



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.

SPECIAL MATERIALS FOR WINNERS

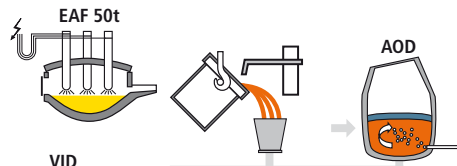
Melted and remelted materials for racing applications

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

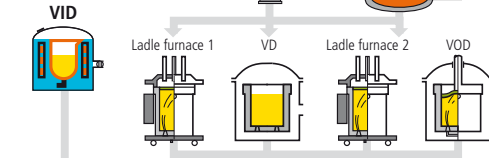
The necessary equipment for melting, remelting and casting to achieve such properties are all available at the BÖHLER Edelstahl plant in Kapfenberg.

Flow of materials

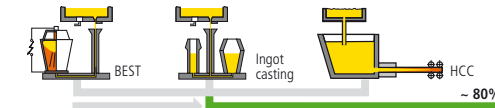
Melting



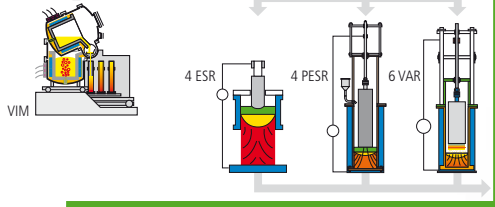
Secondary Metallurgy



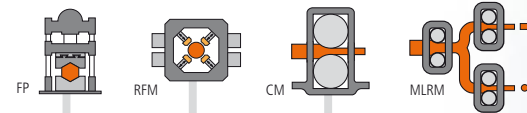
Casting



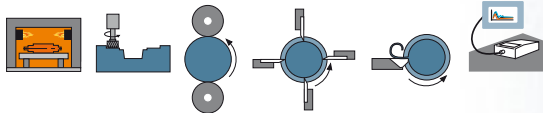
Special Melting and Remelting



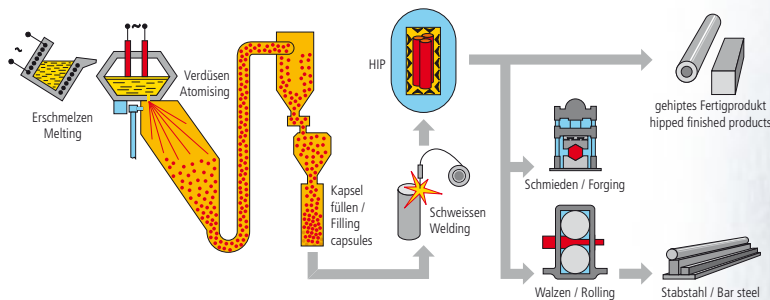
Hot Forming



Heat treatment, Machining, Testing



BÖHLER MICROCLEAN – Production process



BÖHLER grade	Market grade	Melting Route			AMS	Standards BS	Others
		Airmelted	(P)ESR	VMR			
Heat treatable steels							
BÖHLER V124SC	4340	–	■	■	6414	–	1.6944 ~ 40NiCrMo6
BÖHLER V132	300M	–	–	■	6257, 6419	S155	SAE 4340M
BÖHLER V145	30CDN8	■	–	–	–	–	1.6604 30CrNiMo8
BÖHLER V180		–	–	■	–	–	–
BÖHLER V358	E40CDV12	–	■	■	–	S132	1.8523
BÖHLER V361	E32CDV13	–	■	■	6481	–	1.7765
BÖHLER W460		–	–	■	–	–	–
BÖHLER M201		■	–	–	–	–	1.2311
BÖHLER M238		■	–	–	–	–	1.2738
BÖHLER M268		–	–	■	–	–	1.2738
BÖHLER W360		–	■	–	–	–	–
BÖHLER W400		–	–	■	~ H11	~ BH11	–
BÖHLER K600		■	–	–	–	–	1.2767
Case carburising steels							
BÖHLER E108SA		■	■	■	–	S156	1.6722
BÖHLER M100		■	–	–	–	–	20MnCr5
BÖHLER M121		–	■	–	–	–	EN36C
BÖHLER M130		■	–	–	–	–	EN39
PH grades (Stainless steels)							
BÖHLER N700	17-4 PH	■	■	■	5643, 5622	–	1.4542 1.4548
BÖHLER N701	15-5 PH	■	■	–	5659	–	1.4545
BÖHLER N709	13-8 Mo	–	–	■	5629	–	1.4534

A WIDE RANGE OF GRADES

Typical applications	Chemical composition in %												BÖHLER grade
	C	Si	Mn	Cr	Mo	Ni	V	W	Co	Ti	Al	Others	
Control rods, Crankshafts, Bolts, Con rods, Tappets	0.42	0.30	0.80	0.85	0.30	1.90	0.08	–	–	–	0.03	–	BÖHLER V124SC
Drift shafts, Transition shafts, Bolts, Gudgeon pins, Con rods	0.42	1.65	0.80	0.80	0.40	1.80	0.08	–	–	–	–	–	BÖHLER V132
Bolts, Crankshafts, Con rods, Gudgeon pins	0.30	0.30	0.50	2.00	0.35	2.00	–	–	–	–	–	–	BÖHLER V145
Drift shafts, Transition shafts, Bolts, Gudgeon pins, Con rods	0.41	2.70	0.70	0.85	0.45	1.80	0.21	–	–	–	–	–	BÖHLER V180
Crankshafts, Drive shafts, Bolts, Gudgeon pins, Con rods	0.41	0.28	0.65	3.35	0.95	–	0.20	–	–	–	–	–	BÖHLER V358
Crankshafts, Drive shafts, Bolts, Gudgeon pins, Con rods	0.33	0.28	0.50	3.00	1.00	–	0.25	–	–	0.033	–	–	BÖHLER V361
Cam shafts, Gudgeon pins, Con rods, Crankshafts, Bolts, Drive shafts	0.50	0.20	0.45	4.55	3.00	–	0.75	–	–	–	–	–	BÖHLER W460
Tappets, Rocker shafts, Fastener, Con rods, Bolts, Clutch central plates	0.41	0.30	1.50	2.00	0.20	–	–	–	–	–	–	–	BÖHLER M201
Cam shafts, Fasteners, Gudgeon pins, Con rods, Bolts, Crankshafts, Flywheels	0.38	0.30	1.50	2.00	0.20	1.10	–	–	–	–	–	–	BÖHLER M238
Cam shafts, Fasteners, Gudgeon pins, Con rods, Bolts, Crankshafts, Flywheels	0.38	0.30	1.50	–	–	–	–	–	–	–	–	–	BÖHLER M268
Cam shafts, Gudgeon pins, Con rods, Crankshafts, Bolts, Drive shafts	0.50	0.20	0.25	4.50	3.00	–	0.60	–	–	–	–	–	BÖHLER W360
Cam shafts, Gudgeon pins, Con rods, Crankshafts, Bolts, Drive shafts	0.37	0.20	0.30	5.00	1.30	–	0.50	–	–	–	–	–	BÖHLER W400
Con rods, Cam shafts, Bolts, Drive shafts	0.48	0.25	0.40	1.30	0.25	4.00	–	–	–	–	–	–	BÖHLER K600
Gears	0.17	0.28	0.80	0.70	0.25	4.10	–	–	–	–	–	–	BÖHLER E108SA
	0.20	0.28	1.20	1.10	–	–	–	–	–	–	–	–	BÖHLER M100
	0.14	0.28	0.55	0.90	0.13	3.15	–	–	–	–	–	–	BÖHLER M121
	0.19	0.23	0.30	1.25	0.20	4.05	–	–	–	–	–	–	BÖHLER M130
Fasteners, Connecting components with required good corrosion resistance	0.04	0.25	0.40	15.28	–	4.50	–	–	–	–	–	Cu: 3.25 Nb: 0.30	BÖHLER N700
	0.035	0.28	0.60	14.88	–	5.15	–	–	–	–	–	Cu: 3.30 Nb: 0.30	BÖHLER N701
	0.03	–	–	12.45	2.18	8.15	–	–	–	–	1.06	–	BÖHLER N709

BÖHLER grade	Market grade	Melting Route			AMS	Standards BS	Others
		Airmelted	(P)ESR	VMR			
Bearing steels							
BÖHLER N360	X30	–	■	–	5898	–	1.4108 X30CrMoN15-1
BÖHLER N695	440C	■	■	■	5618, 5630	–	1.3544 X105CrMo17 S102CrMo17
BÖHLER R250	M50	–	–	■	6491	–	~ 1.3551
BÖHLER R350	M50 Nil	–	–	■	6278	–	–
BÖHLER V1245C	4340	–	■	■	6414	–	1.6944 ~ 40NiCrMo6 EN24 VAR
Maraging steels							
BÖHLER V720	Maraging 300	–	–	■	6514	–	1.6354
BÖHLER V723	Maraging 250	–	–	■	6512	S162	1.6359
Superalloys (Ni/Fe-Base)							
BÖHLER L080A	Nimonic 80 A	–	–	■	ASTM B637	–	2.4631 2.4952
BÖHLER L090	Nimonic 90	–	–	■	5829	–	2.4632 2.4969
BÖHLER L751	Alloy 751	–	–	■	–	–	–
BÖHLER L625	Alloy 625	–	–	■	5666	–	2.4856 N06625
BÖHLER T200	A286	–	■	–	5731, 5732	–	Z6NCZ25 1.4933 / 1.4944

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

A WIDE RANGE OF GRADES

Typical applications	Chemical composition in %												BÖHLER grade
	C	Si	Mn	Cr	Mo	Ni	V	W	Co	Ti	Al	Others	
Bearings	0.32	0.55	0.45	15.00	1.03	–	0.045	–	–	–	–	–	BÖHLER N360
	1.05	0.40	0.40	16.70	0.50	–	–	–	–	–	–	–	BÖHLER N695
	0.83	0.18	0.28	4.13	4.30	–	1.05	–	–	–	–	–	BÖHLER R250
	0.14	0.18	0.28	4.15	4.25	3.50	1.23	–	–	–	–	–	BÖHLER R350
Bearing cage, Control rods, Crankshafts, Bolts, Con rods	0.42	0.30	0.80	0.85	0.30	1.90	0.08	–	–	–	0.03	–	BÖHLER V124SC
Transition shafts, Prototyping	≤ 0.005	≤ 0.05	≤ 0.05	–	5.00	18.50	–	–	8.80	0.70	0.10	–	BÖHLER V720
	–	–	–	–	4.90	–	–	–	7.80	0.40	0.13	–	BÖHLER V723
Valves, Screws	0.06	–	–	19.50	–	73.00	–	–	≤ 1.00	2.50	1.70	Fe: <1.50 B: 0.004	BÖHLER L080A
Valves	0.065	–	–	19.50	–	58.00	–	–	16.25	2.45	1.40	–	BÖHLER L090
Valves	0.045	–	–	15.00	–	74.00	–	–	–	2.40	1.23	Nb: 0.95	BÖHLER L751
Exhaust gas systems	≤ 0.06	–	–	21.00	8.50	63.90	–	–	≤ 1.00	≤ 0.04	0.18	Nb: 3.40 Fe: <3.00	BÖHLER L625
Valves	0.0045	–	–	–	–	–	–	–	–	–	–	–	BÖHLER T200

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 mm²

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

IBO ECOMAX bar steel, peeled
ECOBLANK bright steel, peeled and
polished, decarb-free
ECOFINISH bright steel, band ground
BRIGHT STEEL ground and polished

Your partner: _____



SPECIAL STEEL FOR WORLD'S TOP PERFORMERS

BÖHLER Edelstahl GmbH & Co KG
Mariazeller Straße 25
A-8605 Kapfenberg/Austria
Phone: +43-3862-20
Fax: +43-3862-20
E-Mail: info@bohler-edelstahl.at
www.bohler-edelstahl.com