HORN

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Drilltec WENDEPLATTENBOHRER
BIS ZU 5XD BOHRTIEFE MÖGLICH

Drilltec INDEXABLE INSERT DRILL
UP TO 5XD DRILLING DEPTH POSSIBLE


boehlerit
BTID 4250-2ST2-07
boehlerit
BTID 3250-2ST2-07

DER UNTERSCHIED: MEHR MÖGLICHKEITEN

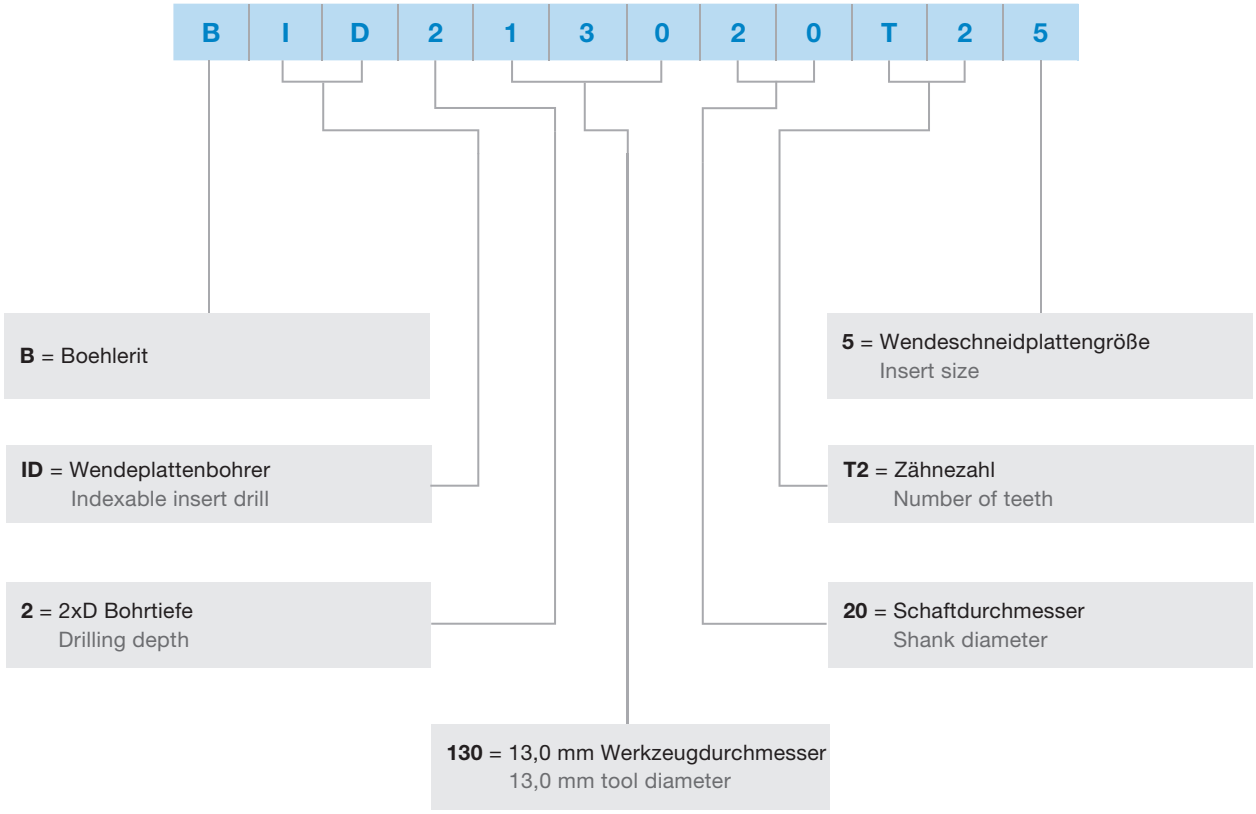
THE DIFFERENCE: MORE POSSIBILITIES

- **Hohe Schnitt- und Vorschub-geschwindigkeit**
  High cutting speed and feed rate

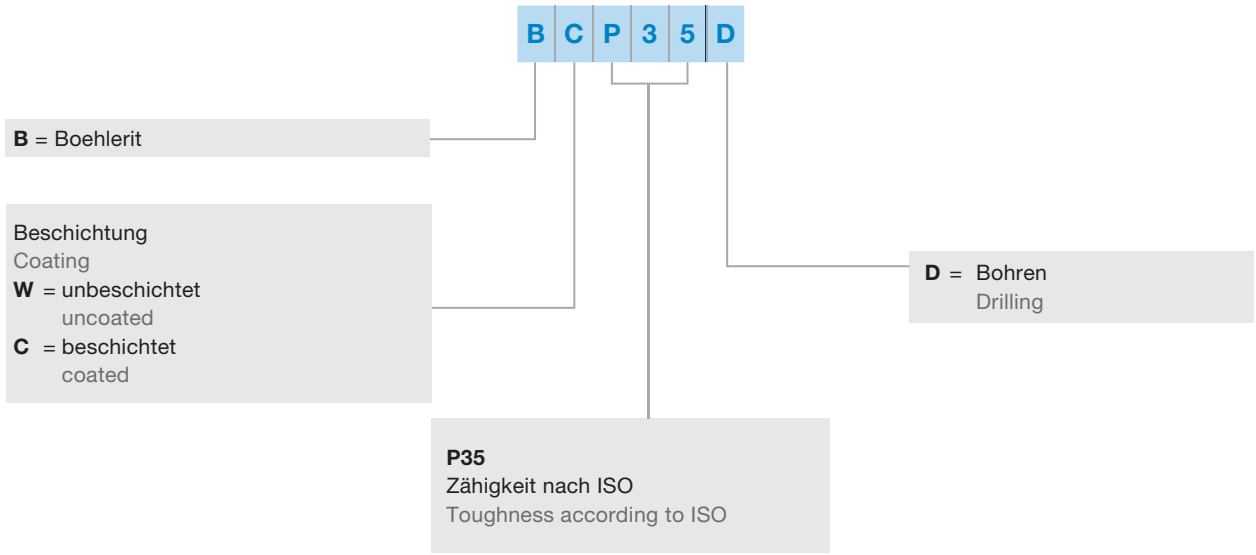
- **Optimaler Späneabfuhrkanal für einfachen Spänetransport**
  Optimum chip removal channel for easy chip evacuation

- **Hohe Prozesssicherheit**
  Secure process

Werkzeugbezeichnung Wendeplattenbohrer
Tool designation indexable insert drill



Schneidstoffsorten, Bezeichnung für Wendeschneidplatten
Cutting materials, designation system for inserts



Entscheidungshilfe und Symbolerklärung für Bohroperationen
Decision aid and symbol explanation for drilling operations

	Bohroperation Drilling operation	2xD	3xD	4xD	5xD
	**Vollbohren** Solid drilling	●	●	●	●
	**Grundloch** Blind hole	●	●	●	●
	**Schmiede-/Gusshaut, Nahtstelle** Forged/cast skin, Juncture	●	●	◑	◑
	**Schräg an-/ausbohren, Schnittunterbrechung** Bevelling/drilling at an angle, cutting interruption	●	●	◑	◑
	**Ballig anbohren** Spherical drilling	●	●	●	●
	**Querbohrung** Cross-hole drilling	●	●	●	●
	**Auskesseln** Springing	●	●	◑	◑
	**Paketbohren** Bundle drilling	●	●	◑	◑
	**Aufbohren** Drilling	●	●	◑	◑
	**Spitze anbohren** Tip drilling	●	●	◑	◑
	**Stegbohren** Rack drilling	●	●	◑	◑

● Geeignet Suitable
◑ Bedingt geeignet Partially suitable

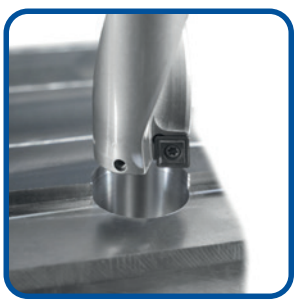
Anwendungsbeispiele für Bohroperationen
Application examples for drilling operations


Auskesseln
Springing


Vollbohren
Solid drilling

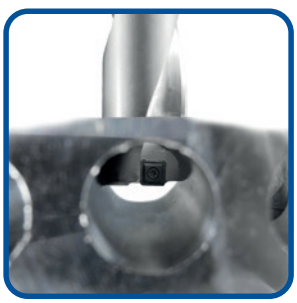

Ballig anbohren
Spherical drilling


Paketbohren
Bundle drilling


Stegbohren
Rack drilling


Spitze anbohren
Tip drilling


Schräg an-/aufbohren, Schnittunterbrechung
Bevelling/drilling at an angle, cutting interruption


Querbohrung
Cross-hole drilling

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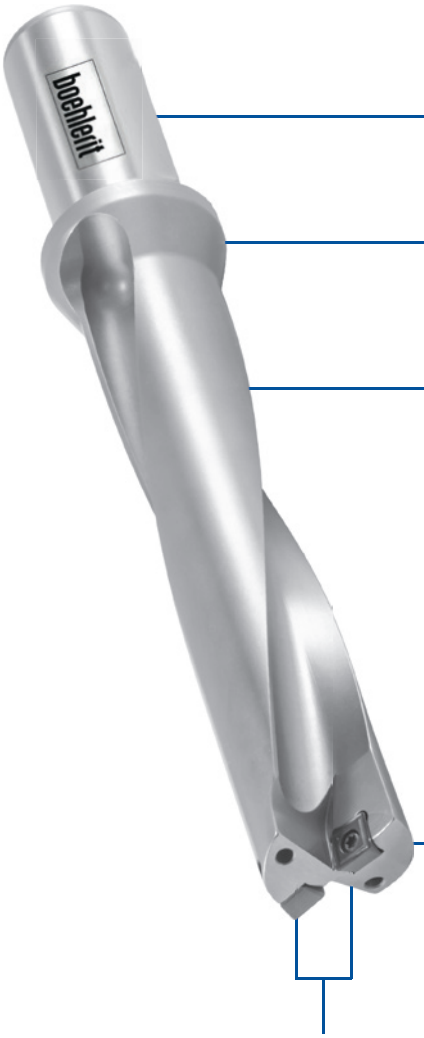

Schafttyp: Weldon HB
Shank type: Weldon HB

Plananschlag
Fixed backstop point

Bohrtyp: 2xD - 3xD - 4xD - 5xD
Drill type: 2xD - 3xD - 4xD - 5xD

Bohrdurchmesser: ø13 - 40 mm
Drill diameter: ø13 - 40 mm

Bohrlänge
Drill length

Bohrtiefe
Drill depth

Wendeschneidplatten: SPGX 050204
Inserts: SPGX 060204
SPGX 07T308
SPGX 090408
SPGX 110408

Sorte: BCK10D - BCP30D - BCP35D
Grade: BCK10D - BCP30D - BCP35D

Spanformer: P – Peripheric C – Centric
Chip breaker: P - Peripheric C - Centric

Technische Vorteile:

- Hohe Schnittgeschwindigkeit und Vorschubgeschwindigkeit
- Hohes Zerspanungsvolumen und Produktivität
- Wirtschaftliche Wendeschneidplatten mit 4 Schneidkanten
- Verfügbarkeit für eine breite Palette von Materialien
- Optimaler Späneabfuhrkanal für einfachen Spänetransport
- Oberflächenqualität und Bohrungspräzision
- Verschiedene Sorten für weiches und hartes Material
- Hohe Dauerfestigkeit der Trägerwerkzeuge
- Hohe Prozesssicherheit
- Bis zu 5xD Bohrtiefe möglich
- Unterschiedliche Hartmetallsorten für höhere Standzeiten

Technical Advantages:

- High cutting speed and feed rate
- High chip volume and productivity
- Economic indexable inserts with 4 cutting edges
- Availability for a wide range of materials
- Optimum chip removal channel for easy chip transport
- Surface quality and bore precision
- Different grades for soft and hard materials
- High tool durability
- High process security
- Up to 5xD drilling depth possible
- Different carbide grades for longer tool life

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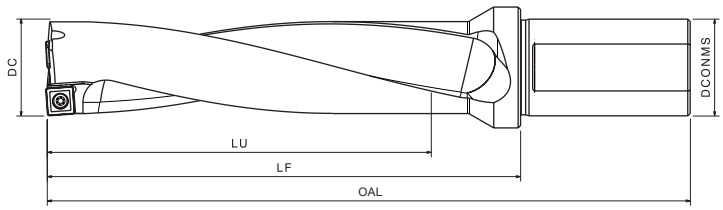
Bohrtiefe 2xD Drilling depth 2xD



Ausführung Execution	Artikelbezeichnung Item code	Abmessungen [mm] Dimensions in [mm] DC	DCONMS	LU	LF	OAL	Bestell-Nr. Ordering No.	Verfügbarkeit Availability	Geeignete Wendeschneidplatte Suitable insert	Ersatzteile Spare parts
2xD	**BID 2130-20T2-05**	13,0	20	26	48	98	5216855	◑	SPGX 050204	**A02-20040** 5217880 **T-06** 5118122
	BID 2135-20T2-05	13,5	20	26	48	98	5217356	◑		
	BID 2140-20T2-05	14,0	20	28	50	100	5217357	◑		
	BID 2145-20T2-05	14,5	20	28	50	100	5217358	◑		
	BID 2150-20T2-05	15,0	20	30	52	105	5217360	◑		
	BID 2155-20T2-05	15,5	20	30	52	102	5217361	◑		
	BID 2160-25T2-06	16,0	25	32	54	110	5217362	◑	SPGX 060204	**A02-22046** 5217882 **T-07** 5121167
	BID 2165-25T2-06	16,5	25	32	54	110	5217363	◑		
	BID 2170-25T2-06	17,0	25	34	56	112	5217364	◑		
	BID 2175-25T2-06	17,5	25	34	56	112	5217365	◑		
	BID 2180-25T2-06	18,0	25	36	58	114	5217366	◑		
	BID 2185-25T2-06	18,5	25	36	58	114	5217368	◑		
	BID 2190-25T2-06	19,0	25	38	60	116	5217369	◑		
	BID 2195-25T2-06	19,5	25	38	60	116	5217370	◑		
	BID 2200-25T2-06	20,0	25	40	62	118	5217374	◑		
	BID 2205-25T2-06	20,5	25	40	62	118	5217376	◑		
	BID 2210-25T2-06	21,0	25	42	64	120	5217379	◑		
	BID 2220-25T2-07	22,0	25	44	66	122	5217380	◑	SPGX 07T308	**A17-25060** 5217883 **T-08** 5217892
	BID 2230-25T2-07	23,0	25	46	68	124	5217381	◑		
	BID 2235-25T2-07	23,5	25	47	68	124	5217382	◑		
	BID 2240-25T2-07	24,0	25	48	70	126	5217384	◑		
	BID 2245-25T2-07	24,5	25	49	70	126	5217386	◑		
	BID 2250-25T2-07	25,0	25	50	72	128	5217387	◑		
	BID 2260-25T2-07	26,0	25	52	74	130	5217388	◑		
	BID 2265-25T2-07	26,5	25	53	74	130	5217389	◑		
	BID 2270-25T2-07	27,0	25	54	76	132	5217390	◑		
	BID 2280-25T2-09	28,0	25	56	78	134	5217418	◑	SPGX 090408	**A02-35090** 5217884 **T-15** 5217893
	BID 2285-25T2-09	28,5	25	57	79	135	5217419	◑		
	BID 2290-25T2-09	29,0	25	58	80	136	5217420	◑		
	BID 2300-32T2-09	30,0	32	60	87	147	5217423	◑		
	BID 2310-32T2-09	31,0	32	62	89	149	5217425	◑		
	BID 2320-32T2-09	32,0	32	64	91	151	5217428	◑		
	BID 2330-32T2-09	33,0	32	66	93	153	5217431	◑		
	BID 2340-32T2-11	34,0	32	68	95	155	5217432	◑	SPGX 110408	**A17-40110** 5217890 **T-15** 5217893
	BID 2350-32T2-11	35,0	32	70	97	157	5217436	◑		
	BID 2360-32T2-11	36,0	32	72	99	159	5217437	◑		
	BID 2370-32T2-11	37,0	32	74	101	161	5217439	◑		
	BID 2380-32T2-11	38,0	32	76	103	163	5217440	◑		
	BID 2390-32T2-11	39,0	32	78	105	165	5217441	◑		
	BID 2395-32T2-11	39,5	32	79	105	165	5217442	◑		
	BID 2400-32T2-11	40,0	32	80	107	167	5217443	◑		

◑ Kurzfristig lieferbar Shortly available

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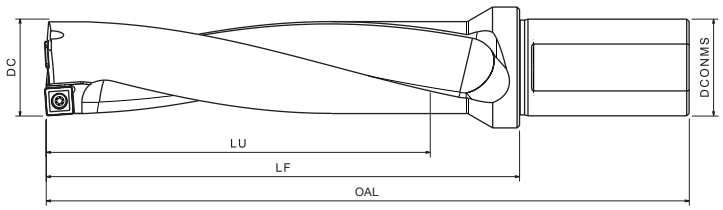
Bohrtiefe 3xD Drilling depth 3xD



Ausführung Execution	Artikelbezeichnung Item code	Abmessungen [mm] Dimensions in [mm]					Bestell-Nr. Ordering No.	Verfügbarkeit Availability	Geeignete Wendeschneidplatte Suitable insert	Ersatzteile Spare parts
		DC	DCONMS	LU	LF	OAL				
3xD	**BID 3130-20T2-05**	13,0	20	39	61	111	5217444	◑	SPGX 050204	**A02-20040** 5217880 **T-06** 5118122
	BID 3135-20T2-05	13,5	20	39	61	111	5217445	◑		
	BID 3140-20T2-05	14,0	20	42	64	114	5217464	◑		
	BID 3145-20T2-05	14,5	20	42	64	114	5217465	◑		
	BID 3150-20T2-05	15,0	20	45	67	117	5217466	◑		
	BID 3155-20T2-05	15,5	20	45	67	117	5217467	◑		
	BID 3160-25T2-06	16,0	25	48	70	126	5217468	◑	SPGX 060204	**A02-22046** 5217882 **T-07** 5121167
	BID 3165-25T2-06	16,5	25	50	70	126	5217469	◑		
	BID 3170-25T2-06	17,0	25	51	73	129	5217470	◑		
	BID 3175-25T2-06	17,5	25	51	73	129	5217471	◑		
	BID 3180-25T2-06	18,0	25	54	76	132	5217473	◑		
	BID 3185-25T2-06	18,5	25	54	76	132	5217474	◑		
	BID 3190-25T2-06	19,0	25	57	79	135	5217475	◑		
	BID 3195-25T2-06	19,5	25	57	79	135	5217476	◑		
	BID 3200-25T2-06	20,0	25	60	82	138	5217477	◑		
	BID 3205-25T2-06	20,5	25	60	82	138	5217478	◑		
	BID 3210-25T2-06	21,0	25	63	85	141	5217479	◑		
	BID 3220-25T2-07	22,0	25	66	88	144	5217480	◑	SPGX 07T308	**A17-25060** 5217883 **T-08** 5217892
	BID 3225-25T2-07	22,5	25	66	88	144	5217483	◑		
	BID 3230-25T2-07	23,0	25	69	91	147	5217485	◑		
	BID 3235-25T2-07	23,5	25	71	91	147	5217486	◑		
	BID 3240-25T2-07	24,0	25	72	94	150	5217487	◑		
	BID 3245-25T2-07	24,5	25	72	94	150	5217488	◑		
	BID 3250-25T2-07	25,0	25	75	97	153	5217489	◑		
	BID 3260-25T2-07	26,0	25	78	100	156	5217490	◑		
	BID 3265-25T2-07	26,5	25	78	100	156	5217491	◑		
	BID 3270-25T2-07	27,0	25	81	103	159	5217492	◑		
	BID 3280-25T2-09	28,0	25	84	106	162	5217493	◑	SPGX 090408	**A02-35090** 5217884 **T-15** 5217893
	BID 3290-25T2-09	29,0	25	87	109	165	5217496	◑		
	BID 3295-25T2-09	29,5	25	87	109	169	5217497	◑		
	BID 3300-32T2-09	30,0	32	90	117	177	5217498	◑		
	BID 3310-32T2-09	31,0	32	93	120	180	5217499	◑		
	BID 3320-32T2-09	32,0	32	96	123	183	5217501	◑		
	BID 3330-32T2-09	33,0	32	99	126	186	5217503	◑		
	BID 3340-32T2-11	34,0	32	102	129	189	5217508	◑	SPGX 110408	**A17-40110** 5217890 **T-15** 5217893
	BID 3350-32T2-11	35,0	32	105	132	192	5217511	◑		
	BID 3360-32T2-11	36,0	32	108	135	195	5217512	◑		
	BID 3370-32T2-11	37,0	32	111	138	198	5217517	◑		
	BID 3380-32T2-11	38,0	32	114	141	201	5217519	◑		
	BID 3390-32T2-11	39,0	32	117	144	204	5217520	◑		
	BID 3395-32T2-11	39,5	32	117	144	204	5217521	◑		
	BID 3400-32T2-11	40,0	32	120	147	207	5217523	◑		

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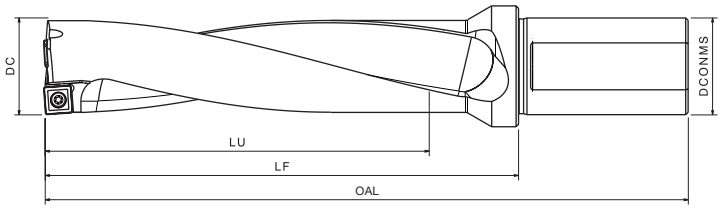
Bohrtiefe 4xD Drilling depth 4xD



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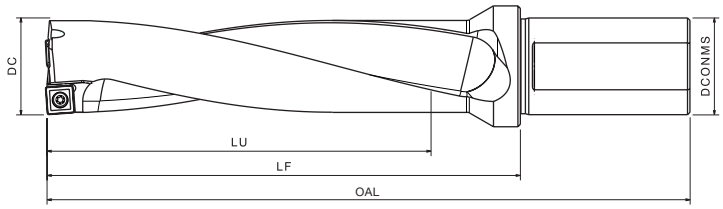
4xD	**BID 4130-20T2-05**	13,0	20	52	74	124	5217532	◑	SPGX 050204	**A02-20040** 5217880 **T-06** 5118122
	BID 4135-20T2-05	13,5	20	52	74	124	5217539	◑		
	BID 4140-20T2-05	14,0	20	56	78	128	5217540	◑		
	BID 4145-20T2-05	14,5	20	56	78	128	5217543	◑		
	BID 4150-20T2-05	15,0	20	60	82	132	5217545	◑		
	BID 4155-20T2-05	15,5	20	60	82	132	5217546	◑		
	BID 4160-25T2-06	16,0	25	64	86	142	5217547	◑	SPGX 060204	**A02-22046** 5217882 **T-07** 5121167
	BID 4165-25T2-06	16,5	25	64	86	142	5217552	◑		
	BID 4170-25T2-06	17,0	25	68	89	145	5217553	◑		
	BID 4175-25T2-06	17,5	25	68	89	145	5217554	◑		
	BID 4180-25T2-06	18,0	25	72	94	150	5217555	◑		
	BID 4185-25T2-06	18,5	25	72	94	150	5217556	◑		
	BID 4190-25T2-06	19,0	25	76	98	154	5217557	◑		
	BID 4195-25T2-06	19,5	25	76	98	154	5217558	◑		
	BID 4200-25T2-06	20,0	25	80	102	158	5217559	◑		
	BID 4205-25T2-06	20,5	25	80	102	158	5217560	◑		
	BID 4210-25T2-06	21,0	25	84	106	162	5217561	◑		
	BID 4220-25T2-07	22,0	25	88	110	166	5217562	◑	SPGX 07T308	**A17-25060** 5217883 **T-08** 5217892
	BID 4225-25T2-07	22,5	25	88	110	166	5217563	◑		
	BID 4230-25T2-07	23,0	25	92	114	170	5217579	◑		
	BID 4235-25T2-07	23,5	25	92	114	170	5217580	◑		
	BID 4240-25T2-07	24,0	25	96	118	174	5217581	◑		
	BID 4245-25T2-07	24,5	25	96	118	174	5217582	◑		
	BID 4250-25T2-07	25,0	25	100	122	178	5217583	◑		
	BID 4260-25T2-07	26,0	25	104	126	182	5217584	◑		
	BID 4265-25T2-07	26,5	25	104	126	182	5217587	◑		
	BID 4270-25T2-07	27,0	25	108	130	186	5217588	◑		
	BID 4280-25T2-09	28,0	25	112	134	190	5217589	◑	SPGX 090408	**A02-35090** 5217884 **T-15** 5217893
	BID 4290-25T2-09	29,0	25	116	138	194	5217591	◑		
	BID 4295-25T2-09	29,5	25	116	138	194	5217592	◑		
	BID 4300-32T2-09	30,0	32	120	147	207	5217597	◑		
	BID 4310-32T2-09	31,0	32	124	151	211	5217599	◑		
	BID 4320-32T2-09	32,0	32	128	155	215	5217600	◑		
	BID 4330-32T2-09	33,0	32	132	159	219	5217601	◑		
	BID 4340-32T2-11	34,0	32	136	163	223	5217602	◑	SPGX 110408	**A17-40110** 5217890 **T-15** 5217893
	BID 4350-32T2-11	35,0	32	140	167	227	5217603	◑		
	BID 4360-32T2-11	36,0	32	144	171	231	5217604	◑		
	BID 4370-32T2-11	37,0	32	148	175	235	5217606	◑		
	BID 4380-32T2-11	38,0	32	152	179	239	5217607	◑		
	BID 4390-32T2-11	39,0	32	156	183	243	5217609	◑		
	BID 4395-32T2-11	39,5	32	156	183	243	5217610	◑		
	BID 4400-32T2-11	40,0	32	160	187	247	5217611	◑		

◑ Kurzfristig lieferbar Shortly available

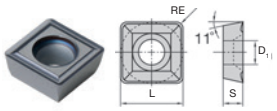
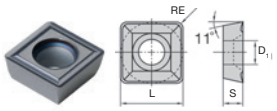
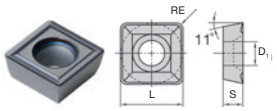
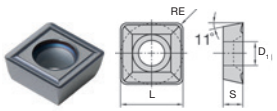
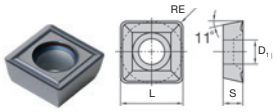
Drilltec

Bohrtiefe 5xD Drilling depth 5xD



Ausführung Execution	Artikelbezeichnung Item code	Abmessungen [mm] Dimensions in [mm] DC	DCONMS	LU	LF	OAL	Bestell-Nr. Ordering No.	Verfügbarkeit Availability	Geeignete Wendeschneidplatte Suitable insert	Ersatzteile Spare parts
5xD	**BID 5140-20T2-05**	14,0	20	70	92	142	5217614	◑	SPGX 050204	**A02-20040** 5217880 **T-06** 5118122
	BID 5145-20T2-05	14,5	20	70	92	142	5217616	◑		
	BID 5150-20T2-05	15,0	20	75	97	147	5217618	◑		
	BID 5155-20T2-05	15,5	20	75	97	147	5217619	◑		
	BID 5160-25T2-06	16,0	25	80	102	158	5217623	◑	SPGX 060204	**A02-22046** 5217882 **T-07** 5121167
	BID 5165-25T2-06	16,5	25	80	102	158	5217624	◑		
	BID 5170-25T2-06	17,0	25	85	107	163	5217625	◑		
	BID 5175-25T2-06	17,5	25	85	107	163	5217626	◑		
	BID 5180-25T2-06	18,0	25	90	112	168	5217627	◑		
	BID 5185-25T2-06	18,5	25	90	112	168	5217628	◑		
	BID 5190-25T2-06	19,0	25	95	117	173	5217629	◑		
	BID 5195-25T2-06	19,5	25	95	117	173	5217632	◑		
	BID 5200-25T2-06	20,0	25	100	122	178	5217633	◑		
	BID 5205-25T2-06	20,5	25	100	122	178	5217634	◑		
	BID 5210-25T2-06	21,0	25	105	127	183	5217635	◑		
	BID 5220-32T2-07	22,0	32	110	137	197	5217636	◑	SPGX 07T308	**A17-25060** 5217883 **T-08** 5217892
	BID 5225-32T2-07	22,5	32	110	137	197	5217641	◑		
	BID 5230-32T2-07	23,0	32	115	142	202	5217652	◑		
	BID 5235-32T2-07	23,5	32	115	142	202	5217653	◑		
	BID 5240-32T2-07	24,0	32	120	147	207	5217654	◑		
	BID 5245-32T2-07	24,5	32	120	147	207	5217655	◑		
	BID 5250-32T2-07	25,0	32	125	152	212	5217656	◑		
	BID 5260-32T2-07	26,0	32	130	157	217	5217658	◑		
	BID 5265-32T2-07	26,5	32	130	157	217	5217660	◑		
	BID 5270-32T2-07	27,0	32	135	162	222	5217662	◑		
	BID 5280-32T2-09	28,0	32	140	167	227	5217691	◑	SPGX 090408	**A02-35090** 5217884 **T-15** 5217893
	BID 5290-32T2-09	29,0	32	145	172	232	5217695	◑		
	BID 5295-32T2-09	29,5	32	145	172	232	5217696	◑		
	BID 5300-32T2-09	30,0	32	150	177	237	5217697	◑		
	BID 5310-32T2-09	31,0	32	155	182	242	5217698	◑		
	BID 5320-32T2-09	32,0	32	160	187	247	5217699	◑		
	BID 5330-32T2-09	33,0	32	165	192	252	5217700	◑		
	BID 5340-32T2-11	34,0	32	170	197	257	5217701	◑	SPGX 110408	**A17-40110** 5217890 **T-15** 5217893
	BID 5350-32T2-11	35,0	32	175	202	262	5217702	◑		
	BID 5360-32T2-11	36,0	32	180	207	267	5217704	◑		
	BID 5370-32T2-11	37,0	32	185	212	272	5217705	◑		
	BID 5380-32T2-11	38,0	32	190	217	277	5217706	◑		
	BID 5390-32T2-11	39,0	32	195	222	282	5217707	◑		
	BID 5395-32T2-11	39,5	32	195	222	282	5217708	◑		
	BID 5400-32T2-11	40,0	32	200	227	287	5217709	◑		

◑ Kurzfristig lieferbar Shortly available

	Aritkelbezeichnung Item code	Sorte Grade	Bestell-Nr. Ordering No.	Verfügbarkeit Availability	Abmessungen [mm] Dimensions [mm]			
					L	S	D_1	RE
 Ø 13-15,5 mm	**SPGX 050204-C**	BCP35D	5217712	●	5,00	2,38	3,00	0,4
	SPGX 050204-P	BCP30D	5217714	●	5,00	2,38	3,00	0,4
	SPGX 050204-P	BCK10D	5217715	●	5,00	2,38	3,00	0,4
 Ø 16-21 mm	**SPGX 060204-C**	BCP35D	5217718	●	6,00	2,38	3,60	0,4
	SPGX 060204-P	BCP30D	5217719	●	6,00	2,38	3,60	0,4
	SPGX 060204-P	BCK10D	5217723	●	6,00	2,38	3,60	0,4
 Ø 22-27 mm	**SPGX 07T308-C**	BCP35D	5217725	●	7,94	3,97	4,10	0,8
	SPGX 07T308-P	BCP30D	5217726	●	7,94	3,97	4,10	0,8
	SPGX 07T308-P	BCK10D	5217728	●	7,94	3,97	4,10	0,8
 Ø 28-33 mm	**SPGX 090408-C**	BCP35D	5217729	●	9,80	4,76	5,85	0,8
	SPGX 090408-P	BCP30D	5217730	●	9,80	4,76	5,85	0,8
	SPGX 090408-P	BCK10D	5217756	●	9,80	4,76	5,85	0,8
 Ø 34-40 mm	**SPGX 110408-C**	BCP35D	5217759	●	11,50	4,76	6,30	0,8
	SPGX 110408-P	BCP30D	5217760	●	11,50	4,76	6,30	0,8
	SPGX 110408-P	BCK10D	5217761	●	11,50	4,76	6,30	0,8

● Verfügbar ab Lager Available from stock

BCP35D

Hochverschleißfeste Feinkornsorte mit einer PVD-AlTiN - Beschichtung für die Bearbeitung von Stahl, niedrig- und hochlegierte rostfreie Stähle und Gusseisen. Durch den Nanolagenaufbau eignet sich diese Sorte ideal für anspruchsvolle Materialien und erhöht gleichzeitig die Prozesssicherheit, sowie Produktivität unter schwierigen Arbeitsbedingungen. Die Schichtstruktur in Kombination mit dem Kobaltanteil gewährleistet eine optimale Balance zwischen Eigenspannung, Härte und Bruchzähigkeit und verhindert dadurch die Ausbreitung von Rissen bei mittleren bis hohen Schnittgeschwindigkeiten.

Highly wear-resistant PVD-AlTiN coating for machining steel, low and high-alloy stainless steels and cast iron. The nanolayer structure makes this grade ideal for demanding materials and at the same time increases process reliability and productivity under difficult working conditions. The layer structure in combination with the cobalt content ensures an optimum balance between residual stress, hardness and fracture toughness, thereby preventing the propagation of cracks at medium to high cutting speeds.

BCP30D

Hochverschleißfeste Feinkornsorte mit einer PVD-AlTiN – Beschichtung für die Bearbeitung von Stahl, niedrig- und hochlegierte rostfreie Stähle und Gusseisen. Diese Sorte bietet optimale Abrasions- und Oxidationsbeständigkeit durch eine sehr glatte Schichtoberflache. Perfekt für Minimalmengenschmierung bei höheren Schnittgeschwindigkeiten.

Highly wear-resistant PVD-AlTiN coating for machining steel, low and high-alloy stainless steels and cast iron. This grade offers optimum abrasion and oxidation resistance thanks to a very smooth coating surface. Perfect for minimum quantity lubrication at higher cutting speeds.

BCK10D

Hochverschleißfeste PVD-AlTiN – beschichtete Sorte mit hoher Schneidkantenstabilität für die Bearbeitung von Gusseisenmaterialien. Zusätzlich bietet die Sorte hervorragende Eigenschaften bei der Feinbearbeitung von legierten und unlegierten Werkzeugstahlen, hochfesten Werkstoffen und Nichteisenmetallen bei hohen Schnittgeschwindigkeiten.

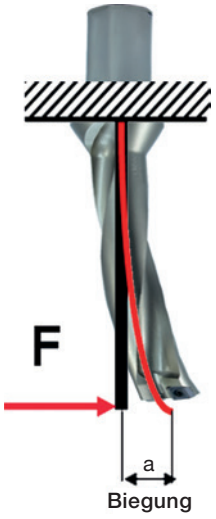
Highly wear-resistant PVD-AlTiN-coated grade with high cutting edge stability for machining cast iron materials. The grade also offers outstanding properties for fine machining of alloyed and unalloyed tool steels, high-strength materials and non-ferrous metals at high cutting speeds.

Maßnahmen bei Bohrproblemen
Options against drilling problems

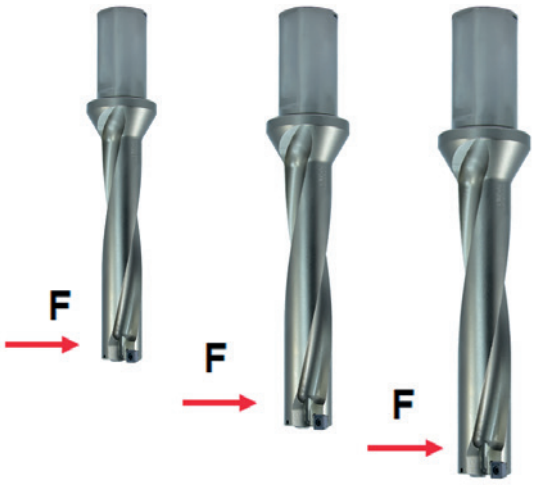
Abhilfe / Option	Problem: Bohrerspitze zerstört / Destroyed drill tip	Verschleiß am Außendurchmesser / Wear on the outer diameter	Bohrerübermaß/-untermaß / Drill oversize/undersize	Spanstau in den Spankanälen / Chip congestion in the chip channels	Vibrationen / Vibrations	Kleine Schneidkantenausbrüche / Small cutting edge breakouts	Unsymmetrische Bohrung / Asymmetrical bore hole	Geringe Standzeit / Low tool life
Bohrerausrichtung / Drill alignment	↔	↔	↔			↔		
Kühlmittelzufuhr / Coolant supply				↑				↑
Filter / Filter				↔				↔
Kühlkanal / Cooling channel				↔				↔
Vorschub / Feed rate			↓	↓	↓		↓	
Einspannung / Clamping	↔	↔		↔	↔		↔	↔
Auskraglänge / Overhang length	↓	↓		↓	↓		↓	↓
Schnittgeschwindigkeit/ Vorschubrichtlinien / Cutting speed/feed guidelines	↔	↔	↔	↔	↔		↔	↔
Hartmetallsorte / Carbide grade	↔	↔	↔			↔		↔
Schnittgeschwindigkeit / Cutting speed				↑		↑		

↑ erhöhen, vergrößern / increase
↓ vermindern, verkleinern / reduce
↔ optimieren, kontrollieren / optimize

Gleichgewicht
Balance



Länge / Length	Biegung / Bending
2xD	1a
3xD	4a
4xD	8a
5xD	16a



- Bei instabilen Verhältnissen sind bei langen Bohrertypen größere Lochtoleranzen zu erwarten.
- In unstable conditions, larger hole tolerances are to be expected with long drill types.

Härte Vergleichstabelle
Hardness comparison chart

Zugfestigkeit Rm Tensible strength Rm [N/mm²]	Vickers-härte Vickers hardness [HV]	Brinell-härte Brinell hardness HB	Rockwell-härte Rockwell hardness HRC
255	80	76	
270	85	80,7	
285	90	85,5	
305	95	90,2	
320	100	95	
335	105	99,8	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	156	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	20,3
785	245	233	21,3
800	250	238	22,2
820	255	242	23,1
835	260	247	24
850	265	252	24,8
865	270	257	25,6
880	275	261	26,4
900	280	266	27,1
915	285	271	27,8
930	290	276	28,5
950	295	280	29,2
965	300	285	29,8
995	310	295	31
1030	320	304	32,2
1060	330	314	33,3
1095	340	323	34,4

Zugfestigkeit Rm Tensible strength Rm [N/mm²]	Vickers-härte Vickers hardness [HV]	Brinell-härte Brinell hardness HB	Rockwell-härte Rockwell hardness HRC
1125	350	333	35,5
1155	360	342	36,6
1190	370	352	37,7
1220	380	361	38,8
1155	390	371	39,8
1290	400	380	40,8
1320	410	390	41,8
1350	420	399	42,7
1385	430	409	43,6
1420	440	418	44,5
1455	450	428	45,3
1485	460	437	46,1
1520	470	447	46,9
1555	480	(456)	47,7
1595	490	(466)	48,4
1630	500	(475)	49,1
1665	510	(485)	49,8
1700	520	(494)	50,5
1740	530	(504)	51,1
1775	540	(513)	51,7
1810	550	(523)	52,3
1845	560	(532)	53,0
1880	570	(542)	53,6
1920	580	(551)	54,1
1955	590	(561)	54,7
1995	600	(570)	55,2
2030	610	(580)	55,7
2070	620	(589)	56,3
2105	630	(599)	56,8
2145	640	(608)	57,3
2180	650	(618)	57,8
	660		58,3
	670		58,8
	680		59,2
	690		59,7
	700		60,1
	720		61
	740		61,8
	760		62,5
	780		63,3
	800		64
	820		64,7
	840		65,3
	860		65,9
	880		66,4
	900		67
	920		67,5
	940		68

Zugfestigkeit Tensible strength	N/mm²	Rm
Vickershärte Vickers hardness	Diamantpyramide 136 , Prüfkraft F ≥ 98 N Diamond pyramid 136 , Test force F ≥ 98 N	HV
Brinellhärte Brinell hardness	0,102 x F/D2 = 30 N/mm²	HB
Kalkuliert mit: Calculated from: HB = 0,95 x HV	F = Prüfkräfte in N, D = Kegeldurchmesser in mm F = Test force in N, D= Cone diameter in mm	
Härte Rockwell C Hardness Rockwell C	Diamantkegel 120°, Gesamtprüfkraft 1471 ± 9 N Diamond cone 120°, Total test force 1471 ± 9 N	HRC

ISO 513	Gruppe Group	Bezeichnung Application	Schnittgeschwindigkeit vc [m/min] Cutting speed vc [m/min]	Vorschub fn [mm/U] Feed rate fn [mm/U]				
				Ø 13,0 - Ø 15,0	Ø 15,5 - Ø 21,5	Ø 22,0 - Ø 27,5	Ø 28,0 - Ø 33,0	Ø 34,0 - Ø 41,0
P - Stahl / P - steel	P.1	Magnetweicheisen Mild / magnetic steel	100 - 200	0,05-0,08	0,06-0,10	0,06-0,12	0,07-0,13	0,08-0,15
	P.2	Baustahl, Einsatzstahl Construction steel, case hardening steel	100 - 200					
	P.3	Kohlenstoffstahl / unlegierter Gussstahl Carbon steel	100 - 200	0,08-0,15	0,08-0,15	0,10-0,18	0,12-0,22	0,12-0,24
	P.4	Legierter Stahl / Vergütungsstahl Alloyed steel / tempered steel	80 - 180					
	P.5	Legierter Stahl / Vergütungsstahl Alloyed steel / tempered steel	80 - 180	0,06-0,12	0,08-0,14	0,10-0,10	0,12-0,22	0,12-0,23
	P.6	Legierter Stahl mit erhöhter Festigkeit Alloyed steel / high strength steel	70 - 160					
	P.7	Rostfreier Stahl ferritisch, martensitisch Ferritic stainless steel, martensitic stainless steel, precipitation hardening	70 - 160	0,06-0,10	0,08-0,15	0,10-0,20	0,12-0,23	0,12-0,24
M - Rostfreier Stahl / M - stainless steel	M.1	Rostfreier Stahl austenitisch Austenitic stainless steel	60 - 100	0,06-0,12	0,08-0,15	0,08-0,15	0,09-0,16	0,10-0,17
	M.2	Rostfreier Stahl ferritisch + martensitisch (Duplex) Ferritic + austenitic (Duplex)	60 - 100					
K - Gusswerkstoffe / K - cast iron materials	K.1	Grauguss Grey cast iron	80 - 100	0,06-0,12	0,08-0,16	0,12-0,20	0,15-0,25	0,16-0,18
	K.2	Kugelgraphitguss, Temperguss Nodular cast iron, malleable cast iron, tempered cast iron	60 - 130					
	K.3	ADI (austenitisch-ferritisches Gusseisen mit Kugelgraphit) Austempered ductile iron (ADI)	50 - 100	0,06-0,10	0,08-0,15	0,10-0,18	0,12-0,20	0,15-0,23

ISO 513	BZG	Deutschland Germany **W-Nr.** Mat.-No.	Deutschland Germany **DIN**	Europa Europe **W.-Nr. EN**	Europa Europe **DIN EN**	Italien Italy **UNI**	
P - Stahl / P - steel Magnetweicheisen, Baustahl, Stahlguss, Einsatzsthl, Nitierstahl, Automatenstahl, Vergütungsstahl, Kugellagerstahl, Federstahl, Werkzeugstahl, Rostfreierstahl ferritisch/ martensitisch Magnetic steel, construction steel, steel castings, cementation steel, nirtiding steel, free cutting steel, heat treatable steel, bearing steel, spring steel, alloyed steel, stainless steel ferritic/ martensitic	**P1**	1.0037	St 37-2		S25GT	Fe360B	
		1.0044	St 44-2		S 235 JR	Fe430B	
		1.0050	St 50-2		E 295	Fe490	
		1.0060	St 60-2		E 335	Fe590	
		1.0301	C10		C10	C10	
		1.0401	C 15		C15	C15, C16, 1C15	
		1.0402	C 22		C22	C20, C21	
		1.0406	C25			C25	
		1.0420	GS-38				
		1.0501	C 35		C35	C35, 1C35	
		1.0503	C 45		C45	C45, 1C45	
		1.0511	C40			C40	
		1.0528	C30			C30	
		1.0535	C 55		C55	C55, 1C55	
		1.0540	C50			C50	
		1.0570	St 52-3		S 355 JR G3	Fe510B	
		1.0601	C 60		C60	C60, 1C60	
		1.0711	9S20		10S20	9S20	
		1.0715	9 SMn 28		11SMn30	9SMn28	
		1.0718	9 SMnPb 28		11SMnPb30	CF9SMnPb28	
		1.0722	10 SPb 20		10SPb20	CF10SPb20	
		1.0726	35 S 20		35S20	35S20	
		1.0736	9 SMn 36		11SMn37	9SMn36, CF9SMn36	
		1.0737	9 SMnPb 36		11SMnPb37	9SMnPb36, CF9SMnPb36	
		1.1013	RFe100				
		1.1014	RFe80				
		1.1015	RFe60				
		1.1141	Ck 15		C15E	C16	
		1.1157	40 Mn 4		40Mn4		
		1.1158	Ck 25		C25E		
		1.1167	36 Mn 5		36Mn5		
		1.1170	28 Mn 6		28Mn6	C28Mn	
		1.1183	Cf 35		C35G	C36, C38	
		1.1191	Ck 45		C45E	C45	
		1.1203	Ck 55		C55E	C50	
		1.1213	Cf 53		C53G	C53	
		1.1221	Ck 60		C60E	C60	
		1.1231	Ck67			C67	
		1.1248	Ck75			C75	
		1.1249	Cf70				
		1.1274	Ck 101		C101E, C100S	C100	
		1.1545	C 105 W 1		C105U	C100KU	
		1.1663	C 125 W		C125W, C125U		
		1.2067	100 Cr 6		99Cr6, 102Cr6		
	P2	1.0904	55 Si 7		56Si7		

	Spanien Spain	Frankreich France	USA U.S.A.	Herstellerbezeichnung Brand Name
	UNE	**AFNOR**	**AISI/SAE**	**AISI / SAE**
		E 24-2	1013	
		E 28-2	1021	
		A 50-2	A 570 (50)	
		A 60-2	A 572 (65)	
		C10	1010	
	F.111	C18RR, XC18	J 409 Grade 1015	
	1C22, F112	AF42C20, XC25, 1C22	1020	
		AF 50 C 30	1025	
			A 27	
	F.113	C35,1C35,AF55,C35	1035	
	F.114	1C45, AF 65 C 45	1045	
		AF 60 C 40	1040	
			1030	
	F.115	C54, 1C55, AF 70 C 55	1055	
			1050	
			1024	
	F.115	C60, 1C60, AF70C55	1060	
			1212	
	F.2111 - 11SMn28	S250	1213	
	F.2112 - 11SMnPb28	S250Pb	12L13, 12L14, J 403 Grade 12L14, J 1397 Grade 12L14	
	10SPb20	10PbF2		
	F.210G	35MF6	J 403 Grade 1141	
	F.2113 - 12 SMn 35	S300	J 403 Grade 1213, J 403 Grade 1215, J 1392 Grade 1213	
	F.2114 - 12 SMnPb 35	S300Pb	J 403 Grade 12L14, J 1397 Grade 12L14	
	F.1511 - C 16 k, F.1110 - C 15 k	XC12	1015	
		35M5	1035, 1041	
	F.1120 - C 25 k, C25K (F1120)	2C25	1025	
	F.1203 - 36 Mn5	40M5	1335	
	28Mn6	20M5	1027	
	0	XC38H1TS	1035	
	F1140-C45k, F1142-C48k	C45RR, XC42H1, XC45, 2C45, XC48, XC48H1	1045	
	F.1150 - C 55 k	XC55H1, 2C55, XC54	1055	
		XC48H1TS	1050, 1055	
	F.511, F.512	C60RR, XC60, 2C60	1060	
		XC 68	1070	
			1074	
		C100RR, C100, XC100, E 100	1095	
	F515, F516	C105E2U, Y1105	W110	
	F.5123 C120	Y2120	W112	
	F.5230 100 Cr6, F.1310 - 100 Cr6, F.131	100Cr6RR, 100C6, Y100C6	L3, 52100, L1	
	F.1440 - 56 Si 7	55S7	9255	

ISO 513	BZG	Deutschland Germany **W-Nr.** Mat.-No.	Deutschland Germany **DIN**	Europa Europe **W.-Nr. EN**	Europa Europe **DIN EN**	Italien Italy **UNI**	
P - Stahl / P - steel Magnetweicheisen, Baustahl, Stahlguss, Einsatzsthl, Nitierstahl, Automatenstahl, Vergütungsstahl, Kugellagerstahl, Federstahl, Werkzeugstahl, Rostfreierstahl ferritisch/ martensitisch Magnetic steel, construction steel, steel castings, cementation steel, nitriding steel, free cutting steel, heat treatable steel, bearing steel, spring steel, alloyed steel, stainless steel ferritic/ martensitic	P2	1.2080	X 210 Cr 12		X210Cr12	X205Cr12KU	
		1.2311	40CrMnMo7		40CrMnNiMo8-6		
		1.2312	40CrMnMoS8-6		40CrMnNiMoS8-6-4		
		1.2365	32CrMoV12-28			30CrMoV12-27 KU	
		1.2419	105 WCr 6		107WCr5, 105WCr6, 100WCr6	107WCr5KU	
		1.2542	45 WCrV 7		45WCrV8, 45WCrV7	45WCrV8KU	
		1.2714	56NiCrMoV7		55NiCrMoV7		
		1.2738	40CrMnNiMo8-6-4				
		1.2767	45NiCrMo16			40NiCrMoV16 KU	
		1.2833	100 V 1		100V1	102V2KU	
		1.3505	100 Cr 6		100Cr6	100Cr6	
		1.3536	100CrMo7-3				
		1.5415	15 Mo 3		16Mo3	16Mo3 (KG KW)	
		1.5423	16 Mo 5		16Mo5	16Mo5KG, 16Mo5KW	
		1.5622	14 Ni 6		14Ni6	14Ni6KG, 14Ni6KT	
		1.5662	X 8 Ni 9		X8Ni9	X10Ni9, X12Ni09	
		1.5680	12 Ni 19		X12Ni5, 12Ni19		
		1.5710	36 NiCr 6		36NiCr6		
		1.5732	14 NiCr 10		14NiCr10	16NiCr11	
		1.5752	14 NiCr 14		15NiCr13		
		1.5919	15CrNi6		15CrNi6	16CrNi4	
		1.6511	36 CrNiMo 4		36CrNiMo4	38NiCrMo7 (KB)	
		1.6523	21NiCrMo2, 20NiCrMo2-2		21NiCrMo2	20NiCrMo2	
		1.6546	40 NiCrMo 22		40NiCrMo2-2, 40NiCrMo2KD	40NiCrMo2 (KB)	
		1.6580	30CrNiMo8		30CrNiMo8	30CrNiMo8	
		1.6582	34 CrNiMo 6		34CrNiMo6	35NiCrMo6KB	
		1.6587	18CrNiMo7-6		17CrNiMo6, 18CrNiMo7-6	18NiCrMo7	
		1.6657	14 NiCrMo 134		14NiCrMo13-4	15NiCrMo13	
		1.6773	36NiCrMo16			36NiCrMo16	
		1.7005	45Cr2			45Cr2	
		1.7015	15 Cr 3		15Cr2KD		
		1.7033	34 Cr 4		34Cr4	34Cr4(KB)	
		1.7034	37Cr4			36CrMn4	
		1.7035	41 Cr 4		41Cr4	41Cr4, 41Cr4KB	
		1.7043	38Cr4			38Cr4	
		1.7045	42 Cr 4		42Cr4	41Cr4	
		1.7108	60SiCr7			60SiCr8	
		1.7131	16 MnCr 5		16MnCr5	16MnCr5	
		1.7147	20MnCr5			20MnCr5	
		1.7176	55 Cr 3		55Cr3	55Cr3	
		1.7218	25 CrMo 4		25CrMo4	25CrMo4 (KB)	
		1.7220	34 CrMo 4		34CrMo4	34CrMo4KB, 35CrMo4, 35CrMo4F	

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	UNE	**AFNOR**	**AISI/SAE**	**AISI / SAE**
	F.5212 X210 Cr12	X200Cr12, Z200C12	D3	
				M200
		32CDV12-28	H10	W320
	F.5233 105 WCr5, F.523	105WC13		
	F.5241 45 WCrSi 8, F.524, F524145WCrSi 8	45WCrV8, 45WCrV20	S1	
				W500
				M238
		Y35NCD16		
		C105E2UV1, Y1105V, 100V2	W210	
	F.5230 100 Cr6, F.1310-100 Cr 6, F.131	Y100C6, 100C6, 100Cr6	L3, 52100	
	F.2601-16 Mo 3	15D3, 15Mo3	ASTM A20, GR	
	F.2602-16Mo5		4520	
	F.2641-15Ni6	16N6, 15N6, 15Ni6	ASTM A350 LF5	
	F.2645-X8 Ni09	Z8N9, 9Ni490	ASTM A353	
		Z18N5, 5Ni390	2515, 2517	
		35NC6	3135	
	F.1540-15NiCr11	14NC11	3415	
		14NC11, 12NC15, 14NC12, 13NiCr14	3310, 3415, 9314	
		16 NC 6	4320	
	F.1280-35NiCrMo4	40NCD3, 36CrNiMo4, 35NCD5	9840	
	F1552-20NiCrMo2, F1534-20NiCrMo3	20NCD2, 22NCD2	J 1268 Grade 8620H, 8620	
	F1204-40NiCrMo2, F1205-40NiCrMo2DF	40NCD2	8740	
		30CrNiMo8, 30NCD8		
	F1272-40NiCrMo7, 34CrNiMo6	35NCD6, 34CrNiMo6, 34CrNiMo8	4340	
	F.1560-14 NiCrMo13, F.156	18NCD6	4320	
	F1560-14NiCrMo13, F.1569-14NiCrMo131	16NCD13		
		12C3, 15Cr2, 18C3	5132	
	F.8221-35 Cr 4, F.224	32C4, 34Cr4	5132	
		38 4	5135	
	38Cr4, 38Cr41, 42Cr4, F.1202-42Cr4	42C4, 41Cr4	5140	
	F1201, F1202, F1206, F.1202-42Cr4	42C4, 42C4TS	5140, 5140H	
		#NV	9262	
	F.1515-16 MnCr5, F.151	16MC5, 16MC4, 16MnCr5	J 1268 Grade 4118H, C5115	
		20 MC 5	5120	
	F.1431-55 Cr3, F.143	55Cr3, 55C3	5155	
	F8372-AM26CrMo4, F8330-AM25CrMo4, F1256-30CrMo4-1, F.222	25CD4, 25CrMo4	4130	
	F8331-AM34CrMo4, F8231-34CrMo4, F1250-35CrMo4, F1254-35CrMo4DF, F.125	35CD4, 34CrMo4, 35CD4 / 34CrMo5	4135, 4137, J 1268 Grade 4135H	

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P - Stahl / P - steel Magnetweicheisen, Baustahl, Stahlguss, Einsatzsthl, Nitierstahl, Automatenstahl, Vergütungsstahl, Kugellagerstahl, Federstahl, Werkzeugstahl, Rostfreierstahl ferritisch/ martensitisch Magnetic steel, construction steel, steel castings, cementation steel, nirtiding steel, free cutting steel, heat treatable steel, bearing steel, spring steel, alloyed steel, stainless steel ferritic/ martensitic	**P2**	1.7223	41 CrMo 4		41CrMo4	41CrMo4	
		1.7225	42 CrMo 4		42CrMo4	38CrMo4KB, 42CrMo4, G40CrMo4	
		1.7228	50CrMo4		50CrMo4	50CrMo4	
		1.7243	18CrMo4			18CrMo4	
		1.7262	15 CrMo 5		15CrMo5		
		1.7335	13 CrMo 4 4		13CrMo4-5	14CrMo3, 16CrMo3	
		1.7361	32 CrMo 12		32CrMo12	32CrMo12	
		1.7380	10 CrMo 9 10		10CrMo9-10	12CrMo9 (KW KG), G14CrMo9, 10	
		1.7715	14 MoV 6 3		14MoV6-3		
		1.8159	50 CrV 4, 51CrV4			50CrV4	
		1.8507	34CrAlMo5		34CrAlMo5-10	34CrAlMo7	
		1.8509	41 CrAlMo 7		41CrAlMo7	41CrAlMo7	
		1.8515	31CrMo12		31CrMo12	31CrMo12	
		1.8519	31CrMoV9		31CrMoV9	31CrMoV10	
		1.8523	39 CrMoV 13 9		39CrMoV13-9		
	P3	1.1269	Ck85			C85	
		1.2085	X33CrS16			35CrMo8 KU	
		1.2316	X36CrMo17			X37CrMoV5-1 KU	
		1.2343	X38CrMoV5-1			X37CrMoV5-1 KU	
		1.2344	X 40 CrMoV 5 1		X40CrMoV5-1	X40CrMoV511KU	
		1.2363	X 100 CrMoV 5 1		X100CrMoV5-1	X100CrMoV51KU	
		1.2379	X153CrMoV12				
		1.2436	X 210 CrW 12		X210CrW12-1, X210CrW12	X215CrW121KU	
		1.2567	X30WCrV5-3		X30WCrV5-3	X30WCrV5-3 KU	
		1.2581	X 30 WCrV 9 3		X30WCrV9-3	X30WCrV9-3 KU	
		1.2601	X 165 CrMoV 12		X165CrMoV12	X165CrMoW12KU	
		1.3243	S 6-5-2-5		HS6-5-2-5	HS6-5-2-5	
		1.3255	S 18-1-2-5		HS18-1-2-5	HS18-1-1-5	
		1.3343	S 6-5-2		HS6-5-2	HS6-5-2-5	
		1.3348	S 2-9-2		HS2-9-2	HS2-9-2	
		1.3355	S 18-0-1		HS18-0-1	HS18-0-1	
		1.3401	X 120 Mn 12		X120Mn12	G-X120Mn12	
		1.5021	48Si7			48Si7	
		1.5026	55Si7			55Si7	
		1.5027	60Si7			60Si7	
		1.7701	51CrMoV4			51CrMoV4	
	P4	1.4000	X 7 Cr 13		X6Cr13	X6Cr13	
		1.4001	X 7 Cr 14		X7Cr14	X6Cr13	
		1.4002	X6CrAl13		X6CrAl13	X6CrAl13	
		1.4005	X12CrS13			X12CrS13	
		1.4006	X 10 Cr 13, X 12 Cr 13		X12Cr13, X10Cr13	X12Cr13, X10Cr13	
		1.4016	X6Cr17		X6Cr17	X8Cr17	

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	UNE	**AFNOR**	**AISI/SAE**	**AISI / SAE**
	F8332-AM42CrMo4, F8232-42CrMo4, F1252-40CrMo4	42CD4TS	4140	
	F8332-AM42CrMo4, F8232-42CrMo4, F1252-40CrMo4	42CD4, 42CrMo4	4140	
		50CrMo4	4150	
	F.1551-12CrMo4	12CD4		
	F.2631-14CrMo45	15CD3.05, 15CD4.05	A387 Grade 12Cl2, ASTM A182	
	F.124.A	30CD12		
	TU.H	12CD9.10, 10CrMo9-10, 10CrMo9-11	A387 Grade 22, A387 Grade 22Cl2, ASTM A182	
	F.2621-13 MoCrV6			
	F.1430-51CrV4	50CV4, 51CrV4, 50CrV4	6150	
		30 CAD 6.12	A355CI-D	
	F.1740-41CrAlMo7	40CAD6.12	Nitralloy 135	
		30 CD 12	A/B	
		-		
		40CDV12		
		C90	1086	
				M314
				M303, M303HH
		Z38CDV5	H11	W300
	F.5318 X40 CrMoV5	X40CrMoV5, Z40CDV5	H13, P20	
	F.5227 X100 CrMoV5	X100CrMoV5, Z100CDV5	A2, D2	
			D2	K110
	F.5213 X210 CrW12, F.521	X210CrW12-1, Z210CW12-01, Z 210 CW 12	D6	
		Z32WCV5	H14	
	F.5323 X30 WCrV9	X30WCrV9, Z30WCV9	O1, H21	
	F.5211 X160 CrMoV12			
	F.5613 6-5-2-5	Z85WDKCV06- 05-05-04-02, Z90WDKCV06- 05-05-04-02	S7, M35	
	F.5530 18-1-1-5	Z80WKCV18- 05-04-01	T4	
	F.5603 6-5-2	Z85WDCV06- 05-04-02	M2	
	F.5607 2-9-2	Z100DCWV09- 04-02-02	M7	
	F.5520 18-0-1	Z80WCV18-04-01	T1	
	F.82551-AM-X 120 Mn 12	Z120M12, Z120Mn12		
		55S7, 56SC7	9255	
		60Si7	9260	
	F.3110-X6 Cr13	Z6013, Z6Cr13, Z8C12	403, 13/6	
	F.8401-AM-X12 Cr13	Z3014, Z8C13FF	403, 410S, 429	
		Z 8 CA 12	405	
		Z 11 CF 13	416	
	F.3401-X12 Cr13	Z12C13, Z12Cr13, Z10C13	410	N100
	F.3113-X8 Cr17	Z8C17, Z6Cr17	430	N200

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P - Stahl / P - steel Magnetweicheisen, Baustahl, Stahlguss, Einsatzsthl, Nitierstahl, Automatenstahl, Vergütungsstahl, Kugellagerstahl, Federstahl, Werkzeugstahl, Rostfreierstahl ferritisch/ martensitisch Magnetic steel, construction steel, steel castings, cementation steel, nirtiding steel, free cutting steel, heat treatable steel, bearing steel, spring steel, alloyed steel, stainless steel ferritic/ martensitic	**P4**	1.4021	X20Cr13			X20Cr13	
		1.4028	X30Cr13		X20Cr13	X30Cr13	
		1.4034	X 46 Cr 13		X46Cr13	X40Cr14	
		1.4057	X 20 CrNi 17 2		X19CrNi17-2, X17CrNi16-2	X16CrNi16	
		1.4104	X 12 CrMoS 17		X14CrMoS17	X10CrS17	
		1.4113	X 6 CrMo 17 1		X6CrMo17-1	X8CrMo17	
		1.4125	X105CrMo17		X105CrMo17	#NV	
		1.4313	X 4 CrNi 13 4		X3CrNiMo13-4	GX6CrNi13 04	
		1.4510	X3CrTi17				
		1.4512	X2CrTi12		X5CrTi12	X6CrTi12	
		1.4542	X5CrNiCuNb16-4				
		1.4545	X5CrNiCu15-5				
		1.4568	X7CrNiAl17-7				
		1.4718	X 45 CrSi 9 3		X45CrSi9-3-1	X45CrSi8	
		1.4724	X 10 CrAl 13, X 10 CrAlSi 13		X10CrAlSi13, X10CrAl13	X10CrAl12	
		1.4742	X 10 CrAl 18, X 10 CrAlSi 18		X10CrAl18, X10CrAlSi18	X8Cr17	
		1.4747	X 80 CrNiSi 20		X80CrNiSi20		
		1.4762	X 10 CrAl 24, X 10 CrAlSi 25		X10CrAl24, X10CrAlSi25	X16Cr26	
	P5	1.1118	GS-24Mn6				
		1.1120	GS-20Mn5				
		1.4027	G-X 20 Cr 14		GX20Cr14		
		1.5419	GS-22Mo4				
		1.5633	GS-24Ni8				
		1.5681	GS-10Ni19				
		1.6309	GS-20MnMoNi5-5				
		1.6571	GS-34CrNiMo6				
		1.6748	GS-40NiCrMo6-5-6				
		1.6750	GS-20NiCrMo3-7				
		1.6760	GS-22NiMoCr5-6				
		1.7231	G42CrMo4				
		1.7357	GS-17CrMo5-5				
		1.7379	GS-18CrMo9-10				

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	UNE	**AFNOR**	**AISI/SAE**	**AISI / SAE**
		Z 20 C 13	420	N320
		Z 20 C 13	420	
	F.3405-X46 Cr13	Z40C14, Z40Cr14, Z38C13M, Z44C14	420	T651
	F.3427-X15 CrNi16, F.313, F3427-X19CrNi172	Z15CN16.02	431	N350
	F3117-X10CrS17, F3413-X14CrMoS17	Z10CF17	430F, J 405 Grade 51435	N310
	F3116-X6CrMo171	Z8CD17.01	434	
		Z 100 CD 17	440C	N695
		Z5CN13.4, Z4CND13.4M, Z6CN13-4, Z8CD17-01	CA6. 13/4	
		Z 3 CT 12	409	
		Z 7 CNU 15-05	630	N700
				N701
	F.3220-X 4 ScrSi 09-03	Z45CS9	HNV3	H700
	F.13152-X 10 CrAl13	Z10C13, Z13C13	405	
	F.3153-X 10 CrAl 18	Z10CAS18, Z12CAS18	430	
	F.3222-X 80CrSiNi20-02	Z80CSN20.02	HNV6	
	F.3154-X 10 CrAl24	Z10CAS24, Z12CAS25	446	H100
		Z 20 C13M		,
			A757	
			A 217	

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M - Rostfreier Stahl / M - stainless steel	Austenitisch, ferritisch + austenitisch Austenitic stainless steel, ferritic + austenitic steel (duplex)	M1	1.4301	X 5 CrNi 18 10		X5CrNi18-10+F3:F21A3F3: F23F3:F24A3F3:F23F3: FF3:F24	X5CrNi18 10	
			1.4303	X4CrNi18-12			X8CrNi1812	
			1.4305	X 10 CrNiS 18 9		X8CrNiS18-9	X10CrNiS 18.09	
			1.4306	X 2 CrNi 19 11		X2CrNi19-11	"X3CrNi18 11, X2CrNi18 11, GX2CrNi19 10"	
			1.4308	G-X 6 CrNi 18 9		GX5CrNi19-10		
			1.4311	X 2 CrNiN 18 10		X2CrNiN18-10	X2CrNiN18 11	
			1.4319	X3CrNiN17-8			X10CrNi1809	
			1.4401	X 5 CrNiMo 17 12 2		X5CrNiMo17-12-2, X4CrNiMo17-12-2, X5CrNiMo18-10	X5CrNiMo17 12	
			1.4404	X2CrNiMo17-12-2		X3CrNiMo17-12-2	X2CrNiMo1712	
			1.4408	G-X 6 CrNiMo 18 10		GX5CrNiMo19-11-2		
			1.4429	X 2 CrNiMoN 17 13 3		X2CrNiMoN17-13-3	X2CrNiMoN17 13	
			1.4435	X 2 CrNiMo 18 14 3, X 2 CrNiMo 18 12		X2CrNiMo18-14-3	X2CrNiMo17 13	
			1.4438	X 2 CrNiMo 18 16 4		X2CrNiMo18-15-4	X2CrNiMo18 16	
			1.4460	X 4 CrNiMoN 27 5 2		X3CrNiMoN27-5-2	X 3 CrNiMo 27 5 2	
			1.4541	X 6 CrNiTi 18 10		X6CrNiTi18-10	X6CrNiTi18 11	
			1.4550	X 6 CrNiNb 18 10		X6CrNiNb18-10	X6CrNiNb18 11	
			1.4558	X 2 NiCrAlTi 32 20		X2NiCrAlTi32-20		
			1.4563	X 1 NiCrMoCu 31 27 4		X1NiCrMoCu31-27-4		
			1.4571	X 6 CrNiMoTi 17 12 2		X6CrNiMoTi17-12-2	X6CrNiMoTi1712	
			1.4565, 1.4581	G-X 5 CrNiMiNb 18 10				
			1.4583	X 10 CrNiMoNb 18 12		X10CrNiMoNb18-12	X6CrNiMoNb	
			1.4828	X 15 CrNiSi 20 12		X15CrNiSi20-12	X16CrNi23 14	
			1.4841	X15CrNiSi25-20			X22CrNiSi2520	
			1.4878	X 12 CrNiTi 18 9		X12CrNiTi18-9, X10CrNiTi18-10	X6CrNiTi1811	
			1.4864	X 12 NiCrSi 36 16		X12NiCrSi36-16, X12NiCrSi35-16		
			1.4958	X 5 NiCrAlTi31-20		X5NiCrAlTi31-20		
			1.4977			X 40 CoCrNi 20 20		
		M2	1.4362	X2CrNiN23-4 (Ally 2304)				
			1.4462	X2CrNiMoN22-5-3		X2CrNiMoN22-5-3	X2CrNiMoN22-5-3	
			1.4501	X2CrNiMoCuWN25-7-4			X2CrNiMoCu WN25-7-4	
			1.4871	X 53 CrMnNiN 21 9		X53CrMnNiN21-9	X53CrMnNiN21 9	
			1.4310	X 12 CrNi 17 7		X9CrNi18-8, X10CrNi18-8	X12CrNi17 07	

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	UNE	**AFNOR**	**AISI/SAE**	**AISI / SAE**
	F.3451-X5 CrNi18-10, F.314, F.3504-X6CrNi19 10, F3504-X5CrNi1810"	Z6CN18.09	304	A500
			305	
	F.3508-X10CrNiS18-09	Z10CNF18.09	303	A506
	F.3503-X 2CrNi19-10, F3503-X 2CrNi18-10	Z1CN18-12, Z2CN18-10, Z3CN19.10M, Z3CN18-10, Z3CN19-11, Z3CN19-11FF	304L	A600
		Z6CN18.10M	---	
	F3541-X2CrNiN1810	Z2CN18.10	304LN	
			302	
	F.3543-X5CrNiMo17-12, F.3543-X6 CrNiMo17- 12-03, F3543-X5CrNiMo17-122"	Z6CND17.11	316	A120
				A200
	F.8414-AM-X7 CrNiMo20 10			
	F3543- X2CrNiMoN17133	Z2CND17.13	316LN	
	F.3533-X2 CrNiMo 17-12-03, F.3534-X6 CrNiMo 17-12-03"	Z2CND17.13, Z3CND17-12-03, Z3CND18-14-03		A220
	F3539-X2CrNiMo18164	Z2CND19.15	317L	
	F3309-X8CrNiMo27-05, F3552-X8CrNiMo266	Z3CND25-07Az, Z5CND27-05Az	S32900	
	F.3553-X7 CrNiTi 18-11, F.3523-X 6 CrNiTi 18-11, 09 Ch 18N10T, F3523-X6CrNiTi1810	Z6CNT18.10	321	
	F.3552-X 7 CrNiNb 18-11, F.3524-X 67 CrNiNb 18-11, F3524-X6CrNiNb1810	Z6CNNb18.10	347	
			N08800 Incoloy 800	
			N08028 Alloy 28	
	F.3552-X 6 CrNiMoTi17-12-03, F3535- X6CrNiMoTi17122	Z6NDT17.12	316Ti	A300
		Z6CNDNb	318	
	F3312-X15CrNiSi20-12	Z15CNS20.12	309	
				H525
	F.3523-X 6CrNiTi 18 11	Z6CNT18.12B	321	
	F.3313-X12 CrNi 36-16	Z12NCS35.16	330	
		Z 42 CNKDWNb		
			S32304	Duplex
		Z 2 CND 22.05 Az	S31803	Duplex, A903
				Super Duplex
	F.3217-X53 CrMnNiN 21-09	Z52CMN21.09	EV8	
	F.3517-X12CrNi17 07	Z12CN17.07, Z12CN18.07, Z11CN17-08, Z11CN18-08, Z12CN18-09	301	

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K - Gusswerkstoffe / K - cast iron materials	Grauguss, Kugelgraphitguss GJS, Temperguss, Gusseisen mit Vermiculargrafit Grey cast iron, nodular cast iron, tempered cast iron, austempered ductile iron	**K1**	0.6010	GG-10, GG 10	EN-JL 1010	EN-GJL-100	G10	
			0.6015	GG-15, GG 15	EN-JL 1020	EN-GJL-150	G15	
			0.6020	GG-20, GG 20	EN-JL 1030	EN-GJL-200	G20	
			0.6025	GG-25, GG 25	EN-JL 1040	EN-GJL-250	G25	
			0.6030	GG-30, GG 30	EN-JL 1050	EN-GJL-300	G30	
			0.6035	GG-35, GG 35	EN-JL 1060	EN-GJL-350	G35	
			0.6040	GG-40, GG 40		EN-GJL-400		
			0.6660	GGL-NiCr 20 2				
				GG-26Cr, GG 26Cr		EN-GJL-260 Cr		
		K2		GGV 45		EN-GJV-450		
			0.7040	GGG-40	EN-JS 1040	EN-GJS-400-15	GS400-12	
			0.7050	GGG-50	EN-JS 1050	EN-GJS-500-7	GS500-7	
			0.7060	GGG-60	EN-JS 1060	EN-GJS-600-3, EN-GJS-600-3U	GS600-3	
			0.7070	GGG-70	EN-JS 1070	EN-GJS-700-2, EN-GJS-700-2U	GS700-2	
			0.7080	GGG-80	EN-JS 1080	EN-GJS-800-2		
			5.3400	ADI 800		EN-GJS-800-10		
			0.7090	GGG90	EN-JS1090			
			5.3403	ADI 1000		EN-GJS-1050-6		
			5.3404	ADI 1200		EN-GJS-1200-3		
			5.3405	ADI 1400		EN-GJS-1400-1		
		K3	0.8035	GTW-35, GTW-35-04	EN-GJMW-350-4	GTW-35-04, EN-GJMW-350-4		
			0.8040	GTW-40-05, GTW-40		EN-GJMW-400-5, GTW-40-05		
			0.8045	GTW-45-07, GTW-45		EN-GJMW-450-7		
			0.8135	GTS-35-10, GTS-35		EN-GJMB 350-10		
			0.8145	GTS-45-06, GTS-45		EN-GJMB 450-6, GTS-45-06		
			0.8155	GTS-55-04, GTS-55		EN-GJMB 550-4, GTS-55-04		
			0.8165	GTS 65-02, GTS-65		EN-GJMB 650-2, GTS-65-02		
			0.8170	GTS 70-02, GTS-70		EN-GJMB 700-2, GTS-70-02		
			---	GJV-300	---	---		
			---	GJV-400	---	---		
			---	GJV-500	---	---		

	Spanien Spain	Frankreich France	USA U.S.A.	Herstellerbezeichnung Brand Name
	UNE	**AFNOR**	**AISI/SAE**	AISI / SAE
	FG 10	Ft10D, FGL100	ASTM A-48-76	
	FG 15	Ft15D, FGL150	NO 20B	
	FG 20	Ft20D, FGL200	NO 30B	
	FG 25	Ft25D, FGL250	NO 35B	
	FG 30	Ft30D, FGL300	NO 40B	
	FG 35	Ft35D, FGL350	NO 55B	
		Ft40D, FGL400		
		L-NC 20 2		
		FGS 400-12	60/40/18	
		FGS 500-7	70/50/05	
		FGS 600-3	80/55/06	
		FGS 700-2	"100/70/03 120/90/02"	
		MB 35-7		
		MB 40-10		
		MB 45-7		
		MN 35-10	32510	
		MP 50-5	40010	
		MP 60-3	50005	
			60004	
		MP 70-2	70003	

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DEUTSCHLAND, STAMMSITZ
GERMANY, HEADQUARTERS
—
Hartmetall-Werkzeugfabrik
Paul Horn GmbH
Horn-Straße 1
72072 Tübingen

Tel +49 7071 / 7004-0
Fax +49 7071 / 72893

info@de.horn-group.com
horn-group.com

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