Transition shafts, Bolts, Gudgeon pins, Con rods	0.41	2.70	0.70	0.85	0.45	1.80	0.21	–	–	–	–	–	<b>BÖHLER V180</b>		
<b>BÖHLER V358</b>	E40CDV12	–	■	■	–	S132	1.8523	Crankshafts, Drive shafts, Bolts, Gudgeon pins, Con rods	0.41	0.28	0.65	3.35	0.95	–	0.20	–	–	–	–	–	<b>BÖHLER V358</b>		
<b>BÖHLER V361</b>	E32CDV13	–	■	■	6481	–	1.7765	Crankshafts, Drive shafts, Bolts, Gudgeon pins, Con rods	0.33	0.28	0.50	0.40	–	–	–	–	–	0.033	–	–	<b>BÖHLER V361</b>		
<b>BÖHLER V460</b> <b>BÖHLER W460</b>		–	–	■	–	–	–	Cam shafts, Gudgeon pins, Con rods, Crankshafts, Bolts, Drive shafts	0.50	0.20	0.45	4.55	3.00	–	0.75	–	–	–	–	–	<b>BÖHLER V460</b> <b>BÖHLER W460</b>		
<b>BÖHLER M201</b>		■	–	–	–	–	1.2311	Tappets, Rocker shafts, Fastener, Con rods, Bolts, Clutch central plates	0.41	0.30	1.50	2.00	0.20	–	–	–	–	–	–	–	<b>BÖHLER M201</b>		
<b>BÖHLER M238</b>		■	–	–	–	–	1.2738	Cam shafts, Fasteners, Gudgeon pins, Con rods, Bolts, Crankshafts, Flywheels	0.38	0.30	1.50	2.00	0.20	1.10	–	–	–	–	–	–	<b>BÖHLER M238</b>		
<b>BÖHLER M268</b>		–	–	■	–	–	1.2738	Cam shafts, Fasteners, Gudgeon pins, Con rods, Bolts, Crankshafts, Flywheels	0.38	0.30	1.50	–	–	–	–	–	–	–	–	–	<b>BÖHLER M268</b>		
<b>BÖHLER W360</b>		–	■	–	–	–	–	Cam shafts, Gudgeon pins, Con rods, Crankshafts, Bolts, Drive shafts	0.50	0.20	0.25	4.50	3.00	–	0.60	–	–	–	–	–	<b>BÖHLER W360</b>		
<b>BÖHLER W400</b>		–	–	■	~ H11	~ BH11	–	Cam shafts, Gudgeon pins, Con rods, Crankshafts, Bolts, Drive shafts	0.37	0.20	0.30	5.00	1.30	–	0.50	–	–	–	–	–	<b>BÖHLER W400</b>		
<b>BÖHLER K600</b>		■	–	–	–	–	1.2767	Con rods, Cam shafts, Bolts, Drive shafts	0.48	0.25	0.40	1.30	0.25	4.00	–	–	–	–	–	–	<b>BÖHLER K600</b>		
<b>Case carburising steels</b>																							
<b>BÖHLER E108SA</b>		■	■	■	–	S156	1.6722	Gears	0.17	0.28	0.80	0.70	0.25	4.10	–	–	–	–	–	–	<b>BÖHLER E108SA</b>		
<b>BÖHLER M100</b>		■	–	–	–	–	20MnCr5		0.20	0.28	1.20	1.10	–	–	–	–	–	–	–	–	–	<b>BÖHLER M100</b>	
<b>BÖHLER M121</b>		–	■	–	–	–	EN36C		0.14	0.28	0.55	0.90	0.13	3.15	–	–	–	–	–	–	–	<b>BÖHLER M121</b>	
<b>BÖHLER M130</b>		■	–	–	–	–	EN39		0.19	0.23	0.30	1.25	0.20	4.05	–	–	–	–	–	–	–	<b>BÖHLER M130</b>	
<b>PH grades (Stainless steels)</b>																							
<b>BÖHLER N700</b>	17-4 PH	■	■	■	5643, 5622	–	1.4542 1.4548	Fasteners, Connecting components with required good corrosion resistance	0.04	0.25	0.40	15.28	–	4.50	–	–	–	–	–	–	Cu: 3.25 Nb: 0.30	<b>BÖHLER N700</b>	
<b>BÖHLER N701</b>	15-5 PH	■	■	–	5659	–	1.4545		0.035	0.28	0.60	14.88	–	5.15	–	–	–	–	–	–	–	Cu: 3.30 Nb: 0.30	<b>BÖHLER N701</b>
<b>BÖHLER N709</b>	13-8 Mo	–	–	■	5629	–	1.4534		0.03	–	–	12.45	2.18	8.15	–	–	–	–	–	1.06	–	<b>BÖHLER N709</b>	

BÖHLER grade	Market grade	Melting Route			AMS	Standards		Typical applications	Chemical composition in %												BÖHLER grade		
		Airmelted	(P)ESR	VMR		BS	Others		C	Si	Mn	Cr	Mo	Ni	V	W	Co	Ti	Al	Others			
<b>Bearing steels</b>																							
<b>BÖHLER N360</b>	X30	–	■	–	5898	–	1.4108 X30CrMoN15-1	Bearings	0.32	0.55	0.45	15.00	1.03	–	0.045	–	–	–	–	–	–	<b>BÖHLER N360</b>	
<b>BÖHLER N695</b>	440C	■	■	■	5618, 5630	–	1.3544 X105CrMo17 S102CrMo17		1.05	0.40	0.40	16.70	0.50	–	–	–	–	–	–	–	–	–	<b>BÖHLER N695</b>
<b>BÖHLER R250</b>	M50	–	–	■	6491	–	~ 1.3551		0.83	0.18	0.28	4.13	4.30	–	1.05	–	–	–	–	–	–	–	<b>BÖHLER R250</b>
<b>BÖHLER R350</b>	M50 Nil	–	–	■	6278	–	–		0.14	0.18	0.28	4.15	4.25	3.50	1.23	–	–	–	–	–	–	–	<b>BÖHLER R350</b>
<b>BÖHLER V1245C</b>	4340	–	■	■	6414	–	1.6944 ~ 40NiCrMo6 EN24 VAR	Bearing cage, Control rods, Crankshafts, Bolts, Con rods	0.42	0.30	0.80	0.85	0.30	1.90	0.08	–	–	–	0.03	–	–	<b>BÖHLER V1245C</b>	
<b>Maraging steels</b>																							
<b>BÖHLER V720</b>	Maraging 300	–	–	■	6514	–	1.6354	Transition shafts, Prototyping	≤ 0.005	≤ 0.05	≤ 0.05	–	5.00	18.50	–	–	8.80	0.70	0.10	–	–	<b>BÖHLER V720</b>	
<b>BÖHLER V723</b>	Maraging 250	–	–	■	6512	S162	1.6359		–	–	–	–	4.90	–	–	–	7.80	0.40	0.13	–	–	<b>BÖHLER V723</b>	
<b>Superalloys (Ni/Fe-Base)</b>																							
<b>BÖHLER L080A</b>	Nimonic 80 A	–	–	■	ASTM B637	–	2.4631 2.4952	Valves, Screws	0.06	–	–	19.50	–	73.00	–	–	≤ 1.00	2.50	1.70	Fe: <1.50 B: 0.004	–	<b>BÖHLER L080A</b>	
<b>BÖHLER L090</b>	Nimonic 90	–	–	■	5829	–	2.4632 2.4969	Valves	0.065	–	–	19.50	–	58.00	–	–	16.25	2.45	1.40	–	–	<b>BÖHLER L090</b>	
<b>BÖHLER L751</b>	Alloy 751	–	–	■	–	–	–	Valves	0.045	–	–	15.00	–	74.00	–	–	–	2.40	1.23	Nb: 0.95	–	<b>BÖHLER L751</b>	
<b>BÖHLER L625</b>	Alloy 625	–	–	■	5666	–	2.4856 N06625	Exhaust gas systems	≤ 0.06	–	–	21.00	8.50	63.90	–	–	≤ 1.00	≤ 0.04	0.18	Nb: 3.40 Fe: <3.00	–	<b>BÖHLER L625</b>	
<b>BÖHLER T200</b>	A286	–	■	–	5731, 5732	–	Z6NCZ25 1.4933 / 1.4944	Valves	0.0045	–	–	–	–	–	–	–	–	–	–	–	–	<b>BÖHLER T200</b>	

BÖHLER grade	Typical applications	Chemical composition in %											
		C	Si	Mn	Cr	Mo	Ni	V	W	Co	Ti	Al	Others
<b>PM production</b>													
<b>BÖHLER K490 MICROCLEAN</b>	Cams, Cam followers, Components with required high wear resistance	1.40	–	–	6.40	1.50	–	3.70	3.50	–	–	–	+ Nb
<b>BÖHLER M390 MICROCLEAN</b>		1.91	0.60	0.30	20.0	1.00	–	4.00	0.60	–	–	–	N:0.24
<b>BÖHLER S290 MICROCLEAN</b>		2.00	–	–	3.80	2.50	–	5.10	14.30	11.00	–	–	–
<b>BÖHLER S390 MICROCLEAN</b>		1.64	–	–	3.80	2.00	–	4.80	10.40	8.00	–	–	–
<b>BÖHLER S590 MICROCLEAN</b>		1.29	–	–	4.20	5.00	–	3.00	6.30	8.40	–	–	–
<b>BÖHLER S690 MICROCLEAN</b>		1.35	–	–	4.10	5.00	–	4.10	5.90	–	–	–	–
<b>BÖHLER S790 MICROCLEAN</b>		1.29	–	–	4.20	5.00	–	3.00	6.30	–	–	–	–

**BARS rolled\***

round: 12.5 – 150 mm  
square: 15 – 150 mm  
flat: width thickness  
15 – 60 mm 5 – 41 mm  
60 – 200 mm 5 – 86 mm  
100 – 300 mm 15 – 80 mm

**ROLLED WIRE**

rolled: dia. 5.0 – 13.5 mm  
drawn: dia. 1.0 – 12.0 mm  
precision shaped:  
round 1 – 28 mm  
flat 0.5 – 40 mm<sup>2</sup>

**BARS forged\***

round, square: 100 – 1200 mm  
flat: width thickness  
1600 1000 mm maximum  
Ratio width/thickness maximum 10:1

**BARS pre-machined**

IBO ECOMAX 12.5 – 425 mm  
(on request up to 900 mm)

**BRIGHT BARS**

ECOBANK peeled and polished  
ECOFINISH band ground  
ECOMAX ground and polished

Your partner: \_\_\_\_\_



**SPECIAL STEEL FOR WORLD'S TOP PERFORMERS**

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