Cutting Tools Manufacturing

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8TH EDITION

Europa Tool Co.,Ltd

www.europatool.co.uk

8TH EDITION

- MILLING
- DRILLING
- THREADING

Our Aim Is Your Success

TOOL NO. STRUCTURE

101 1 23 0600

Outside Diameter

Eg) Metric Size

6.0mm	→	0600	30.5mm	→	3050
6.75mm	→	0675	40.75mm	→	4075
20.0mm	→	2000	50.0mm	→	5000

*** In case of End mills having different sizes of shank diameter with the same outside diameter, designate first digit number as "9" and then give numbers from 1 to 999 in ascending order.**

Eg) Metric Size

0.D 6mm	×	S.H 6mm	→	0600
0.D 6mm	×	S.H 8mm	→	9001
0.D 6mm	×	S.H 10mm	→	9002

Material / Coating

Material	UNCOATED	TIN	TiCN	TiAlN	ALCRN	STEAM TEMPER	NITRIDED	HARDSLICK
M2	01	04	06	26	—	—	—	—
M42	02	05	07	21	—	—	—	—
CARBIDE K30	03	08	09	23	42	—	—	—
ASP 30	10	11	12	—	—	—	—	—
ASP 60	13	14	15	22	40	—	—	—
M35 (HSS Co5)	16	17	18	27	—	30	31	53
PULSAR	19	—	—	20	—	—	—	—
DIAMOND COATED	—	—	—	25	—	—	—	—
PULSAR BLUE	—	—	—	—	50	—	—	—
HSSE-EX	60	34	—	—	—	—	—	—

NOT APPLICABLE TO SPADE INSERT.

SHANK TYPE

1	→	FLAT(WELDON) SHANK
2	→	SCREWED(THREAD) SHANK
3	→	STRAIGHT(PLAIN) SHANK

SERIES No.

100 ~ 299	→	ISO/DIN METRIC
300 ~ 399	→	BS STANDARD METRIC
400 ~ 499	→	ASIAN METRIC
500 ~ 599	→	BS INCH
700 ~ 799	→	ROTARY BURRS
600 ~ 699	→	ANSI INCH
800 ~ 899	→	DRILLS
900 ~ 999	→	SPECIAL TOOLS

EUROPA TOOL

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EUROPA TOOL COMPANY
THE DISTRIBUTORS TRUE
CUTTING TOOL PARTNER

Our Aim Is Your Success

MILLING.
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PULSAR BLUE

END MILLS

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DESIGNED
SPECIFICALLY FOR
USE IN DRY CUTTING
CONDITIONS

Europa Tool 8TH EDITION

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(Carbide high speed & dry cutting condition materials up to Hrc 70)

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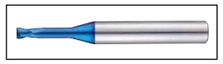	102350	2FLUTE CORNER RADIUS END MILLS for RIB PROCESSING	5
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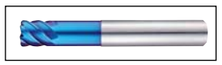	108350	6FLUTE 45°HELIX with CORNER RADIUS END MILLS	11
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2 FLUTE, MINIATURE

MG | 30° | BLUE | FLUTE 2 | R ±0,005

CAT No. 100350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	OAL
1003500030	-	0.3	6	0.45	50
1003500040	-	0.4	6	0.6	50
1003500050	0.05	0.5	6	0.7	50
1003500060	0.05	0.6	6	0.9	50
1003500080	0.05	0.8	6	1.2	50
1003500100	0.10	1	6	1.5	50
1003500120	0.10	1.2	6	1.8	50
1003500150	0.15	1.5	6	2.2	50
1003500200	0.15	2	6	2.2	50

MILL DIA TOLERANCE(mm)	CORNER R TOLERANCE	SHANK DIA TOLERANCE
0~-0.012	±0.010	h6

2 FLUTE, STUB CUT LENGTH, with CORNER RADIUS

MG | 30° | BLUE | FLUTE 2 | R ±0,005 | R ±0,015

Series No. 101350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	LENGTH BELOW SHANK	OAL	NECK DIA
1013500030	-	0.3	3	0.45	-	40	-
1013500040	-	0.4	3	0.6	-	40	-
1013500050	0.05	0.5	3	0.7	-	40	-
1013500060	0.05	0.6	3	0.9	-	40	-
1013500080	0.05	0.8	3	1.2	-	40	-
1013500100	0.10	1	3	1.5	-	40	-
1013500901	0.1	1	4	1.5	-	40	-
1013500150	0.10	1.5	3	2.2	-	40	-
1013500200	0.10	2	3	3	6	40	1.9
1013500902	0.1	2	4	3	6	40	1.9
1013500250	0.10	2.5	3	4	6	40	2.4
1013500300	0.10	3	6	4	7	45	2.9
1013500350	0.10	3.5	6	5	9	45	3.3
1013500400	0.10	4	6	5	9	45	3.8
1013500450	0.10	4.5	6	6	10	45	4.3
1013500500	0.20	5	6	6	11	50	4.8
1013500600	0.20	6	6	7	14	50	5.8
1013500800	0.20	8	8	9	18	60	7.8
1013501000	0.20	10	10	12	25	75	9.7
1013501200	0.30	12	12	15	30	75	11.7
1013501600	0.30	16	16	18	38	90	15.7
1013502000	0.30	20	20	24	45	100	19.7

MILL DIA TOLERANCE(mm)	CORNER R TOLERANCE	SHANK DIA TOLERANCE
0~-0.012(up to ø6) 0~-0.015(over ø6)	±0.010(up to ø6) ±0.015(over ø6)	h6

PULSAR BLUE DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

2FLUTE, CORNER RADIUS END MILLS for RIB PROCESSING

MG | 30° | BLUE | FLUTE 2 | R ±0.010

CAT No. 102350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS R	O.D	S.D	LOC	LENGTH BELOW SHANK	OAL	NECK DIA
1023500050	0.05	0.5	6	0.7	1.5	50	0.45
1023500901	0.05	0.5	6	0.7	3.3	50	0.45
1023500060	0.05	0.6	6	0.9	2.0	50	0.55
1023500902	0.05	0.6	6	0.9	4.0	50	0.55
1023500080	0.05	0.8	6	1.2	2.5	50	0.75
1023500903	0.05	0.8	6	1.2	5.5	50	0.42
1023500100	0.10	1	6	1.5	3.3	50	0.95
1023500904	0.10	1	6	1.5	6.7	50	0.95
1023500120	0.10	1.2	6	1.8	4.4	50	1.15
1023500905	0.10	1.2	6	1.8	8.0	50	1.15
1023500150	0.15	1.5	6	2.2	5.0	50	1.40
1023500906	0.15	1.5	6	2.2	9.7	50	1.40
1023500200	0.15	2	6	2.2	6.0	50	1.90
1023500907	0.15	2	6	2.2	13.0	50	1.90

MILL DIA TOLERANCE(mm)	CORNER R TOLERANCE	SHANK DIA TOLERANCE
0~-0.012	±0.010	h6

4FLUTE, STUB CUT LENGTH, with EXTENDED NECK

MG | 30° | BLUE | FLUTE 4 | R ±0.010 | R ±0.015

Series No. 103350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	LENGTH BELOW SHANK	OAL	NECK DIA
1033500100	0.10	1	3	1.5	-	40	-
1033500150	0.10	1.5	3	2.2	-	40	-
1033500200	0.10	2	3	3	6	40	1.9
1033500250	0.10	2.5	3	4	6	40	2.4
1033500300	0.10	3	6	4	7	45	2.9
1033500350	0.10	3.5	6	5	9	45	3.3
1033500400	0.10	4	6	5	9	45	3.8
1033500450	0.10	4.5	6	6	10	45	4.3
1033500500	0.20	5	6	6	11	50	4.8
1033500600	0.20	6	6	7	14	50	5.8
1033500800	0.20	8	8	9	18	60	7.8
1033501000	0.20	10	10	12	25	75	9.7
1033501200	0.30	12	12	15	30	75	11.7
1033501600	0.30	16	16	18	38	90	15.7
1033502000	0.30	20	20	24	45	100	19.7

MILL DIA TOLERANCE(mm)	CORNER R TOLERANCE	SHANK DIA TOLERANCE
0~-0.012(up to ⌀6) 0~-0.015(over ⌀6)	±0.010(up to ⌀6) ±0.015(over ⌀6)	h6

PULSAR BLUE DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

2FLUTE, MINIATURE, BALL NOSE

MG | 30° | BLUE | FLUTE 2 | R ±0.005

CAT No. 104350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	OAL
1043500040	0.20	0.4	6	0.4	50
1043500050	0.25	0.5	6	0.5	50
1043500060	0.30	0.6	6	0.6	50
1043500080	0.40	0.8	6	0.8	50
1043500100	0.50	1	6	1.0	50
1043500120	0.60	1.2	6	1.2	50
1043500150	0.75	1.5	6	1.5	50
1043500200	1.00	2	6	2.0	50

RADIUS TOLERANCE	SHANK DIA TOLERANCE
±0.005	h6

2 FLUTE, STUB CUT LENGTH BALL NOSE, with EXTENDED NECK

MG | 30° | BLUE | FLUTE 2 | R ±0.005 | R ±0.010

Series No. 105350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	LENGTH BELOW SHANK	OAL	NECK DIA
1053500100	0.50	1	4	1.0	2.2	50	0.95
1053500120	0.60	1.2	4	1.2	2.6	50	1.1
1053500150	0.75	1.5	4	1.5	3.0	50	1.4
1053500200	1.00	2	6	2	4.0	50	1.9
1053500300	1.50	3	6	3	6.0	60	2.9
1053500400	2.00	4	6	4	8.0	70	3.9
1053500500	2.50	5	6	5	10.0	80	4.9
1053500600	3.00	6	6	6	12.0	90	5.9
1053500700	3.50	7	8	7	14.0	90	6.9
1053500800	4.00	8	8	8	16.0	100	7.9
1053500900	4.50	9	10	9	18.0	100	8.9
1053501000	5.00	10	10	10	20.0	100	9.9
1053501200	6.00	12	12	12	24.0	110	11.9
1053501400	7.00	14	14	14	28.0	110	13.8
1053501600	8.00	16	16	16	32.0	140	15.8
1053501800	9.00	18	18	18	36.0	140	17.8
1053502000	10.00	20	20	20	40.0	160	19.8
1053502500	12.50	25	25	25	50.0	180	24.8

RADIUS TOLERANCE	SHANK DIA TOLERANCE
±0.005(up to R6) ±0.010(over R6)	h6

PULSAR BLUE DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

2FLUTE, BALL NOSE END MILLS for RIB PROCESSING

MG | 30° | BLUE | FLUTE 2 | R ±0.005

CAT No. 106350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	LENGTH BELOW SHANK	OAL	NECK DIA
1063500050	0.25	0.5	6	0.5	1.5	50	0.45
1063500901	0.25	0.5	6	0.5	3.3	50	0.45
1063500060	0.30	0.6	6	0.6	2.0	50	0.55
1063500902	0.30	0.6	6	0.6	4.0	50	0.55
1063500080	0.40	0.8	6	0.8	2.5	50	0.75
1063500903	0.40	0.8	6	0.8	5.5	50	0.75
1063500100	0.50	1	6	1	3.3	50	0.95
1063500904	0.50	1	6	1	6.7	50	0.95
1063500905	0.50	1	6	1	12.0	50	0.95
1063500120	0.60	1.2	6	1.2	4.4	50	1.15
1063500906	0.60	1.2	6	1.2	8.0	50	1.15
1063500150	0.75	1.5	6	1.5	5.0	50	1.40
1063500907	0.75	1.5	6	1.5	9.7	50	1.40
1063500908	0.75	1.5	6	1.5	15.0	50	1.40
1063500200	1.00	2	6	2	6.0	50	1.90
1063500909	1.00	2	6	2	13.0	50	1.90
1063500910	1.00	2	6	2	20.0	60	1.90

RADIUS TOLERANCE	SHANK DIA TOLERANCE
±0.005	h6

3FLUTE, BALL NOSE, LONG LENGTH

MG | 30° | BLUE | FLUTE 3 | R ±0.010

Series No. 107350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	OAL
1073500300	1.5	3	6	8	60
1073500400	2.0	4	6	8	70
1073500500	2.5	5	6	10	80
1073500600	3.0	6	6	12	90
1073500800	4.0	8	8	14	100
1073501000	5.0	10	10	18	100
1073501200	6.0	12	12	22	110
1073501600	8.0	16	16	30	140
1073502000	10.0	20	20	38	160

RADIUS TOLERANCE	SHANK DIA TOLERANCE
±0.005(up to R3) ±0.010(over R3)	h6

PULSAR BLUE DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

6FLUTE, 45° HELIX, with CORNER RADIUS

MG | 45° | BLUE | FLUTE 6 | ±0.010 | ±0.015

CAT No. 108350

NANO GRAIN
ALCRN COATING

EDP. No	CORNER RADIUS	O.D	S.D	LOC	LENGTH BELOW SHANK	OAL	NECK DIA
1083500600	0.5	6	6	6	14	50	5.7
1083500800	0.5	8	8	8	24	60	7.65
1083501000	1.0	10	10	10	30	70	9.65
1083501200	1.0	12	12	12	30	75	11.6

EDP. No	CORNER RADIUS	O.D	S.D	LOC	LENGTH BELOW SHANK	OAL	NECK DIA
1083500901	0.5	6	6	13	-	70	-
1083500910	0.5	6	6	26	-	70	-
1083500902	0.5	8	8	19	-	90	-
1083500911	0.5	8	8	36	-	90	-
1083500903	0.5	10	10	22	-	100	-
1083500904	1.0	10	10	22	-	100	-
1083500912	1.0	10	10	46	-	100	-
1083500905	0.5	12	12	26	-	110	-
1083500906	1.0	12	12	26	-	110	-
1083500913	1.0	12	12	56	-	110	-
1083501600	1.0	16	16	32	-	130	-
1083500907	1.5	16	16	32	-	130	-
1083500914	1.5	16	16	66	-	130	-
1083502000	1.0	20	20	38	-	140	-
1083500908	1.5	20	20	38	-	140	-
1083500909	2.0	20	20	38	-	140	-
1083500915	2.0	20	20	76	-	140	-

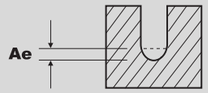
MILL DIA TOLERANCE(mm)	CORNER R TOLERANCE	SHANK DIA TOLERANCE
0~-0.02 (Extra Long Type: 0~-0.03)	±0.010(up to ⌀6) ±0.015(over ⌀6)	h6

PULSAL BLUE CUTTING CONTENTS

2 FLUTE BALL NOSE ENDMILL for RIB PROCESSING

106350

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS						COPPER		
HARDNESS	HRc 30 ~ HRc 45			HRc 45 ~ HRc 55			HRc 55 ~ HRc 65					
DIAMETER	RPM	FEED	Ae (mm)	RPM	FEED	Ae (mm)	RPM	FEED	Ae (mm)	RPM	FEED	Ae (mm)
R0.1	50000	300~350	0.006~0.016	50000	265~310	0.005~0.013	50000	225~265	0.005~0.012	50000	455~530	0.010~0.022
R0.15	48000~50000	480~520	0.010~0.017	48000~50000	440~460	0.008~0.014	46000~50000	390~420	0.007~0.013	48000~50000	690~790	0.002~0.023
R0.2	48000~50000	720~790	0.013~0.032	48000~50000	450~550	0.011~0.026	46000~50000	400~460	0.010~0.024	48000~50000	1000~1150	0.019~0.048
R0.25	34100~49500	600~870	0.007~0.028	31900~35200	490~540	0.005~0.023	31900~35200	440~480	0.005~0.021	49000~50000	1100~1400	0.010~0.042
R0.3	28600~40700	590~850	0.007~0.034	26400~29700	480~540	0.006~0.028	26400~29700	400~480	0.006~0.025	42000~50000	1100~1700	0.011~0.050
R0.4	22000~30800	640~890	0.016~0.064	19800~22000	490~550	0.013~0.052	19800~22000	440~500	0.012~0.048	31000~50000	1100~2250	0.024~0.096
R0.5	17600~24200	600~850	0.008~0.080	15400~17600	470~540	0.007~0.065	15400~17600	440~500	0.006~0.060	24000~49500	1100~2200	0.012~0.120
R0.6	14300~18700	590~780	0.024~0.032	12000~14000	480~540	0.020~0.026	12000~14000	420~480	0.018~0.024	28500~38500	1480~1950	0.036~0.048
R0.75	11000~14300	580~760	0.031~0.048	10000~11500	480~540	0.025~0.039	10000~11500	420~480	0.023~0.036	17000~28500	1100~1950	0.046~0.072
R1	8500~11000	590~800	0.024~0.160	7900~8800	470~530	0.020~0.130	7900~8800	440~480	0.018~0.120	12600~24000	1100~2150	0.036~0.240
R1.5	5700~8200	730~1000	0.064~0.240	5300~5800	590~650	0.052~0.195	5300~5800	550~620	0.048~0.120	11900~17000	1850~2700	0.096~0.360
R2	4300~6200	680~990	0.080~0.320	3950~4400	550~620	0.065~0.026	3850~4400	530~570	0.060~0.240	6600~12500	1260~2500	0.120~0.480

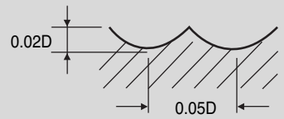


RPM = rev./min.
Feed = mm/min.

3 FLUTE LONG LENGTH BALL NOSE END MILLS

107350

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS							
HARDNESS	HRc 30 ~ HRc 45		HRc 45 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R1.5	32000	8600	26840	5800	19840	4280	18680	4040	12780	2760
R2	24080	7700	20130	5430	14880	3880	14220	3650	9580	2500
R2.5	20000	7250	16780	5430	12400	3690	11670	3470	8000	2370
R3	18000	8570	15200	6220	12200	4500	11100	3830	7590	2460
R4	13500	7350	11300	5250	9200	3980	8320	3350	5690	2130
R5	10800	6530	9100	4590	7350	3450	6660	2870	4550	1960
R6	9050	6100	7590	4260	6130	3190	5530	2400	3800	1640
R8	6700	4600	5690	3250	4600	2480	4160	1800	2850	1230
R10	5400	3600	4550	2620	3670	1980	3300	1440	2280	980

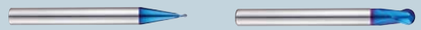


RPM = rev./min.
Feed = mm/min.

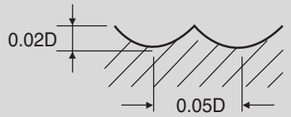
PULSAL BLUE CUTTING CONTENTS

2 FLUTE BALL NOSE MINIATURE END MILLS

104350, 105350



MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R0.1	50000	1200	50000	1050	45000	960	40000	770	35000	674	31500	570
R0.15	50000	1500	50000	1350	45000	1200	40000	965	35000	840	31500	700
R0.2	50000	1900	50000	1700	45000	1500	40000	1200	35000	1050	31500	890
R0.25	50000	2400	50000	2100	45000	1900	40000	1500	35000	1300	31500	1100
R0.3	50000	2900	50000	2500	45000	2200	40000	1800	35000	1600	31500	1400
R0.4	50000	3900	50000	3300	45000	3000	40000	2400	35000	2100	31500	1800
R0.5	50000	4800	50000	4200	45000	3800	40000	3000	35000	2600	35000	2300
R0.6	50000	5100	48000	4300	43000	3850	38000	3000	34000	2700	30600	2300
R0.75	50000	5400	48000	4500	43000	4000	37000	3100	33000	2700	29700	2300
R1	49700	5700	47800	4800	40000	4000	35000	3150	32000	2800	28500	2300
R1.5	33100	6000	31800	5300	26500	4000	23500	3150	21000	2800	19000	2300
R2	24900	6000	23900	5300	20000	4000	17500	3150	16000	2800	14500	2300
R2.5	18600	5800	17800	4900	15000	3750	13500	3050	11500	2550	10500	2100
R3	13900	4850	13400	4100	11000	3100	10000	2500	8800	2150	8000	1750
R4	11100	4200	10700	3500	9000	2700	8000	2150	7000	1850	6500	1550
R5	9300	3700	8900	3100	7500	2400	6600	1900	5800	1650	5300	1380
R6	6950	2950	6680	2500	5600	1900	5000	1550	4400	1250	4000	1050
R8	5570	2650	5350	2200	4500	1700	4000	1350	3500	1000	3200	850
R10	4450	2350	4300	1950	3600	1500	3200	1200	2800	800	2550	660

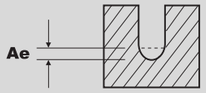


RPM = rev./min.
Feed = mm/min.

2 FLUTE CORNER RADIUS ENDMILL for RIB PROCESSING

102350

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS					
HARDNESS	HRc 30 ~ HRc 45			HRc 45 ~ HRc 55			HRc 55 ~ HRc 60		
DIAMETER	RPM	FEED	Ae (mm)	RPM	FEED	Ae (mm)	RPM	FEED	Ae (mm)
0.5	25650~33000	370~470	0.0056~0.0350	23750~26000	285~315	0.0040~0.0250	14200~18000	115~130	0.0024~0.0150
0.6	20900~35200	330~560	0.0063~0.0294	19900~22000	260~290	0.0450~0.0210	11900~15500	100~120	0.0027~0.0126
0.8	16150~26400	360~590	0.0084~0.0392	15200~16700	280~310	0.0060~0.0280	9000~11700	110~125	0.0036~0.0168
1.0	12300~18700	350~540	0.0105~0.0280	10500~11500	250~280	0.0075~0.0200	6300~8050	100~115	0.0045~0.0120
1.2	10450~17600	350~590	0.0245~0.0700	9100~10000	250~280	0.0150~0.0420	5400~7000	100~115	0.0090~0.0252
1.5	9100~17600	430~830	0.0161~0.0770	7000~8000	250~280	0.0115~0.0550	4300~5500	100~115	0.0069~0.0330
2.0	6350~10550	340~570	0.0210~0.1400	6100~6700	270~300	0.0150~0.1000	3600~4700	100~120	0.0090~0.0600



RPM = rev./min.
Feed = mm/min.

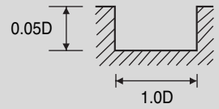
PULSAR BLUE DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

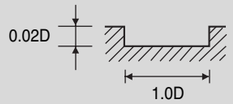
PULSAL BLUE CUTTING CONTENTS

3 FLUTE MINIATURE END MILLS

100350

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS							
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
0.3	50000	190	45000	140	40000	115	33000	70	25000	40
0.4	50000	235	45000	180	40000	140	33000	90	25000	55
0.5	50000	370	45000	280	40000	220	33000	140	25000	85
0.6	50000	470	45000	360	40000	285	30000	160	25000	105
0.8	50000	600	40000	440	30000	295	25000	185	19000	110
1.0	48000	750	38000	570	25500	360	20500	215	16000	135
1.2	42000	790	34000	640	22500	380	20000	250	14500	145
1.5	37000	800	30500	670	21000	410	17000	250	13000	155
2.0	33300	850	26000	680	17500	420	14500	260	11000	160





RPM = rev./min.
Feed = mm/min.

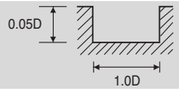
PULSAL BLUE CUTTING CONTENTS

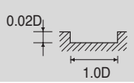
2 FLUTE STUB CUT LENGTH with EXTENDED NECK

101350

SLOTTING

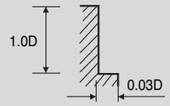
MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
0.2	50000	130	45000	115	40000	95	33000	60	33000	45	26400	30
0.3	50000	190	45000	140	40000	115	33000	70	25000	50	20000	35
0.4	50000	235	45000	180	40000	140	33000	90	25000	55	20000	40
0.5	50000	370	45000	280	40000	220	33000	140	25000	85	20000	60
0.6	50000	470	45000	360	40000	285	30000	160	25000	105	20000	75
0.8	50000	600	40000	440	30000	295	25000	185	19000	110	15200	80
0.9	49000	655	39000	520	27800	330	22700	205	17500	125	14000	90
1	48000	750	38000	570	25500	360	20500	215	16000	135	12500	85
2	33300	850	26000	680	17500	420	14500	260	11000	160	9500	115
3	21800	850	17300	680	11500	420	9500	260	7500	160	6400	115
4	16700	880	13200	700	8800	440	7200	270	5600	170	4750	118
5	15700	1000	12500	805	8300	500	6400	285	5100	180	4450	132
6	13100	950	10350	770	6900	480	5300	280	4200	180	3700	130
8	9880	930	7800	720	5200	445	4000	255	3200	165	2800	120
10	7800	850	6150	680	4100	415	3200	240	2550	155	2200	112
12	6650	850	5250	680	3500	415	2650	240	2100	155	1860	112
16	4900	730	3900	580	2600	365	2000	210	1600	135	1400	95
20	3900	660	3100	525	2050	335	1600	195	1300	125	1100	85





SIDE CUTTING

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48000	1050	38000	820	25500	510	20500	310	16000	190	12500	125
2	33300	1200	26000	970	17500	600	14500	370	11000	230	9500	165
3	21800	1200	17300	970	11500	600	9500	370	7500	230	6400	165
4	16700	1250	13200	1000	8800	625	7200	385	5600	240	4750	170
5	15700	1450	12500	1150	8300	710	6400	410	5100	260	4450	190
6	13100	1350	10350	1100	6900	690	5300	400	4200	255	3700	185
8	9880	1320	7800	1030	5200	635	4000	365	3200	235	2800	170
10	7800	1200	6150	970	4100	590	3200	340	2550	220	2200	160
12	6650	1200	5250	970	3500	590	2650	340	2100	220	1860	160
16	4900	1050	3900	840	2600	520	2000	300	1600	190	1400	140
20	3900	950	3100	750	2050	475	1600	275	1300	175	1100	125



RPM = rev./min.
Feed = mm/min.

PULSAR BLUE DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

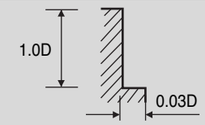
PULSAL BLUE CUTTING CONTENTS

4 FLUTE STUB CUT LENGTH with EXTENDED NECK

103350

SIDE CUTTING

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48000	1480	38000	1050	25500	710	20500	430	16000	270	12500	175
2	33300	1750	26000	1250	17500	840	14500	520	11000	320	9500	230
3	21800	1750	17300	1250	11500	840	9500	520	7500	320	6400	230
4	16700	1800	13200	1300	8800	880	7200	540	5600	335	4750	240
5	15700	2000	12500	1500	8300	1000	6400	580	5100	370	4450	270
6	13100	1950	10350	1400	6900	950	5300	560	4200	350	3700	260
8	9880	1880	7800	1350	5200	900	4000	520	3200	330	2800	240
10	7800	1750	6150	1260	4100	840	3200	480	2550	310	2200	220
12	6650	1750	5250	1260	3500	840	2650	480	2100	300	1860	220
16	4900	1500	3900	1100	2600	730	2000	420	1600	270	1400	200
20	3900	1300	3100	970	2050	650	1600	380	1300	250	1100	180

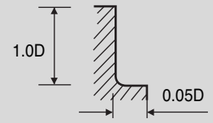


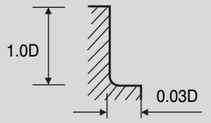
RPM = rev./min.
Feed = mm/min.

6 FLUTE 45° HELIX with CORNER RADIUS END MILLS

108350

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	24800	5350	23500	4900	16000	4900	13500	3300	10500	2100	8000	1450
8	20000	5500	19000	5000	12000	4600	10000	3100	8000	2000	6000	1400
10	16000	4900	15500	4500	9500	4100	8000	2900	6400	1800	4800	1300
12	13000	4500	12500	4100	8000	3800	6600	2500	5300	1600	4000	1150
16	10000	4000	9700	3700	6000	3400	5000	2300	4000	1250	3000	870
20	8000	3350	7800	3400	4800	3200	4000	2100	3200	1020	2400	690





※ The Feed, in long & extra long types, should be reduced by around 50%.

RPM = rev./min.
Feed = mm/min.

PULSAR

END MILLS

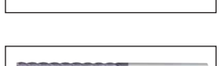
w w w.europatool.co.uk

DESIGNED
SPECIFICALLY FOR
USE IN DRY CUTTING
CONDITIONS

Europa Tool 8TH EDITION

PULSAR END MILL CONTENTS

(Carbide high speed & dry cutting condition materials up to Hrc 65)

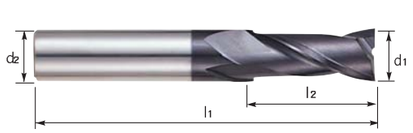
PRODUCTS	SERIES	SHANK TYPE	DESCRIPTION	PAGE
	100120 100320	• FLAT • STRAIGHT	2 FL SHORT PULSAR END MILLS	20
	102120 102320	• FLAT • STRAIGHT	2 FL LONG PULSAR END MILLS	21
	155120 155320	• FLAT • STRAIGHT	2 FL CORNER RADIUS LONG PULSAR END MILLS	22
	112120 112320	• FLAT • STRAIGHT	2 FL BALL NOSE LONG PULSAR END MILLS	23
	118120 118320	• FLAT • STRAIGHT	2 FL BALL NOSE SHORT PULSAR END MILLS	24
	114120 114320	• FLAT • STRAIGHT	2 FL BALL NOSE LONG REACH PULSAR END MILLS	25
	103120 103320	• FLAT • STRAIGHT	3 FL MINIATURE PULSAR END MILLS	26
	109120 109320	• FLAT • STRAIGHT	4 FL SHORT PULSAR END MILLS	27
	111120 111320	• FLAT • STRAIGHT	4 FL LONG PULSAR END MILLS	28
	157120 157320	• FLAT • STRAIGHT	4 FL CORNER RADIUS LONG PULSAR END MILLS	29
	156120 156320	• FLAT • STRAIGHT	4 FL CORNER RADIUS STUB CUT PULSAR END MILLS	30
	116120 116320	• FLAT • STRAIGHT	2 FL BALL NOSE STUB CUT LENGTH for OVER HRc55	31
	115120 115320	• FLAT • STRAIGHT	4 FL BALL NOSE LONG PULSAR END MILLS	32
	149120 149320	• FLAT • STRAIGHT	6&8 FL 45° HELIX LONG PULSAR END MILLS	33
	150120 150320	• FLAT • STRAIGHT	6 FL 45° HELIX EXTRA LONG PULSAR END MILLS	34
	158120 158320	• FLAT • STRAIGHT	6 FL 45° HELIX CORNER RADIUS LONG PULSAR END MILLS	35

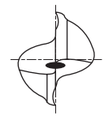
PULSAR END MILL CONTENTS

(Carbide high speed & dry cutting condition materials up to Hrc 65)

PRODUCTS	SERIES	SHANK TYPE	DESCRIPTION	PAGE
	148120 148320	• FLAT • STRAIGHT	MULTI FL ROUGHING SHORT PULSAR END MILLS	36
	147120 147320	• FLAT • STRAIGHT	MULTI FL ROUGHING LONG PULSAR END MILLS	37
	145120 145320	• FLAT • STRAIGHT	3, 4 FL ROUGHING BALL NOSE, LONG LENGTH END MILLS	38
	100320	• STRAIGHT	2 FL MINIATURE PULSAR END MILLS	39
	105320	• STRAIGHT	2 FL BALL NOSE MINIATURE PULSAR END MILLS	40
	143320	• STRAIGHT	2 FL BALL NOSE PULSAR END MILLS for RIB PROCESSING	41
	107320 108320	• STRAIGHT	2 FL PULSAR END MILLS for RIB PROCESSING	42
	120320	• STRAIGHT	4 FL PULSAR END MILLS for RIB PROCESSING	43/44
	130320	• STRAIGHT	4 FL BALL NOSE PULSAR END MILLS for RIB PROCESSING	45/46
			CUTTING DATA	47 ~ 60

2 FLUTE, SHORT LENGTH





MG <.5 µm | 30° | N | FLUTE 2 | PLAIN | FLAT

Series No. 100120, 100320

2 SCHNEIDEN, KURZ, "PULSAR" SCHAFTFRÄSER
2 DENTS, SÉRIE COURTE, FRAISES À RAINURER "PULSAR"
2 LABIOS, SERIE CORTA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
—	1003200100	1.0	4	2.5	40
—	1003200150	1.5		4	
—	1003200200	2.0		6	
—	1003200250	2.5		8	
1001200300	1003200300	3.0	6	8	45
1001200350	1003200350	3.5		10	
1001200400	1003200400	4.0		11	
1001200450	1003200450	4.5		11	
1001200500	1003200500	5.0		13	50
1001200550	1003200550	5.5		13	
1001200600	1003200600	6.0		13	
1001200650	1003200650	6.5	8	16	60
1001200700	1003200700	7.0		16	
1001200750	1003200750	7.5		16	
1001200800	1003200800	8.0		19	
1001200850	1003200850	8.5	10	19	70
1001200900	1003200900	9.0		19	
1001200950	1003200950	9.5		19	
1001201000	1003201000	10.0		22	
1001201050	1003201050	10.5	12	22	75
1001201100	1003201100	11.0		22	
1001201150	1003201150	11.5		22	
1001201200	1003201200	12.0		26	
1001201300	1003201300	13.0		26	85
1001201400	1003201400	14.0	14	26	
1001201500	1003201500	15.0	16	26	90
1001201600	1003201600	16.0		32	100
1001201700	1003201700	17.0		32	
1001201800	1003201800	18.0	18	32	
1001201900	1003201900	19.0	20	32	
1001202000	1003202000	20.0		38	105
1001202200	1003202200	22.0		38	
1001202400	1003202400	24.0	25	45	120
1001202500	1003202500	25.0		45	

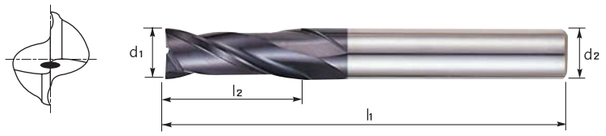
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

PULSAR DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

2 FLUTE, LONG LENGTH

MG .5 µm | 30° | N | FLUTE 2 | PLAIN | FLAT



Series No. 102120, 102320

2 SCHNEIDEN, LANG, "PULSAR" SCHAFTFRÄSER
2 DENTS, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
2 LABIOS, SERIE LARGA, FRESAS "PULSAR"

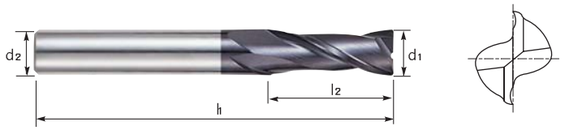
EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
—	1023200200	2.0	4	8	40
1021200300	1023200300	3.0	6	12	50
1021200400	1023200400	4.0		15	
1021200500	1023200500	5.0		20	60
1021200600	1023200600	6.0		20	
1021200800	1023200800	8.0	8	25	70
1021201000	1023201000	10.0	10	30	90
1021201200	1023201200	12.0	12	30	
1021201400	1023201400	14.0	16	40	110
1021201600	1023201600	16.0		50	
1021201800	1023201800	18.0	20	50	
1021202000	1023202000	20.0		55	
1021202500	1023202500	25.0	25	75	140

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

2 FLUTE, CORNER RADIUS, LONG LENGTH

MG .5 µm | 30° | N | FLUTE 2 | PLAIN | FLAT



Series No. 155120, 155320

2 SCHNEIDEN, ECKENRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
2 DENTS, RAYON EN COIN, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
2 LABIOS, RADIO EN EL ÁNGULO LATERAL, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
1551200600	1553200600	6 ×R0.5	6	20	60
1551209001	1553209001	6 ×R1		20	
1551200800	1553200800	8 ×R0.5	8	25	70
1551209002	1553209002	8 ×R1		25	
1551209003	1553209003	8 ×R1.5		25	
1551209004	1553209004	8 ×R2		25	
1551201000	1553201000	10 ×R0.5	10	30	90
1551209005	1553209005	10 ×R1		30	
1551209006	1553209006	10 ×R1.5		30	
1551209007	1553209007	10 ×R2		30	
1551201200	1553201200	12 ×R0.5	12	30	
1551209008	1553209008	12 ×R1		30	
1551209009	1553209009	12 ×R1.5		30	
1551209010	1553209010	12 ×R2		30	

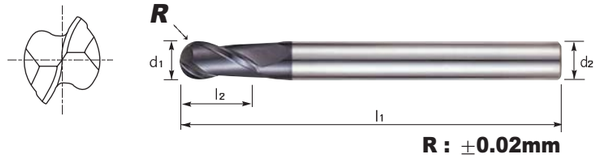
▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

2 FLUTE, BALL NOSE, LONG LENGTH

MG <.5 µm | 30° | N | FLUTE 2 | PLAIN | FLAT



R : ±0.02mm

Series No. 112120, 112320

2 SCHNEIDEN, STIRNRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
2 DENTS, FRAISES HÉMISPHÉRIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
2 LABIOS, PUNTA ESFÉRICA, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
—	1123200100	1.0	4	2.5	50
—	1123200120	1.2		3	
—	1123200150	1.5		4	
1121200200	1123200200	2.0	6	5	
1121200300	1123200300	3.0		8	60
1121200400	1123200400	4.0		8	70
1121200500	1123200500	5.0		10	80
1121200600	1123200600	6.0		12	90
1121200700	1123200700	7.0	8	14	
1121200800	1123200800	8.0		14	100
1121200900	1123200900	9.0	10	18	
1121201000	1123201000	10.0		18	
1121201200	1123201200	12.0	12	22	110
1121201400	1123201400	14.0	14	26	
1121201600	1123201600	16.0	16	30	140
1121201800	1123201800	18.0	18	34	
1121202000	1123202000	20.0	20	38	160
1121202500	1123202500	25.0	25	50	180

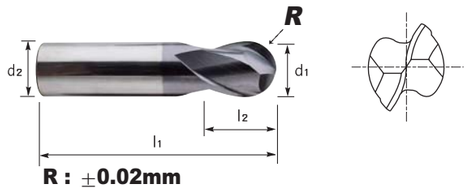
▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶For copy - milling machines

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

2 FLUTE BALL NOSE, SHORT LENGTH

MG <.5 µm | 30° | N | FLUTE 2 | PLAIN | FLAT



R : ±0.02mm

Series No. 118120, 118320

2 SCHNEIDEN, STIRNRADIUS, KURZ, "PULSAR" SCHAFTFRÄSER
2 DENTS, FRAISES HEMISPHERIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
2 LABIOS, PUNTA ESFERICA, SERIE CORTA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
1181200300	1183200300	3	6	4	50
1181200400	1183200400	4		5	54
1181200500	1183200500	5		6	
1181200600	1183200600	6		7	
1181200700	1183200700	7	8	8	58
1181200800	1183200800	8		9	
1181200900	1183200900	9	10	10	66
1181201000	1183201000	10		11	
1181201200	1183201200	12	12	12	73
1181201400	1183201400	14	14	14	75
1181201600	1183201600	16	16	16	82
1181201800	1183201800	18	18	18	84
1181202000	1183202000	20	20	20	92

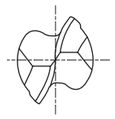
▶Radius Tolerance: ±0.02

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

2 FLUTE, BALL NOSE, LONG REACH

MG | <.5 µm | 30° | N | FLUTE 2 | PLAIN | FLAT



Series No. 114120, 114320

2 SCHNEIDEN, STIRNRADIUS, LANG REACH, "PULSAR" SCHAFTFRÄSER
2 DENTS, FRAISES HÉMISPHÉRIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
2 LABIOS, PUNTA ESFÉRICA, SERIE LARGA, FRESAS "PULSAR"

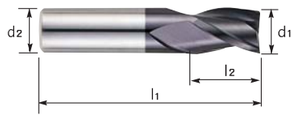
EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
—	1143200200	2	3	6	80
—	1143200300	3		8	100
—	1143200400	4	4	8	
1141200500	1143200500	5	6	10	120
1141200600	1143200600	6		10	
1141200800	1143200800	8	8	14	140
1141201000	1143201000	10	10	18	180
1141201200	1143201200	12	12	22	200
1141201600	1143201600	16	16	30	250
1141202000	1143202000	20	20	38	

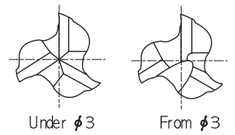
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

3 FLUTE, MINIATURE

MG | <.5 µm | 30° | N | FLUTE 3 | PLAIN | FLAT





Series No. 103120, 103320

3 SCHNEIDEN, MINI, "PULSAR" SCHAFTFRÄSER
3 DENTS, MINI, FRAISES À RAINURER "PULSAR"
3 LABIOS, MINI, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
—	1033200100	1	4	2	35
—	1033200200	2		4	
1031200300	1033200300	3	6	5	36
1031200400	1033200400	4		7	38
1031200500	1033200500	5		8	39
1031200600	1033200600	6		8	
1031200800	1033200800	8	8	11	43
1031201000	1033201000	10	10	13	50
1031201200	1033201200	12	12	15	55
1031201400	1033201400	14	14	15	58
1031201600	1033201600	16	16	18	62
1031201800	1033201800	18	18	20	70
1031202000	1033202000	20	20	22	75

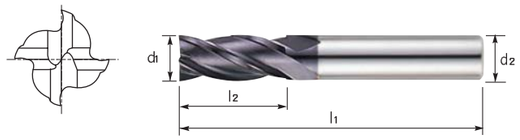
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

PULSAR DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

4 FLUTE, SHORT LENGTH

MG | < .5 µm | 30° | N | FLUTE 4 | PLAIN | FLAT



Series No. 109120, 109320

4 SCHNEIDEN, KURZ, "PULSAR" SCHAFTFRÄSER
4 DENTS, SÉRIE COURTE, FRAISES À RAINURER "PULSAR"
4 LABIOS, SERIE CORTA, FRESAS "PULSAR"

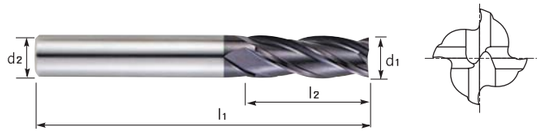
EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
—	1093200200	2.0	4	6	40
—	1093200250	2.5		8	
1091200300	1093200300	3.0	6	8	45
1091200350	1093200350	3.5		10	
1091200400	1093200400	4.0		11	
1091200450	1093200450	4.5		11	
1091200500	1093200500	5.0		13	50
1091200550	1093200550	5.5		13	
1091200600	1093200600	6.0		13	
1091200650	1093200650	6.5	8	16	60
1091200700	1093200700	7.0		16	
1091200750	1093200750	7.5		16	
1091200800	1093200800	8.0		19	
1091200850	1093200850	8.5	10	19	70
1091200900	1093200900	9.0		19	
1091200950	1093200950	9.5		19	
1091201000	1093201000	10.0		22	
1091201050	1093201050	10.5	12	22	75
1091201100	1093201100	11.0		22	
1091201150	1093201150	11.5		22	
1091201200	1093201200	12.0		26	
1091201300	1093201300	13.0		26	85
1091201400	1093201400	14.0	14	26	
1091201500	1093201500	15.0	16	26	90
1091201600	1093201600	16.0		32	100
1091201700	1093201700	17.0		32	
1091201800	1093201800	18.0	18	32	
1091201900	1093201900	19.0	20	32	
1091202000	1093202000	20.0		38	105
1091202200	1093202200	22.0		38	
1091202400	1093202400	24.0	25	45	120
1091202500	1093202500	25.0		45	

▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶4 Flute allows for better workpiece finishes.

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

4 FLUTE, LONG LENGTH



MG | < .5 µm | 30° | N | FLUTE 4 | PLAIN | FLAT

Series No. 111120, 111320

4 SCHNEIDEN, LANG, "PULSAR" SCHAFTFRÄSER
4 DENTS, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
4 LABIOS, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
—	1113200200	2.0	4	8	40
1111200300	1113200300	3.0	6	12	50
1111200400	1113200400	4.0		15	
1111200500	1113200500	5.0		20	60
1111200600	1113200600	6.0		20	
1111200800	1113200800	8.0	8	25	70
1111201000	1113201000	10.0	10	30	90
1111201200	1113201200	12.0	12	30	
1111201400	1113201400	14.0	16	40	110
1111201600	1113201600	16.0		50	
1111201800	1113201800	18.0	20	50	
1111202000	1113202000	20.0		55	
1111202500	1113202500	25.0	25	75	140

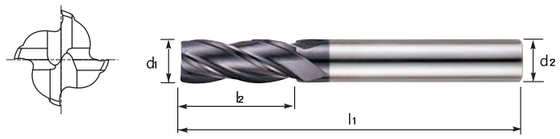
▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶4 Flute allows for better workpiece finishes.

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

4 FLUTE, CORNER RADIUS, LONG LENGTH

MG | <.5 µm | 30° | N | FLUTE 4 | PLAIN | FLAT



Series No. 157120, 157320

4 SCHNEIDEN, ECKENRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
4 DENTS, RAYON EN COIN, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
4 LABIOS, RADIO EN EL ÁNGULO LATERAL, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
1571200600	1573200600	6 ×R0.5	6	20	60
1571209001	1573209001	6 ×R1		20	
1571200800	1573200800	8 ×R0.5	8	25	70
1571209002	1573209002	8 ×R1		25	
1571209003	1573209003	8 ×R1.5		25	
1571209004	1573209004	8 ×R2		25	
1571201000	1573201000	10 ×R0.5	10	30	90
1571209005	1573209005	10 ×R1		30	
1571209006	1573209006	10 ×R1.5		30	
1571209007	1573209007	10 ×R2		30	
1571201200	1573201200	12 ×R0.5	12	30	
1571209008	1573209008	12 ×R1		30	
1571209009	1573209009	12 ×R1.5		30	
1571209010	1573209010	12 ×R2		30	

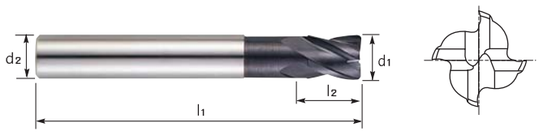
▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

4 FLUTE, CORNER RADIUS, STUB CUT LENGTH

MG | <.5 µm | 30° | N | FLUTE 4 | PLAIN | FLAT



Series No. 156120, 156320

4 SCHNEIDEN, ECKENRADIUS, EXTRA KURZ, "PULSAR" SCHAFTFRÄSER
4 DENTS, RAYON EN COIN, FRAISES À RAINURER "PULSAR"
4 LABIOS, RADIO EN EL ÁNGULO, FRESAS "PULSAR"

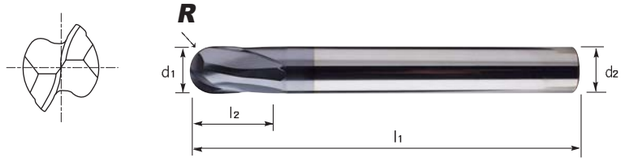
EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1
FLAT	STRAIGHT				
1561200200	1563200200	2 ×R0.2	6	2.5	50
1561200250	1563200250	2.5 ×R0.25		3	
1561200300	1563200300	3 ×R0.3		4	
1561200350	1563200350	3.5 ×R0.35		4.5	
1561200400	1563200400	4 ×R0.4		5	
1561200500	1563200500	5 ×R0.5		6	
1561200600	1563200600	6 ×R0.6		7	55
1561200800	1563200800	8 ×R0.8	8	10	60
1561201000	1563201000	10 ×R1	10	12	70
1561201200	1563201200	12 ×R1.2	12	15	80
1561201600	1563201600	16 ×R1.6	16	18	90

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

2 FLUTE, BALL NOSE, STUB CUT LENGTH for OVER HRc55

MG <.5 μm | 15° | FLUTE 2 | PLAIN | FLAT



R : ±0.01mm

Series No. 116120, 116320

HRc55 ~HRc65

2 SCHNEIDEN, STIRNRADIUS, EXTRA KURZ für ÜBER HRc55

EDP. No FLAT	EDP. No STRAIGHT	MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
—	1163200100	1.0	4	1	50
—	1163200120	1.2		1.2	
—	1163200150	1.5		1.5	
1161200200	1163200200	2.0	6	2	
1161200300	1163200300	3.0		3	60
1161200400	1163200400	4.0		4	70
1161200500	1163200500	5.0		5	80
1161200600	1163200600	6.0		6	90
1161200700	1163200700	7.0	8	7	
1161200800	1163200800	8.0		8	100
1161200900	1163200900	9.0	10	9	
1161201000	1163201000	10.0		10	
1161201200	1163201200	12.0	12	12	110
1161201400	1163201400	14.0	14	14	
1161201600	1163201600	16.0	16	16	140
1161201800	1163201800	18.0	18	18	
1161202000	1163202000	20.0	20	20	160
1161202500	1163202500	25.0	25	25	180

- Suitable for HRc55~HRc65 high hardened materials.
- Strong cutting edges and higher tool rigidity.
- Radius tolerance ± 0.01mm.

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

4 FLUTE, BALL NOSE, LONG LENGTH

MG <.5 μm | 30° | N | FLUTE 4 | PLAIN | FLAT

R : ±0.02mm

Series No. 115120, 115320

4 SCHNEIDEN, STIRNRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
4 DENTS, FRAISES HÉMISPHÉRIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
4 LABIOS, PUNTA ESFÉRICA, SERIE LARGA, FRESAS "PULSAR"

EDP. No FLAT	EDP. No STRAIGHT	MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
—	1153200100	1.0	4	2.5	50
—	1153200150	1.5		4	
1151200200	1153200200	2.0	6	5	
1151200300	1153200300	3.0		8	60
1151200400	1153200400	4.0		8	70
1151200500	1153200500	5.0		10	80
1151200600	1153200600	6.0		12	90
1151200700	1153200700	7.0	8	14	
1151200800	1153200800	8.0		14	100
1151200900	1153200900	9.0	10	18	
1151201000	1153201000	10.0		18	
1151201200	1153201200	12.0	12	22	110
1151201400	1153201400	14.0	14	26	
1151201600	1153201600	16.0	16	30	140
1151201800	1153201800	18.0	18	34	
1151202000	1153202000	20.0	20	38	160
1151202500	1153202500	25.0	25	50	180

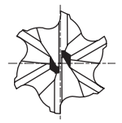
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- For copy - milling machines

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

6,8 FLUTE, 45° HELIX, LONG LENGTH

MG | < .5 µm | 45° | N | FLUTE 6 & 8 | PLAIN | FLAT



Series No. 149120, 149320

6,8 SCHNEIDEN, 45° RECHTSSPIPALE, LANG, "PULSAR" SCHAFTFRÄSER
6,8 DENTS, HÉLICE 45°, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
6,8 LABIOS, HÉLICE 45°, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
FLAT	STRAIGHT					
1491200600	1493200600	6.0	6	13	57	6
1491200700	1493200700	7.0	8	16	63	6
1491200800	1493200800	8.0		19		6
1491200900	1493200900	9.0	10	19	72	6
1491201000	1493201000	10.0		22		6
1491201200	1493201200	12.0	12	26	83	6
1491201400	1493201400	14.0	14	26		6
1491201600	1493201600	16.0	16	32	92	6
1491201800	1493201800	18.0	18	32		8
1491202000	1493202000	20.0	20	38	104	8
1491202500	1493202500	25.0	25	44		8

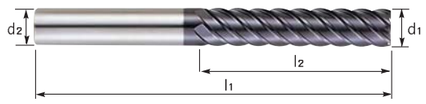
▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶High speed cutting and finish milling with high feed rates.

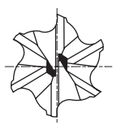
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

6 FLUTE, 45° HELIX, EXTRA LONG LENGTH

MG | < .5 µm | 45° | N | FLUTE 6 | PLAIN | FLAT





Series No. 150120, 150320

6 SCHNEIDEN, 45° RECHTSSPIPALE, EXTRA LANG, "PULSAR" SCHAFTFRÄSER
6 DENTS, HÉLICE 45°, SÉRIE EXTRA-LONGUE, FRAISES À RAINURER "PULSAR"
6 LABIOS, HÉLICE 45°, SERIE EXTRA-LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
FLAT	STRAIGHT					
1501200600	1503200600	6.0	6	26	70	6
1501200800	1503200800	8.0	8	36	90	6
1501201000	1503201000	10.0	10	46	100	6
1501201200	1503201200	12.0	12	56	110	6
1501201600	1503201600	16.0	16	66	130	6
1501202000	1503202000	20.0	20	76	140	6
1501202500	1503202500	25.0	25	92	180	6

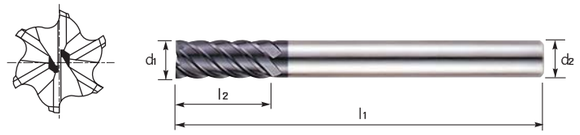
▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶High speed cutting and finish milling with high feed rates.

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

6 FLUTE, 45° HELIX, CORNER RADIUS, LONG LENGTH

MG | <.5 µm | 45° | N | FLUTE 6 | PLAIN | FLAT



Series No. 158120, 158320

6 SCHNEIDEN, 45° RECHTSSPIPALE, ECKENRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
6 DENTS, HÉLICE 45°, RAYON EN COIN, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
6 LABIOS, HÉLICE 45°, RADIO EN EL ÁNGULO, SERIE LARGA, FRESAS "PULSAR"

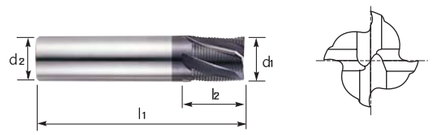
EDP. No		MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
FLAT	STRAIGHT					
1581200600	1583200600	6 ×R0.5	6	13	70	6
1581200800	1583200800	8 ×R0.5	8	19	90	6
1581201000	1583201000	10 ×R0.5	10	22	100	6
1581209001	1583209001	10 ×R1.0		22		6
1581201200	1583201200	12 ×R0.5	12	26	110	6
158120 9002	158320 9002	12 ×R1.0		26		6
1581201600	1583201600	16 ×R1.0	16	32	130	6
1581209003	1583209003	16 ×R1.5		32		6
1581202000	1583202000	20 ×R1.0	20	38	140	6
1581209004	1583209004	20 ×R1.5		38		6
1581209005	1583209005	20 ×R2.0		38		6

▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶High speed cutting and finish milling with high feed rates.

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

MULTI FLUTE, ROUGHING, SHORT LENGTH



MG | <.5 µm | 20° | HR | FLUTE 3 - 5 | FINE | PLAIN | FLAT

Series No. 148120, 148320

MULTI. SCHNEIDEN, SCHRUPPFRÄSER, KURZ, "PULSAR" SCHAFTFRÄSER
MULTI-DENTS, SÉRIE COURTE, FRAISES "PULSAR" EN BOUT RAVAGEUSES
MULTI-LABIOS, GRAN DESBATE, SERIE CORTA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER h10(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
FLAT	STRAIGHT					
1481200600	1483200600	6.0	6	7	54	3
1481200700	1483200700	7.0	8	8	58	3
1481200800	1483200800	8.0		9		3
1481200900	1483200900	9.0	10	13	66	4
1481201000	1483201000	10.0		14		4
1481201200	1483201200	12.0	12	16	73	4
1481201400	1483201400	14.0	14	18	75	4
1481201600	1483201600	16.0	16	22	82	4
1481201800	1483201800	18.0	18	24	84	4
1481202000	1483202000	20.0	20	26	92	4
1481202500	1483202500	25.0	25	25	110	5

▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶High velocity milling of hardened steels.

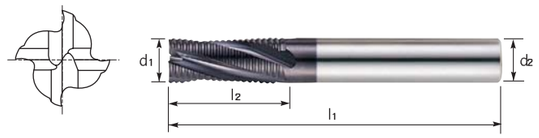
Tolerances according to DIN h10 not e8
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

MULTI FLUTE, ROUGHING, LONG LENGTH

MG <.5 µm | 20° | HR | FLUTE 3 - 5 | FINE | PLAIN | FLAT

Series No. 147120, 147320



MULTI. SCHNEIDEN, SCHRUPPFRÄSER, LANG, "PULSAR" SCHAFTFRÄSER
MULTI-DENTS, SÉRIE LONGUE, FRAISES "PULSAR" EN BOUT RAVAGEUSES
MULTI-LABIOS, GRAN DESBATE, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER h10(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
FLAT	STRAIGHT					
1471200600	1473200600	6.0	6	16	57	3
1471200700	1473200700	7.0	8	16	63	3
1471200800	1473200800	8.0		16		3
1471200900	1473200900	9.0	10	19	72	4
1471201000	1473201000	10.0		22		4
1471201200	1473201200	12.0	12	26	83	4
1471201400	1473201400	14.0	14	26		4
1471201600	1473201600	16.0	16	32	92	4
1471201800	1473201800	18.0	18	32		4
1471202000	1473202000	20.0	20	38	104	4
1471202500	1473202500	25.0	25	45	121	5

▶Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
▶High velocity milling of hardened steels.

Tolerances according to DIN h10 not e8
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

3, 4 FLUTE, ROUGHING BALL NOSE, LONG LENGTH

R : ±0.02mm

MG <.5 µm | 20° | HR | FLUTE 3 - 4 | FINE | PLAIN | FLAT

Series No. 145120, 145320

EDP. No		MILL DIAMETER h10(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
FLAT	STRAIGHT					
1451200600	1453200600	6.0	6	16	57	3
1451200800	1453200800	8.0	8	16	63	3
1451201000	1453201000	10.0	10	22	72	4
1451201200	1453201200	12.0	12	26	83	4
1451201400	1453201400	14.0	14	26		4
1451201600	1453201600	16.0	16	32	92	4
1451201800	1453201800	18.0	18	32		4
1451202000	1453202000	20.0	20	38	104	4

Tolerances according to DIN h10 not e8
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

PULSAR DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

2 FLUTE, MINIATURE

MG < .5 μm | 30° | FLUTE 2 | PLAIN

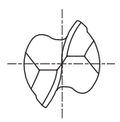
Series No. 100320

EDP. No STRAIGHT	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	OVERALL LENGTH
1003200040	0.4	3	0.8	40
1003200050	0.5	3	1.0	40
1003200060	0.6	3	1.2	40
1003200070	0.7	3	1.4	40
1003200080	0.8	3	1.6	40
1003200090	0.9	3	2.0	40
1003200100	1.0	4	2.5	40
1003200110	1.1	4	2.5	40
1003200120	1.2	4	4.0	40
1003200130	1.3	4	4.0	40
1003200140	1.4	4	4.0	40
1003200150	1.5	4	4.0	40

Unit : mm

MILL DIAMETER	0.4 ~ 0.9	1.0 ~ 1.5
MILL DIA. TOLERANCE	0 —0.012	—0.014 —0.028
SHANK DIA. TOLERANCE	0 —0.006	0 —0.008

2 FLUTE, MINIATURE BALL NOSE



MG < .5 μm | 30° | FLUTE 2 | PLAIN

Series No. 105320

EDP. No STRAIGHT	R ±0.01	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	OVERALL LENGTH
1053200060	R0.30	0.6	3	1.1	40
1053200070	R0.35	0.7	3	1.5	40
1053200080	R0.40	0.8	3	2.0	40
1053200090	R0.45	0.9	3	2.2	40
1053200100	R0.50	1.0	3	2.5	40
1053200110	R0.55	1.1	3	3.0	40
1053200120	R0.60	1.2	3	3.0	40
1053200130	R0.65	1.3	3	3.5	40
1053200140	R0.70	1.4	3	3.5	40
1053200150	R0.75	1.5	3	4.0	40

Unit : mm

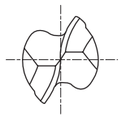
RADIUS TOLERANCE	± 0.010
MILL DIA. TOLERANCE	— 0.014 — 0.028
SHANK DIA. TOLERANCE	0 — 0.006

PULSAR DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

2 FLUTE, BALL NOSE for RIB PROCESSING

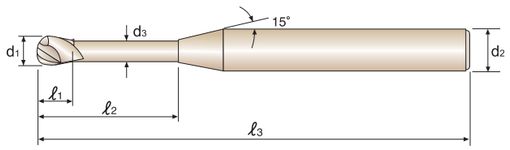
MG < .5 μm | 30° | FLUTE 2 | PLAIN

Series No. 143320



R : ±0.01mm

EDP. No STRAIGHT	MILL DIAMETER d_1	SHANK DIAMETER d_2(h6)	LENGTH OF CUT l_1	LENGTH BELOW SHANK l_2	OVERALL LENGTH l_3	NECK DIAMETER d_3
1433200060	0.6	3	0.9	6	35	0.55
1433200080	0.8	4	1.2	6	45	0.75
1433200081	0.8	4	1.2	8	45	0.75
1433200100	1.0	4	1.5	6	45	0.97
1433200101	1.0	4	1.5	8	45	0.95
1433200102	1.0	4	1.5	12	45	0.93
1433200120	1.2	4	1.8	8	45	1.15
1433200121	1.2	4	1.8	12	45	1.13
1433200140	1.4	4	2.1	12	45	1.33
1433200150	1.5	4	2.3	8	45	1.45
1433200151	1.5	4	2.3	12	45	1.43
1433200152	1.5	4	2.3	16	50	1.41
1433200160	1.6	4	2.4	16	50	1.51
1433200180	1.8	4	2.7	16	50	1.71
1433200200	2.0	4	3.0	8	45	1.95
1433200201	2.0	4	3.0	16	50	1.91
1433200202	2.0	4	3.0	20	55	1.89
1433200300	3.0	6	4.5	16	55	2.85
1433200301	3.0	6	4.5	20	60	2.85
1433200400	4.0	6	6.0	16	60	3.85
1433200401	4.0	6	6.0	20	65	3.85



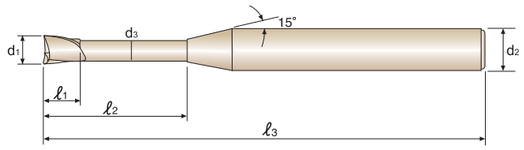
MILL DIAMETER (mm)	0.6	0.8 ~ 3.0	4.0
MILL DIA. TOLERANCE(mm)		−0.014 −0.028	−0.020 −0.038
SHANK DIA. TOLERANCE		h6	

2 FLUTE END MILLS for RIB PROCESSING

MG < .5 μm | 30° | FLUTE 2 | PLAIN

Series No. 107320, 108320

EDP. No STRAIGHT	MILL DIAMETER d_1	SHANK DIAMETER d_2(h6)	LENGTH OF CUT l_1	LENGTH BELOW SHANK l_2	OVERALL LENGTH l_3	NECK DIAMETER d_3
1073200080	0.8	4	1.2	6	45	0.75
1083200080	0.8	4	1.2	8	45	0.75
1073200100	1.0	4	1.5	6	45	0.97
1083200100	1.0	4	1.5	8	45	0.95
1073200102	1.0	4	1.5	12	45	0.93
1073200120	1.2	4	1.8	8	45	1.15
1083200120	1.2	4	1.8	12	45	1.13
1073200140	1.4	4	2.1	12	45	1.33
1073200150	1.5	4	2.3	8	45	1.45
1083200150	1.5	4	2.3	10	45	1.45
1073200152	1.5	4	2.3	12	45	1.43
1073200153	1.5	4	2.3	16	50	1.41
1073200160	1.6	4	2.4	12	45	1.53
1073200180	1.8	4	2.7	12	45	1.73
1073200200	2.0	4	3.0	12	45	1.93
1083200200	2.0	4	3.0	16	50	1.91
1073200250	2.5	4	3.7	12	45	2.40
1083200250	2.5	4	3.7	16	55	2.40
1073200300	3.0	6	4.5	14	50	2.85
1083200300	3.0	6	4.5	18	55	2.85



Unit : mm

MILL DIA. TOLERANCE	SHANK DIA. TOLERANCE
0 −0.015	0 −0.008

4 FLUTE, TAPER for RIB PROCESSING

MG <.5 μm | 25° | FLUTE 4 | PLAIN

Series No. 120320

EDP. No STRAIGHT	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1203200100	1.0	4	8	30′	45
1203200101	1.0	4	12	30′	45
1203200102	1.0	4	8	1°	45
1203200103	1.0	4	12	1°	45
1203200104	1.0	4	8	1° 30′	45
1203200105	1.0	4	12	1° 30′	45
1203200106	1.0	4	8	2°	45
1203200107	1.0	4	12	2°	45
1203200120	1.2	4	8	30′	45
1203200121	1.2	4	12	30′	45
1203200122	1.2	4	8	1°	45
1203200123	1.2	4	12	1°	45
1203200124	1.2	4	8	1° 30′	45
1203200125	1.2	4	12	1° 30′	45
1203200126	1.2	4	8	2°	45
1203200127	1.2	4	12	2°	45
1203200150	1.5	4	8	30′	45
1203209001	1.5	4	12	30′	45
1203209002	1.5	4	16	30′	50
1203209003	1.5	4	8	1°	45

MILL DIA. TOLERANCE(mm)	0 −0.015
TAPER ANGLE TOLERANCE	±5′
SHANK DIA. TOLERANCE(mm)	0 −0.008

PULSAR DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

4 FLUTE, TAPER for RIB PROCESSING

MG <.5 μm | 25° | FLUTE 4 | PLAIN

Series No. 120320

EDP. No STRAIGHT	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1203209004	1.5	4	12	1°	45
1203209005	1.5	4	16	1°	50
1203209006	1.5	4	8	1° 30′	45
1203209007	1.5	4	12	1° 30′	45
1203209008	1.5	4	16	1° 30′	50
1203209009	1.5	4	8	2°	45
1203209010	1.5	4	12	2°	45
1203209011	1.5	4	16	2°	50
1203200200	2.0	4	12	30′	45
1203200201	2.0	4	16	30′	50
1203200202	2.0	4	12	1°	45
1203200203	2.0	4	16	1°	50
1203200204	2.0	4	12	1° 30′	45
1203200205	2.0	4	16	1° 30′	50
1203200206	2.0	4	12	2°	45
120300207	2.0	4	16	2°	50

MILL DIA. TOLERANCE(mm)	0 −0.015
TAPER ANGLE TOLERANCE	±5′
SHANK DIA. TOLERANCE(mm)	0 −0.008

4 FLUTE, TAPER BALL NOSE for RIB PROCESSING

MG <.5 μm | 25° | FLUTE 4 | PLAIN

Series No. 130320

R : ±0.01mm

EDP. No STRAIGHT	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1303200100	1.0	4	8	30′	45
1303200101	1.0	4	12	30′	45
1303200102	1.0	4	8	1°	45
1303200103	1.0	4	12	1°	45
1303200104	1.0	4	8	1° 30′	45
1303200105	1.0	4	12	1° 30′	45
1303200106	1.0	4	8	2°	45
1303200107	1.0	4	12	2°	45
1303200120	1.2	4	8	30′	45
1303200121	1.2	4	12	30′	45
1303200122	1.2	4	8	1°	45
1303200123	1.2	4	12	1°	45
1303200124	1.2	4	8	1° 30′	45
1303200125	1.2	4	12	1° 30′	45
1303200126	1.2	4	8	2°	45
1303200127	1.2	4	12	2°	45
1303200130	1.5	4	8	30′	45
1303209001	1.5	4	12	30′	45
1303209002	1.5	4	16	30′	50
1303209003	1.5	4	8	1°	45

RADIUS TOLERANCE(mm)	±0.010
TAPER ANGLE TOLERANCE	±5′
SHANK DIA. TOLERANCE(mm)	0 / −0.008

4 FLUTE, TAPER BALL NOSE for RIB PROCESSING

MG <.5 μm | 25° | FLUTE 4 | PLAIN

Series No. 130320

R : ±0.01mm

EDP. No STRAIGHT	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1303209004	1.5	4	12	1°	45
1303209005	1.5	4	16	1°	50
1303209006	1.5	4	8	1° 30′	45
1303209007	1.5	4	12	1° 30′	45
1303209008	1.5	4	16	1° 30′	50
1303209009	1.5	4	8	2°	45
1303209010	1.5	4	12	2°	45
1303209011	1.5	4	16	2°	50
1303200200	2.0	4	12	30′	45
1303200201	2.0	4	16	30′	50
1303200202	2.0	4	12	1°	45
1303200203	2.0	4	16	1°	50
1303200204	2.0	4	12	1° 30′	45
1303200205	2.0	4	16	1° 30′	50
1303200206	2.0	4	12	2°	45
1303200207	2.0	4	16	2°	50

RADIUS TOLERANCE(mm)	±0.010
TAPER ANGLE TOLERANCE	±5′
SHANK DIA. TOLERANCE(mm)	0 / −0.008

PULSAR DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

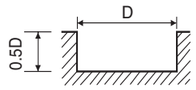
PULSAR cutting condition

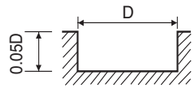
2 FLUTE, SHORT, SLOTTING

100120, 100320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1000 ~ 1500N/㎟		1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	190	7560	120	6300	90	5040	35		
3	8920	210	5560	140	4620	120	3360	40	1900	40
4	7560	300	4620	180	3880	150	2940	40	1480	40
5	6300	320	3780	190	3160	160	2320	50	1260	40
6	5560	350	3360	220	2840	180	2000	55	1100	40
8	4200	380	2520	200	2100	180	1680	75	840	40
10	3260	330	2000	160	1680	160	1360	60	680	35
12	2740	280	1680	130	1360	130	1160	55	560	35
16	2200	220	1360	110	1060	110	900	40	440	20
20	1680	170	1060	80	840	80	680	30	320	20
25	1360	130	840	70	680	60	540	20	260	15

(UP TO ∮3:0.2D)





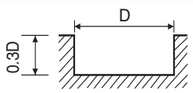
R.P.M = rev./min, Feed = mm/min

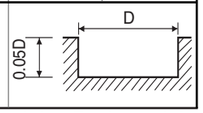
2 FLUTE, LONG, SLOTTING

102120, 102320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc30 ~ HRc45	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1000 ~ 1500N/㎟	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	60	5040	50	3150	25
3	4410	70	3570	60	2200	30
4	3570	85	2840	70	1790	35
5	3050	105	2420	85	1580	40
6	2630	125	2100	105	1370	50
8	2000	135	1580	105	1050	50
10	1680	135	1370	105	840	50
12	1370	105	1160	95	700	40
16	1160	95	890	75	560	35
20	840	70	680	50	420	25

(UP TO ∮3:0.4mm)





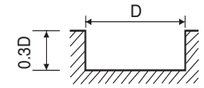
R.P.M = rev./min, Feed = mm/min

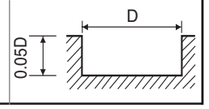
PULSAR cutting condition

2 FLUTE, CORNER RADIUS, LONG, SLOTTING

155120, 155320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2630	125	2100	105	1370	50	1160	35
8	2000	135	1580	105	1050	50	840	35
10	1680	135	1370	105	840	50	670	35
12	1370	105	1160	95	700	40	550	25





R.P.M = rev./min, Feed = mm/min

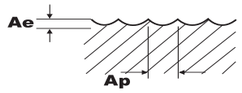
2 FLUTE, BALL NOSE, LONG

112120, 112320

HIGH SPEED CUTTING

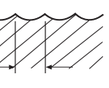
MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	15760	250	12720	200	5800	90
1.5	15760	350	12140	270	5320	120
2	15760	530	11560	320	4840	110
2.5	14400	750	10700	490	4680	150
3	13100	680	10000	460	4520	150
4	10500	740	8400	530	4200	180
5	9140	820	7300	580	3680	180
6	7780	840	6300	630	3160	190
8	5260	950	4420	660	2100	190
10	4620	1020	3780	710	1780	190
12	3780	900	2940	660	1360	190
16	2740	920	2320	650	1160	190
20	2100	840	1900	630	840	190

Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.2 ×D



NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
~HRc45		HRc45 ~ HRc65	
~1500N/㎟		1500N/㎟~	
RPM	FEED	RPM	FEED
25000	650	25000	400
23000	700	23000	430
21000	740	21000	470
21000	880	19000	490
21000	1000	17000	520
21000	1470	13660	580
21000	1800	12000	600
21000	2310	10500	630
15760	2840	7880	740
13660	3050	6300	840
10500	2630	5260	840
8200	2630	3780	710
6300	2520	2940	530

Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.05 ×D



R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

2 FLUTE BALL NOSE FOR OVER HRc55

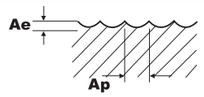
116320, 116120

HIGH SPEED CUTTING

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc45 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	1400 ~ 1750N/㎟		1750 ~ 2000N/㎟		2000 ~ 2080N/㎟		2080N/㎟ ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	20000	460	20000	400	20000	350	20000	240
1.5	16300	640	16100	580	16000	570	14200	360
2	14500	800	14200	740	13850	760	11300	465
2.5	13400	950	13000	890	12600	920	9600	560
3	12700	1100	12300	1050	11800	1000	8400	660
4	10600	1100	10300	1050	9800	1000	6650	650
5	9400	1100	9050	1050	8600	950	5600	680
6	8600	1150	8250	1100	7850	950	4850	700
8	7000	1050	6700	1000	6350	950	3800	650
10	6050	1000	5800	960	5450	900	3200	620
12	5450	1000	5200	960	4900	900	2750	610
16	4350	870	4150	830	3900	820	2100	265
20	3500	690	3300	650	3100	630	1700	220

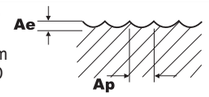
Ae : D 1 ~ D4 = 0.05 × D
D 5 ~ D8 = 0.25mm
D10 ~ D20 = 0.30mm

Ap : D 1 ~ D20
0.1 × D



HARDENED STEELS	HARDENED STEELS	HARDENED STEELS		HARDENED STEELS	
HRc45 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60	
1400 ~ 1750N/㎟		1750 ~ 2000N/㎟		2000 ~ 2080N/㎟	
RPM	FEED	RPM	FEED	RPM	FEED
20000	460	20000	400	20000	350
16300	640	16100	580	16000	570
14500	800	14200	740	13850	760
13400	950	13000	890	12600	920
12700	1100	12300	1050	11800	1000
10600	1100	10300	1050	9800	1000
9400	1100	9050	1050	8600	950
8600	1150	8250	1100	7850	950
7000	1050	6700	1000	6350	950
6050	1000	5800	960	5450	900
5450	1000	5200	960	4900	900
4350	870	4150	830	3900	820
3500	690	3300	650	3100	630

Ae : D 1 ~ D4 = 0.05 × D
D 5 ~ D8 = 0.25mm
D10 ~ D20 = 0.30mm
Ap : D 1 ~ D20 = 0.05 × D



R.P.M = rev./min, Feed = mm/min

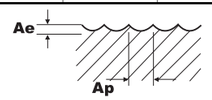
2 FLUTE, BALL NOSE

118120, 118320

HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500N/㎟ ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	15760	250	12720	200	5800	90
1.5	15760	350	12140	270	5320	120
2	14400	750	10700	490	4680	150
2.5	14400	750	10700	490	4680	150
3	13100	680	10000	460	4520	150
4	10500	740	8400	530	4200	180
5	9140	820	7300	580	3680	180
6	7780	840	6300	630	3160	190
8	5260	950	4420	660	2100	190
10	4620	1020	3780	710	1780	190
12	3780	900	2940	660	1360	190
16	2740	920	2320	650	1160	190
20	2100	840	1900	630	840	190

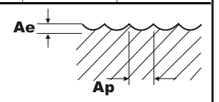
Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.2D



Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.1D

NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
~HRc45		HRc45 ~ HRc65	
~1500N/㎟		1500N/㎟ ~	
RPM	FEED	RPM	FEED
25000	650	25000	400
23000	700	23000	430
21000	740	21000	470
21000	880	19000	490
21000	1000	17000	520
21000	1470	13660	580
21000	1800	12000	600
21000	2310	10500	630
15760	2840	7880	740
13660	3050	6300	840
10500	2630	5260	840
8200	2630	3780	710
6300	2520	2940	530

Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : D1 ~ D20=0.05 ×D



R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

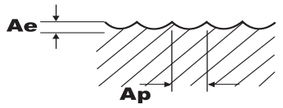
2 FLUTE, BALL NOSE LONG REACH

114320, 114120

HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500N/㎟ ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	12600	200	10180	160	4640	70
1.5	12600	280	9710	220	4250	95
2	12600	420	9250	260	3870	90
2.5	11520	600	8560	390	3740	120
3	10500	540	8000	370	3620	120
4	8400	590	6720	420	3360	140
5	7310	660	5840	460	2940	140
6	6220	670	5040	500	2530	150
8	4210	760	3540	530	1680	150
10	3700	820	3020	570	1420	150
12	3020	720	2350	530	1090	150
16	2190	740	1860	520	930	150
20	1680	670	1520	500	670	150

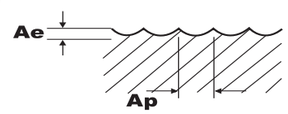
Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.2D



Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.1D

NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
~HRc45		HRc45 ~ HRc65	
~1500N/㎟		1500N/㎟ ~	
RPM	FEED	RPM	FEED
20000	520	20000	320
18400	560	18400	340
16800	590	16800	380
16800	700	15200	390
16800	800	13600	420
16800	1180	10930	460
16800	1440	9600	480
16800	1850	8400	500
12610	2270	6300	590
10930	2440	5040	670
8400	2100	4210	670
6560	2100	3020	570
5040	2020	2350	420

Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.05D



R.P.M = rev./min, Feed = mm/min

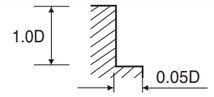
PULSAR cutting condition

3 FLUTE MINIATURE

103320, 103120

SIDE CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟				1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	210	7560	140	6300	115	5040	30		
3	8920	240	5560	150	4620	125	3360	40	1900	45
4	7560	430	4620	260	3880	210	2940	45	1480	45
5	6300	450	3780	270	3160	230	2320	55	1260	45
6	5560	500	3360	310	2840	250	2000	60	1100	45
8	4200	530	2520	290	2100	265	1680	80	840	45
10	3260	460	2000	230	1680	230	1360	70	680	35
12	2740	390	1680	190	1360	180	1160	60	560	35
16	2200	310	1360	150	1060	150	900	45	440	20
20	1940	280	1210	135	950	130	790	35	380	20
25	1680	240	1060	120	840	115	680	30	320	20

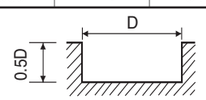


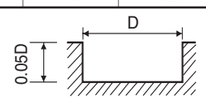
R.P.M = rev./min, Feed = mm/min

SLOTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟				1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	170	7560	110	6300	80	5040	30		
3	8920	190	5560	130	4620	110	3360	35	1900	40
4	7560	270	4620	160	3880	130	2940	35	1480	35
5	6300	280	3780	170	3160	140	2320	45	1260	35
6	5560	310	3360	200	2840	160	2000	50	1100	35
8	4200	340	2520	180	2100	160	1680	65	840	35
10	3260	300	2000	140	1680	145	1360	55	680	30
12	2740	250	1680	120	1360	120	1160	50	560	30
16	2200	200	1360	100	1060	100	900	35	440	20
20	1940	175	1210	85	950	85	790	30	380	20
25	1680	150	1060	70	840	70	680	25	320	20

(UP TO ϕ3:0.2D)





R.P.M = rev./min, Feed = mm/min

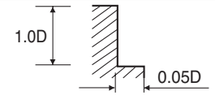
PULSAR DESIGNED SPECIFICALLY FOR USE IN DRY CUTTING CONDITIONS

PULSAR cutting condition

4 FLUTE, SHORT, SIDE CUTTING

109120, 109320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟				1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	280	7560	170	6300	140	5040	50		
3	8920	320	5560	200	4620	170	3360	60	1900	60
4	7560	570	4620	350	3880	280	2940	60	1480	60
5	6300	600	3780	360	3160	300	2320	70	1260	60
6	5560	660	3360	410	2840	330	2000	80	1100	60
8	4200	710	2520	380	2100	350	1680	110	840	60
10	3260	610	2000	300	1680	300	1360	90	680	50
12	2740	520	1680	250	1360	240	1160	80	560	50
16	2200	410	1360	200	1100	200	900	60	440	30
20	1680	320	1060	160	840	150	680	40	320	30
25	1360	250	840	130	680	120	540	30	260	20

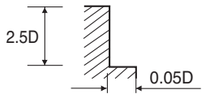


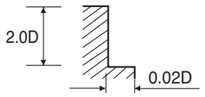
R.P.M = rev./min, Feed = mm/min

4 FLUTE, LONG, SIDE CUTTING

111120, 111320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	100	5040	80	3150	45		
3	4410	115	3570	100	2200	55	1890	30
4	3570	140	2840	115	1790	60	1470	35
5	3050	180	2420	140	1580	70	1260	40
6	2630	215	2100	180	1370	90	1160	50
8	2000	230	1580	180	1050	90	840	50
10	1680	230	1370	180	840	90	670	50
12	1370	180	1160	160	700	70	560	40
16	1160	160	890	125	560	60	440	35
20	840	115	680	90	420	45	340	25





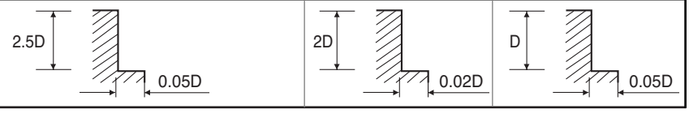
R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

4 FLUTE, CORNER RADIUS, LONG, SIDE CUTTING

157120, 157320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2630	215	2100	180	1370	85	1160	50
8	2000	230	1580	180	1050	85	840	50
10	1680	230	1370	180	840	85	670	50
12	1370	180	1160	160	700	70	550	40

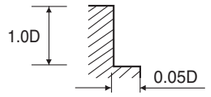


R.P.M = rev./min, Feed = mm/min

4 FLUTE, CORNER RADIUS STUB, SIDE CUTTING

156320, 156120

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	13870	340	9070	205	6050	60		
2.5	12290	360	7870	220	5040	65		
3	10700	385	6670	240	4030	70	2280	70
3.5	9890	535	6100	330	3780	70	2030	70
4	9070	685	5540	420	3530	70	1780	70
5	7560	720	4540	430	2780	85	1510	70
6	6670	790	4030	490	2400	95	1320	70
8	5040	850	3020	455	2020	130	1010	70
10	3910	730	2400	360	1630	110	820	60
12	3290	625	2020	300	1390	95	670	60
16	2640	490	1630	240	1080	70	530	35



R.P.M = rev./min, Feed = mm/min

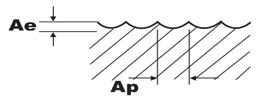
PULSAR cutting condition

4 FLUTE, BALL NOSE, LONG

115120, 115320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1500N/㎟		1500N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	15760	380	12720	300	5800	130
1.5	15760	530	12140	410	5320	180
2	15760	800	11560	480	4840	160
3	13100	1020	10000	690	4520	220
4	10500	1110	8400	800	4200	270
5	9140	1230	7300	870	3680	270
6	7780	1260	6300	950	3160	280
8	5260	1430	4420	990	2100	280
10	4620	1530	3780	1070	1780	280
12	3780	1350	2940	990	1360	280
16	2740	1380	2320	980	1160	280
20	2100	1260	1900	950	840	280

Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.2 ×D

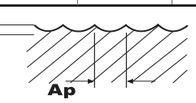


R.P.M = rev./min, Feed = mm/min

115120, 115320

HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
HARDNESS	~HRc45		HRc45 ~ HRc65	
STRENGTH	~1500N/㎟		1500N/㎟ ~	
DIAMETER	RPM	FEED	RPM	FEED
1	25000	980	25000	600
1.5	23000	1050	23000	640
2	21000	1110	21000	700
3	21000	1500	17000	780
4	21000	2210	13660	870
5	21000	2700	12000	900
6	21000	3470	10500	940
8	15760	4260	7880	1110
10	13660	4580	6300	1260
12	10500	3950	5260	1260
16	8200	3950	3780	1060
20	6300	3780	2940	790



Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.05 ×D

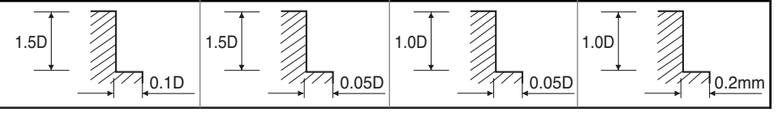
R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

6 & 8 FLUTE, 45° HELIX, LONG, SIDE CUTTING

149120, 149320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1750N/㎟		1750 ~ 2080N/㎟		2080N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	2000	3880	1370	1580	210	1100	130
8	4200	2000	2940	1370	1160	210	840	130
10	3360	2000	2320	1370	1000	210	680	130
12	2840	1680	2000	1160	840	180	560	110
16	2100	1260	1480	880	640	130	420	70
20	1680	1010	1160	690	500	110	320	60
25	1500	900	1100	600	430	90	260	50

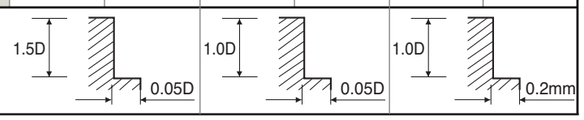


R.P.M = rev./min, Feed = mm/min

149120, 149320

HIGH SPEED CUTTING

MATERIAL	HEAT RESISTANT STEELS HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1750N/㎟		1750 ~ 2080N/㎟		2080N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
6	16800	6090	8400	3050	4200	1470
8	12600	6090	6300	3050	3160	1470
10	9980	5990	5040	3050	2520	1470
12	8400	5040	4200	2520	2100	1260
16	6300	3780	3160	1890	1580	950
20	5040	3050	2520	1470	1260	760
25	4500	2700	2200	1300	1120	670



R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

6 FLUTE, 45° HELIX, EXTRA LONG, SIDE CUTTING

150120, 150320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc40		HRc40 ~ HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1250N/㎟		1250 ~ 1750N/㎟		1750 ~ 2080N/㎟		2080N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2230	470	1670	350	1390	250	1110	200
8	1670	450	1250	330	1050	240	840	180
10	1330	440	1000	300	840	230	680	160
12	1110	400	840	270	690	210	560	150
16	840	330	630	230	530	170	420	130
20	670	280	500	200	420	150	320	120
25	540	240	400	170	340	130	270	95

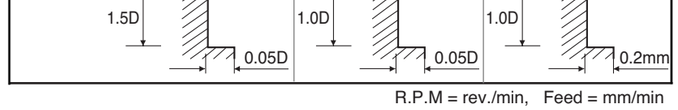
R.P.M = rev./min, Feed = mm/min

6 FLUTE, 45° HELIX, CORNER RADIUS, SIDE CUTTING

158120, 158320

HIGH SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1750N/㎟		1750 ~ 2080N/㎟		2080N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
6	16800	6090	8400	3050	4200	1470
8	12600	6090	6300	3050	3150	1470
10	9980	5990	5040	3050	2520	1470
12	8400	5040	4200	2520	2100	1260
16	6300	3780	3150	1890	1580	950
20	5040	3050	2520	1470	1260	760



R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

MULTI. FLUTE, ROUGHING, SIDE CUTTING

148120, 148320, 147120, 147320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc38		HRc38 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1200N/㎟		1200 ~ 1400N/㎟		1400 ~ 2000N/㎟		2000N/㎟~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	15600	2320	12400	840	8400	570	3400	260	2400	190
8	11600	2320	9200	840	6300	570	2400	240	1800	180
10	9200	2320	7600	840	5100	570	2000	290	1300	190
12	8000	2400	6000	800	4200	570	1680	260	1200	190
14	6800	2400	5200	840	3600	570	1400	200	900	130
16	6000	2400	4800	760	3300	510	1200	160	800	110
18	5200	2320	4400	720	2700	420	1100	150	700	100
20	4800	2160	3600	560	2400	360	1000	150	660	100
25	4300	2150	3200	620	2160	410	900	160	600	100

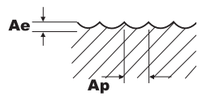
R.P.M = rev./min, Feed = mm/min

2 FLUTE, MINIATURE BALL NOSE

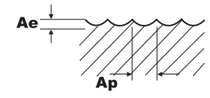
105320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
HARDNESS	HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	1000 ~ 1500N/㎟		1500 ~ 2000N/㎟	
DIAMETER	RPM	RPM	RPM	RPM
0.6	30000	510	30000	360
0.8	27000	560	27000	330
1	25000	560	25000	340
1.2	24000	570	24000	350
1.5	23000	600	23000	370

D < 1
Ae=0.05×D
Ap=0.15×D
D ≧ 1
Ae=0.075×D
Ap=0.15×D



D < 1
Ae=0.05×D
Ap=0.1×D
D ≧ 1
Ae=0.05×D
Ap=0.15×D



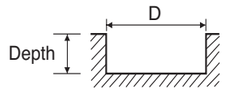
R.P.M = rev./min, Feed = mm/min

2FLUTE, MINIATURE, SLOTTING

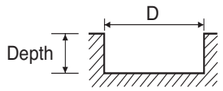
100320

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	1000 ~ 1500N/㎟		1500 ~ 2000N/㎟	
DIAMETER	RPM	RPM	RPM	RPM
0.4	30000	90	23000	50
0.8	24000	150	18000	65
1	20000	160	15000	75
1.2	16000	160	12000	75
1.5	12000	150	9000	70

D < 1
Depth=0.15×D
D ≧ 1
Depth=0.25×D



D < 1
Depth=0.02×D
D ≧ 1
Depth=0.05×D



R.P.M = rev./min, Feed = mm/min

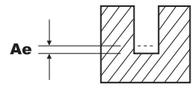
PULSAR cutting condition

2 FLUTE for RIB PROCESSING

107320, 108320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc 30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/㎟			1000 ~ 1500N/㎟			1500 ~ 2000N/㎟		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	31000~40000	200~440	0.007~0.018	22500~28000	85~340	0.007~0.018	14300~17000	30~90	0.004~0.008
0.5	31000~40000	200~440	0.009~0.022	22500~28000	85~340	0.009~0.022	14300~17000	30~90	0.004~0.009
0.6	31000~40000	250~570	0.011~0.026	22500~28000	110~430	0.011~0.026	14300~17000	40~110	0.005~0.011
0.7	31000~40000	250~570	0.012~0.031	22500~28000	110~430	0.012~0.031	14300~17000	40~110	0.006~0.013
0.8	27000~35000	280~630	0.014~0.035	19500~24500	120~480	0.014~0.035	12500~14800	45~125	0.007~0.015
0.9	25000~31500	280~720	0.030~0.060	17500~22500	160~540	0.030~0.060	11000~12500	55~130	0.008~0.016
1	22500~28000	280~810	0.045~0.090	15700~20000	190~600	0.045~0.090	10000~12500	65~130	0.009~0.018
1.2	18500~22500	280~900	0.055~0.100	13000~16500	190~600	0.055~0.100	8300~10500	65~130	0.010~0.022
1.4	16000~20000	280~900	0.062~0.125	11500~14000	190~600	0.062~0.125	7200~9000	65~130	0.012~0.025
1.5	14500~18500	280~900	0.070~0.135	10500~13500	190~600	0.070~0.135	6700~8200	65~130	0.014~0.028
1.6	14000~18000	280~900	0.075~0.145	10200~12800	190~600	0.075~0.145	6400~8000	65~130	0.015~0.030
1.8	13000~16500	280~900	0.080~0.160	9200~11500	190~600	0.080~0.160	5700~7200	65~130	0.016~0.032
2	12000~14500	280~900	0.090~0.180	8300~10500	190~600	0.090~0.180	5300~6600	65~130	0.018~0.035
2.5	9500~12000	280~900	0.112~0.235	6700~8500	190~600	0.112~0.235	4300~5300	65~130	0.022~0.045
3	8000~10000	280~900	0.135~0.270	5500~7000	190~600	0.135~0.270	3500~4400	65~130	0.028~0.055
2	6000~7500	280~900	0.180~0.360	4100~5300	190~600	0.180~0.360	2600~3300	65~130	0.036~0.072
5	4800~6000	280~900	0.225~0.450	3300~4200	190~600	0.225~0.450	2100~2600	65~130	0.045~0.090
6	4000~5000	280~900	0.270~0.540	2800~3500	190~600	0.270~0.540	1750~2600	65~130	0.054~0.108

(Depth of Cut per one pass)



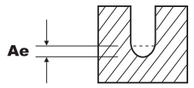
R.P.M = rev./min, Feed = mm/min

2 FLUTE, BALL NOSE for RIB PROCESSING

143320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc 30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/㎟			1000 ~ 1500N/㎟			1500 ~ 2000N/㎟		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	31000~40000	175~490	0.018~0.036	22500~28500	88~270	0.018~0.036	14300~18000	88~175	0.004~0.007
0.5	31000~40000	175~490	0.023~0.045	22500~28500	88~270	0.023~0.045	14300~18000	88~175	0.005~0.009
0.6	31000~40000	225~630	0.027~0.054	22500~28500	110~350	0.027~0.054	14300~18000	110~225	0.005~0.011
0.8	31000~40000	225~630	0.036~0.072	22500~28500	110~350	0.036~0.072	14300~18000	110~225	0.007~0.014
1	29000~36500	250~700	0.045~0.090	20500~26000	125~390	0.045~0.090	13000~16300	125~250	0.009~0.018
1.2	24000~30500	250~780	0.055~0.100	17000~21500	125~390	0.055~0.100	10800~13700	125~250	0.010~0.022
1.4	21000~26000	250~780	0.062~0.125	15000~18000	125~390	0.062~0.125	9400~11700	125~250	0.012~0.025
1.5	19000~24000	250~780	0.070~0.135	13500~17500	125~390	0.070~0.135	8700~10700	125~250	0.014~0.028
1.6	18000~23500	250~780	0.075~0.145	13200~16500	125~390	0.075~0.145	8300~10400	125~250	0.015~0.030
1.8	17000~21500	250~780	0.080~0.160	12000~15000	125~390	0.080~0.160	7400~9400	125~250	0.016~0.032
2	15500~19000	250~780	0.090~0.180	11000~13500	125~390	0.090~0.180	6900~8600	125~250	0.018~0.035
3	10500~13000	250~780	0.135~0.270	7000~9000	125~390	0.135~0.270	4600~5700	125~250	0.028~0.055
4	8500~11000	250~780	0.180~0.360	5800~7800	125~390	0.180~0.360	3900~4900	125~250	0.035~0.070
5	6800~8800	250~780	0.225~0.450	4600~6200	125~390	0.225~0.450	3100~3900	125~250	0.044~0.088
6	5700~7300	250~780	0.270~0.540	3900~5200	125~390	0.270~0.540	2600~3300	125~250	0.053~0.105

(Depth of Cut per one pass)



R.P.M = rev./min, Feed = mm/min

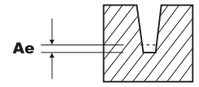
PULSAR cutting condition

4 FLUTE, TAPER for RIB PROCESSING

120320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc 30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/㎟			1000 ~ 1500N/㎟			1500 ~ 2000N/㎟		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
1	20000	700	0.020~0.040	15000	500	0.020~0.030	10000	300	0.010~0.020
1.2	16000	700	0.025~0.050	13000	500	0.025~0.040	8000	300	0.012~0.025
1.5	13000	700	0.030~0.060	10000	500	0.030~0.050	6500	300	0.015~0.030
2	10000	700	0.040~0.080	8000	500	0.040~0.060	5000	300	0.020~0.040

(Depth of Cut per one pass)



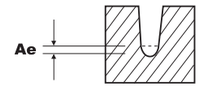
R.P.M = rev./min, Feed = mm/min

4 FLUTE, TAPER BALL NOSE for RIB PROCESSING

130320

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc 30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/㎟			1000 ~ 1500N/㎟			1500 ~ 2000N/㎟		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
1	20000	700	0.020~0.040	15000	500	0.020~0.030	10000	300	0.010~0.020
1.2	16000	700	0.025~0.050	13000	500	0.025~0.040	8000	300	0.012~0.025
1.5	13000	700	0.030~0.060	10000	500	0.030~0.050	6500	300	0.015~0.030
2	10000	700	0.040~0.080	8000	500	0.040~0.060	5000	300	0.020~0.040

(Depth of Cut per one pass)



R.P.M = rev./min, Feed = mm/min

ET1

END MILLS

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DESIGNED
FOR STAINLESS STEEL,
TITANIUM,
INCONEL

Europa Tool 8TH EDITION

ET1 END MILL CONTENTS

(Carbide for Stainless, Titanium, Inconel)

	PRODUCTS	SERIES	SHANK TYPE	DESCRIPTION	PAGE
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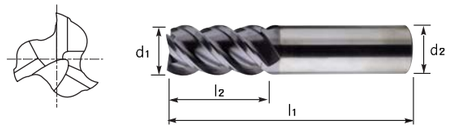
		320123 320323	• FLAT • STRAIGHT	ET1 MULTI FL 30° HELIX SHORT ROUGHING CARBIDE TiAlN COATED END MILLS	64
		118123 118323	• FLAT • STRAIGHT	ET1 MULTI FL 30° HELIX LONG CARBIDE TiAlN COATED END MILLS	65
		107122	• FLAT	ET1 4 & 6 FL 30° HELIX SHORT ASP60 TiAlN COATED END MILLS	66
				CUTTING DATA	67

3&4 FLUTE 50° HELIX CARBIDE TiAlN COATED END MILLS

MG HM | 50° | FLUTE 3 & 4 | PLAIN | FLAT



Series No. 132123, 132323

for Stainless Steel, Titanium, Inconel

TiAlN

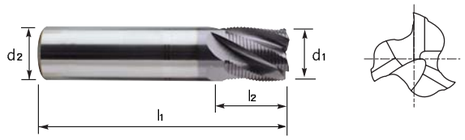
EDP. No FLAT	EDP. No STRAIGHT	MILL DIAMETER h10(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
1321230600	1323230600	6.0	6.0	13.0	50.0	3
1321230800	1323230800	8.0	8.0	19.0	60.0	
1321231000	1323231000	10.0	10.0	22.0	70.0	
1321231200	1323231200	12.0	12.0	25.0	75.0	
1321231600	1323231600	16.0	16.0	32.0	90.0	
1321231800	1323231800	18.0	18.0	32.0	90.0	
1321232000	1323232000	20.0	20.0	38.0	100.0	4
1321232500	1323232500	25.0	25.0	45.0	120.0	

Tolerances according to DIN h10 not e8
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

MULTI FLUTE 30° HELIX SHORT ROUGHING CARBIDE TiAlN COATED END MILLS

MG HM | 30° | FLUTE 3 - 5 | FINE | PLAIN | FLAT



Series No. 320123, 320323

for Stainless Steel, Titanium, Inconel

TiAlN

EDP. No FLAT	EDP. No STRAIGHT	MILL DIAMETER h10(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
3201230600	3203230600	6.0	6.0	7.0	54.0	3
3201230700	3203230700	7.0	8.0	8.0	58.0	
3201230800	3203230800	8.0		9.0		
3201230900	3203230900	9.0	10.0	13.0	66.0	4
3201231000	3203231000	10.0		14.0		
3201231200	3203231200	12.0	12.0	16.0	73.0	
3201231400	3203231400	14.0	14.0	18.0	75.0	
3201231600	3203231600	16.0	16.0	22.0	82.0	
3201231800	3203231800	18.0	18.0	24.0	84.0	
3201232000	3203232000	20.0	20.0	26.0	92.0	
3201232500	3203232500	25.0	25.0	25.0	110.0	5

Tolerances according to DIN h10 not e8
Toleranzen nach DIN 7160 & 7161

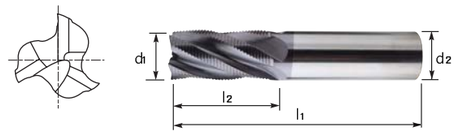
Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

MULTI FLUTE 30° HELIX LONG ROUGHING CARBIDE TiAlN COATED END MILLS

MG HM | 30° | FLUTE 3 - 5 | FINE | PLAIN | FLAT

Series No. 118123, 118323

TiAlN



for Stainless Steel, Titanium, Inconel

EDP. No FLAT	EDP. No STRAIGHT	MILL DIAMETER h10(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
1181230600	1183230600	6.0	6.0	16.0	57.0	3
1181230700	1183230700	7.0	8.0	16.0	63.0	
1181230800	1183230800	8.0		16.0		
1181230900	1183230900	9.0	10.0	19.0	72.0	4
1181231000	1183231000	10.0		22.0		
1181231200	1183231200	12.0	12.0	26.0	83.0	
1181231400	1183231400	14.0	14.0	26.0		
1181231600	1183231600	16.0	16.0	32.0	92.0	
1181231800	1183231800	18.0	18.0	32.0		
1181232000	1183232000	20.0	20.0	38.0	104.0	
1181232500	1183232500	25.0	25.0	45.0	121.0	5

Tolerances according to DIN h10 not e8
Toleranzen nach DIN 7160 & 7161

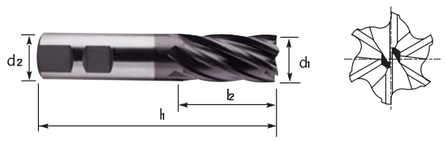
Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

4&6 FLUTE 30° HELIX SHORT ASP60 TiAlN COATED END MILLS

PM ASP60 | 30° | FLUTE 4&6 | FLAT

Series No. 107122

TiAlN



for Stainless Steel, Titanium, Inconel

EDP. No FLAT	EDP. No STRAIGHT	MILL DIAMETER e8(d_1)	SHANK DIAMETER h6(d_2)	LENGTH OF CUT l_2	OVERALL LENGTH l_1	NO. OF FLUTE
1071220300	—	3.0	6.0	8.0	52.0	4
1071220400	—	4.0		11.0	55.0	
1071220500	—	5.0		13.0	57.0	
1071220600	—	6.0		13.0		
1071220800	—	8.0	10.0	19.0	69.0	
1071221000	—	10.0		22.0	72.0	
1071221200	—	12.0	12.0	26.0	83.0	
1071221400	—	14.0		26.0		6
1071221600	—	16.0	16.0	32.0	92.0	
1071221800	—	18.0		32.0		
1071222800	—	20.0	20.0	38.0	104.0	
1071222500	—	25.0	25.0	45.0	121.0	

Tolerances according to DIN 7160 & 7161(ASP-60)

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
MILL DIA.	+ 30 0				
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

ET1 CUTTING CONDITION

3 & 4 FLUTE ET1 50° HIGH HELIX

132123, 132323

SIDE CUTTING

MATERIAL	STAINLESS STEEL TITANIUM ALLOY		INCONEL	
DIAMETER	RPM	FEED	RPM	FEED
6	2840	210	1050	55
8	2100	220	840	50
10	1680	220	680	50
12	1370	180	560	45
16	1050	135	420	35
18	950	125	370	30
20	840	145	340	30
25	670	115	270	25

SLOTTING

STAINLESS STEEL TITANIUM ALLOY		INCONEL	
RPM	FEED	RPM	FEED
1580	90	1160	40
1160	100	840	40
1010	105	670	40
840	90	560	30
630	65	420	25
560	60	370	20
510	55	320	20
400	45	270	15

R.P.M = rev./min, Feed = mm/min

MULTI FLUTE ET1 ROUGHING END MILLS

320323, 320123, 118123, 118323

SIDE CUTTING

MATERIAL	STAINLESS STEEL TITANIUM ALLOY		INCONEL	
DIAMETER	RPM	FEED	RPM	FEED
6	8400	570	2400	190
8	6300	570	1800	180
10	5100	570	1300	190
12	4200	570	1200	190
14	3600	570	900	130
16	3300	510	800	110
18	2700	420	700	100
20	2400	360	660	100
25	2160	410	600	110

R.P.M = rev./min, Feed = mm/min

4 & 6 FLUTE ET1 ASP60

107122

SIDE CUTTING

MATERIAL	STAINLESS STEEL TITANIUM ALLOY		INCONEL	
DIAMETER	RPM	FEED	RPM	FEED
6	8400	570	2400	190
8	6300	570	1800	180
10	5100	570	1300	190
12	4200	570	1200	190
14	3600	570	900	130
16	3300	510	800	110
18	2700	420	700	100
20	2400	360	660	100
25	2160	410	600	110

R.P.M = rev./min, Feed = mm/min

EUROPA TOOL

SPHERE & DIAMOND COATED

END MILLS

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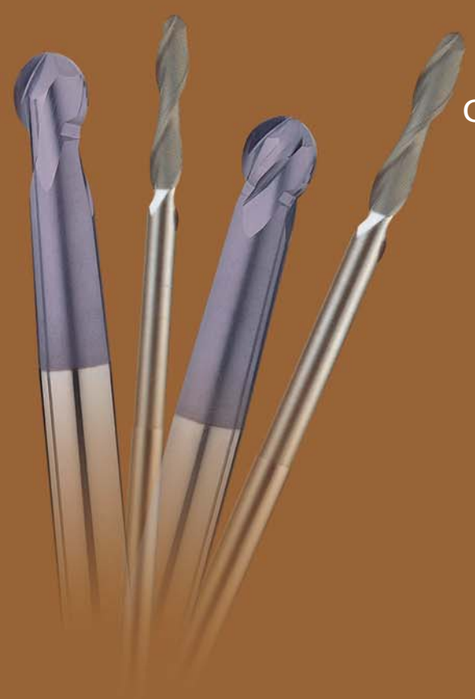


DESIGNED FOR
SURPASSING MILLING
OPERATION DRY CUTTING &
HIGH SPEED CUTTING

Europa Tool 8TH EDITION

SPHERE & DIAMOND COATED END MILLS CONTENTS

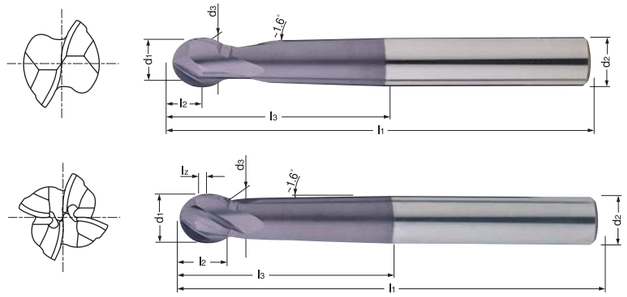
(Carbide for surpassing milling operation & dry cutting condition)

	PRODUCTS	SERIES	SHANK TYPE	DESCRIPTION	PAGE
		152320	• STRAIGHT	SPHERE 2 FL PULSAR COATED LONG CARBIDE BALL END MILLS	71
		154320	• STRAIGHT	SPHERE 4 FL PULSAR COATED LONG CARBIDE BALL END MILLS	71
		113325	• STRAIGHT	DIAMOND COATED 2 FL LONG CARBIDE BALL END MILLS	72
		114325	• STRAIGHT	DIAMOND COATED 2 FL LONG REACH CARBIDE BALL END MILLS	72
				CUTTING DATA	73

2&4 FLUTE, LONG BALL NOSE CARBIDE "PULSAR" COATED END MILLS

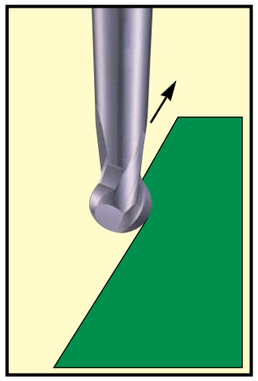
MG HM | 30° | PULSAR COATED | FLUTE 2 & 4 | PLAIN

Series No. 152320, 154320

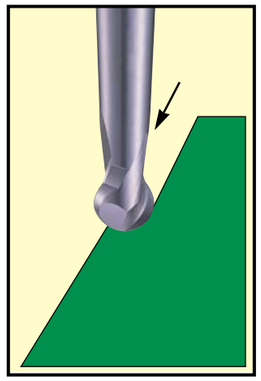


EDP. No 2FLUTE	EDP. No 4FLUTE	d_1 h9	r ±0.01	d_3	l_2	l_3	l_1	d_2 h6	l_z
1523200300	-	3.0	1.5	2.5	4.0	30.0	80.0	6.0	1.5
1523200400	-	4.0	2.0	3.3	5.0	30.0			
1523200500	1543200500	5.0	2.5	4.1	6.0	43.0			2
1523200600	1543200600	6.0	3.0	4.7	7.0	30.0	100.0	8.0	3
1523200800	1543200800	8.0	4.0	6.5	9.0	36.0		10.0	
1523201000	1543201000	10.0	5.0	8.2	11.0	43.0		12.0	
1523201200	1543201200	12.0	6.0	9.8	13.0	52.0		16.0	
1523201600	1543201600	16.0	8.0	13.4	15.0	61.0	150.0		

■ ADVANCED TECHNIQUE ■ NORMAL MILLING

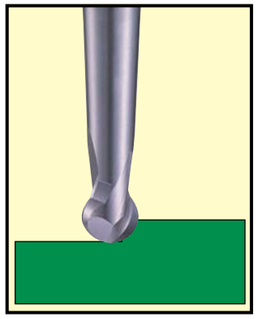


Favorable Back Milling
Vorteilhaftes Rückwärtsfräsen

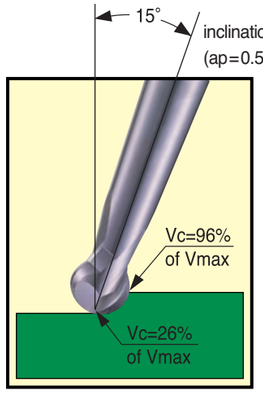


Normal Ball Nose
Unvorteilhaftes Fräsen

- Operating angle 14° ~ 16°, higher speed and feed are possible by decreased cutting resistance at the cutting edges contacting the workpiece.
- Excellent surface roughness and higher milling process.
- Enable to milling with higher speed and feed when Back Milling.



Normal Ball Nose
Unvorteilhaftes Profilfräsen



Favorable Profiling
Vovorteilhaftes Profilfräsen

- When 15° inclination milling operation, more productivity and higher speed and feed are possible.
- Decreased cutting force.
- Excellent surface roughness and brightness.

2 FLUTE, DIAMOND COATED LONG CARBIDE END MILLS

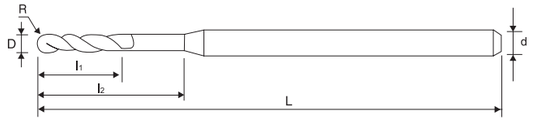
MG HM | 30° | COATED | FLUTE 2 | PLAIN

Series No. 113325

EDP. No	Radius ±0.02	MILL DIAMETER D (e8)	SHANK DIAMETER d (h6)	LENGTH OF CUT l_1	LENGTH BELOW SHANK l_2	OVERALL LENGTH L
1133250200	1.0	2.0	4.0	10.0	20.0	80
1133250300	1.5	3.0		15.0	25.0	
1133250400	2.0	4.0		20.0	30.0	
1133250500	2.5	5.0	6.0	30.0	50.0	100
1133250600	3.0	6.0		30.0	50.0	
1133250800	4.0	8.0	8.0	40.0	60.0	110
1133251000	5.0	10.0	10.0	50.0	70.0	120
1133251200	6.0	12.0	12.0	55.0	75.0	130

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13



2 FLUTE, DIAMOND COATED LONG REACH CARBIDE END MILLS

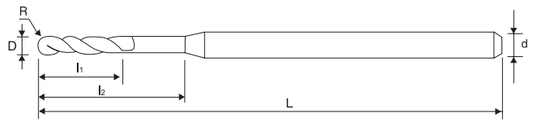
MG HM | 30° | COATED | FLUTE 2 | PLAIN

Series No. 114325

EDP. No	Radius ±0.02	MILL DIAMETER D (e8)	SHANK DIAMETER d (h6)	LENGTH OF CUT l_1	LENGTH BELOW SHANK l_2	OVERALL LENGTH L
1143250200	1.0	2.0	4.0	10.0	20.0	100
1143250300	1.5	3.0		15.0	25.0	
1143250400	2.0	4.0		20.0	30.0	
1143250500	2.5	5.0	6.0	30.0	50.0	120
1143250600	3.0	6.0		30.0	50.0	150
1143250800	4.0	8.0	8.0	40.0	60.0	

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13



DIAMOND & SPHERE CUTTING CONDITION

DIAMOND CUTTING CONDITION

113325, 114325

CUTTING SPEED : 200～400m/min

FEED : 0.05～0.15mm/teeth

SPHERE CARBIDE LONG BALL CUTTING CONDITION

152320

HIGH SPEED CUTTING

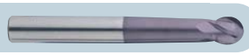
MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1250N/㎟		1500N/㎟	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
3	35000	2800	33000	2600	12000	900
4	26000	2300	25000	2200	9000	800
5	21000	2100	20000	2000	7000	700
6	17000	1900	16000	1800	6000	650
8	13000	1700	12000	1600	4500	550
10	10500	1450	10000	1400	3500	500
12	9000	1400	8000	1300	3000	450
16	6000	1200	5500	1100	2000	400

NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS	
~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
~1000N/㎟		1000 ~ 1250N/㎟		1500N/㎟	
RPM	FEED	RPM	FEED	RPM	FEED
47000	3700	44000	3500	17000	1400
35000	3200	33000	3000	13000	1200
28000	2800	27000	2600	10000	1100
23000	2600	22000	2400	8000	950
18000	2300	17000	2100	6000	850
14000	2000	13000	1900	5000	750
12000	1800	11000	1800	4000	700
9000	1600	8000	1500	3300	600

R.P.M = rev./min, Feed = mm/min

SPHERE CARBIDE LONG BALL CUTTING CONDITION

154320



HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~1000N/㎟		1000 ~ 1250N/㎟		1500N/㎟	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
5	21000	4000	20000	4000	7000	1400
6	17000	4000	16000	3500	6000	1300
8	13000	3500	12000	3000	4500	1100
10	10500	3000	10000	2500	3500	1000
12	9000	2800	8000	2500	3000	950
16	6000	2800	5500	2200	2000	800

NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS	
~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
~1000N/㎟		1000 ~ 1250N/㎟		1500N/㎟	
RPM	FEED	RPM	FEED	RPM	FEED
28000	5600	27000	5300	11000	2100
23000	5100	22000	4900	9000	1900
18000	4600	17000	4300	7000	1700
14000	3900	13000	3700	5000	1400
12000	3700	11000	3500	4500	1300
9000	3100	8000	3000	3300	1100

R.P.M = rev./min, Feed = mm/min

EUROPA TOOL

HX2

STAGGERED HELIX END MILLS

w w w.europatool.co.uk

Europa Tool 8TH EDITION

HX2 STAGGERED HELIX END MILL CONTENTS

(Carbide for silent and improved machining)

	PRODUCTS	SERIES	SHANK TYPE	DESCRIPTION	PAGE
		136123 136323	FLAT STRAIGHT	4 FLUTE, SHORT LENGTH	78
		137123 137323	FLAT STRAIGHT	4 FLUTE, SHORT LENGTH, CORNER RADIUS	79
		138123 138323	FLAT STRAIGHT	4 FLUTE, LONG LENGTH	80
		139123 139323	FLAT STRAIGHT	4 FLUTE, LONG LENGTH, CORNER RADIUS	81
				CUTTING DATA	82

HX2 STAGGERED HELIX MILLING CUTTERS

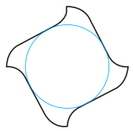
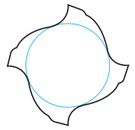
COMPLETELY NEW MILLING GENERATION
WORLD FIRST. VERY SMOOTH CHIP REMOVAL AND SILENT MACHINING
AVOIDS RESONANCE VIBRATION DUE TO THE UNIQUE SINUSOIDAL FLUTE FORM DESIGN
IMPROVES SURFACE FINISH DUE TO THE CHATTER FREE DESIGN
INCREASED CUTTING DEPTH AND FEED RATES

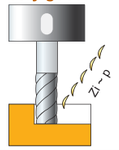
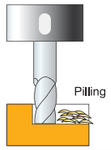
APPLICATION
STAINLESS STEELS, TITANIUM ALLOYS, INCONEL, MILD STEELS & CAST IRON,
TOOL STEELS AND LOW HARDNESS MATERIAL UNDER HRC40

MATERIAL	K30/40	PRIME GRADE CARBIDE
COATING	ALTIN	HARDNESS: HV (0.05) = 3,500 OXIDISATION TEMP: 900 DEG C
GEOMETRY	SINUSOIDAL	HIGH RAKE MEDIUM CORE

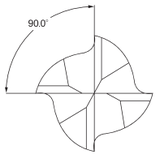
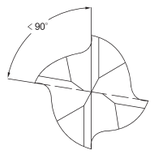
HX2 STAGGERED HELIX VS COMPETITORS

THE CHARACTERISTICS

HX2	CONVENTIONAL
	
CROSS SECTION OF CORE	

HX2	CONVENTIONAL
Very good! 	
◎  Chip flow: Very smooth	×  Chip flow: Not smooth

GEOMETRY COMPARISON BETWEEN HX2 AND COMPETITORS

	HX2 END MILL	COMPETITORS END MILLS
HELIX	SINUSOIDAL	UNEQUAL CONSTANT
END INDEX	 EQUAL	 UNEQUAL
RADIAL RAKE ANGLE	CHANGEABLE	CONSTANT
RADIAL PRIMARY RELIEF & TYPE	CHANGEABLE & ECCENTRIC	CONSTANT & ECCENTRIC
FLUTE FORM DESIGN	UNIQUE	CONVENTIONAL

UNIQUE PATENTED FLUTE FORM DESIGN

4 FLUTE, SHORT LENGTH

MG HM | FLUTE 4 | PLAIN | FLAT

Series No. 136123, 136323

SOLID CARBIDE MICRO GRAIN
STRAIGHT AND FLATTED SHANK ALTIN COATED
4 FLUTES SHORT

MINIMIZED TOOL DEFLECTION
CORNER PROTECTED
REDUCED TOOL VIBRATION

ALL DIMENSIONS ARE IN MM

MILL DIAMETER	SHANK DIAMETER	LENGTH OF CUT	OVERALL LENGTH	EUROPA CODE FLATTED	EUROPA CODE PLAIN
3	6	7	54	**1361230300**	**1363230300**
4	6	8	54	**1361230400**	**1363230400**
5	6	10	54	**1361230500**	**1363230500**
6	6	10	54	**1361230600**	**1363230600**
8	8	12	58	**1361230800**	**1363230800**
10	10	14	66	**1361231000**	**1363231000**
12	12	16	73	**1361231200**	**1363231200**
14	14	18	75	**1361231400**	**1363231400**
16	16	22	82	**1361231600**	**1363231600**
18	18	24	84	**1361231800**	**1363231800**
20	20	26	92	**1361232000**	**1363232000**

SUITABLE FOR
STAINLESS STEELS, TITANIUM AND INCONEL

4 FLUTE, SHORT LENGTH, CORNER RADIUS

MG HM | FLUTE 4 | PLAIN | FLAT

Series No. 137123, 137323

SOLID CARBIDE MICRO GRAIN
STRAIGHT AND FLATTED SHANK
ALTIN COATED
4 FLUTES SHORT

MINIMIZED TOOL DEFLECTION
CORNER PROTECTED
REDUCED TOOL VIBRATION

ALL DIMENSIONS ARE IN MM

MILL DIA.	RADIUS R	SHANK DIA.	L.O.C.	O/ALL	EUROPA CODE FLATTED	EUROPA CODE PLAIN
3	**R0.25-R0.38**	6	7	54	**1371230300**	**1373230300**
4	**R0.25-R0.38**	6	8	54	**1371230400**	**1373230400**
5	**R0.25-R0.38**	6	10	54	**1371230500**	**1373230500**
6	**R0.38-R0.51**	6	10	54	**1371230600**	**1373230600**
8	**R0.38-R0.51**	8	12	58	**1371230800**	**1373230800**
10	**R0.38-R0.51**	10	14	66	**1371231000**	**1373231000**
12	**R0.64-R0.76**	12	16	73	**1371231200**	**1373231200**
14	**R0.64-R0.76**	14	18	75	**1371231400**	**1373231400**
16	**R0.89-R1.02**	16	22	82	**1371231600**	**1373231600**
18	**R0.89-R1.02**	18	24	84	**1371231800**	**1373231800**
20	**R0.89-R1.02**	20	26	92	**1371232000**	**1373232000**

SUITABLE FOR
STAINLESS STEELS, TITANIUM AND INCONEL

4 FLUTE, LONG LENGTH

MG HM | FLUTE 4 | PLAIN | FLAT

Series No. 138123, 138323

SOLID CARBIDE MICRO GRAIN
STRAIGHT AND FLATTED SHANK
ALTIN COATED
4 FLUTES LONG SERIES

MINIMIZED TOOL DEFLECTION
CORNER PROTECTED
REDUCED TOOL VIBRATION

ALL DIMENSIONS ARE IN MM

MILL DIAMETER	SHANK DIAMETER	LENGTH OF CUT	OVERALL LENGTH	EUROPA CODE FLATTED	EUROPA CODE PLAIN
3	6	8	57	**1381230300**	**1383230300**
4	6	11	57	**1381230400**	**1383230400**
5	6	13	57	**1381230500**	**1383230500**
6	6	13	57	**1381230600**	**1383230600**
8	8	19	63	**1381230800**	**1383230800**
10	10	22	72	**1381231000**	**1383231000**
12	12	26	83	**1381231200**	**1383231200**
14	14	26	83	**1381231400**	**1383231400**
16	16	32	92	**1381231600**	**1383231600**
18	18	32	92	**1381231800**	**1383231800**
20	20	38	104	**1381232000**	**1383232000**
25	25	38	108	**1381232500**	**1383232500**

SUITABLE FOR
STAINLESS STEELS, TITANIUM AND INCONEL

4 FLUTE, LONG LENGTH, CORNER RADIUS

MG HM | FLUTE 4 | PLAIN | FLAT

Series No. 139123, 139323

SOLID CARBIDE MICRO GRAIN
STRAIGHT AND FLATTED SHANK
ALTIN COATED
4 FLUTES LONG

MINIMIZED TOOL DEFLECTION
CORNER PROTECTED
REDUCED TOOL VIBRATION

ALL DIMENSIONS ARE IN MM

MILL DIA.	RADIUS R	SHANK DIA.	L.O.C.	O/ALL	EUROPA CODE FLATTED	EUROPA CODE PLAIN
3	**R0.25-R0.38**	6	8	57	**1391230300**	**1393230300**
4	**R0.25-R0.38**	6	11	57	**1391230400**	**1393230400**
5	**R0.25-R0.38**	6	13	57	**1391230500**	**1393230500**
6	**R0.38-R0.51**	6	13	57	**1391230600**	**1393230600**
8	**R0.38-R0.51**	8	19	63	**1391230800**	**1393230800**
10	**R0.38-R0.51**	10	22	72	**1391231000**	**1393231000**
12	**R0.64-R0.76**	12	26	83	**1391231200**	**1393231200**
14	**R0.64-R0.76**	14	26	83	**1391231400**	**1393231400**
16	**R0.89-R1.02**	16	32	92	**1391231600**	**1393231600**
18	**R0.89-R1.02**	18	32	92	**1391231800**	**1393231800**
20	**R0.89-R1.02**	20	38	104	**1391232000**	**1393232000**

SUITABLE FOR
STAINLESS STEELS, TITANIUM AND INCONEL

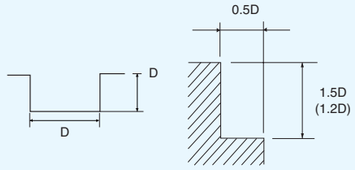
HX2 STAGGERED HELIX cutting condition

136123, 137123, 138123, 139123

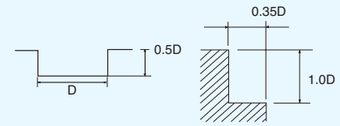
MATERIAL (material)	ALLOY STEELS CASTIRON (Legierte Stähle / Grauguss)		ALLOY STEELS CASTIRON (Legierte Stähle / Grauguss)		STAINLESS STEELS 300SERIES (Rostfreie Stähle 300Serien)		STAINLESS STEELS 400SERIES (Rostfreie Stähle 400Serien)		TITANIUM (Titanium)		INCONEL (Inconel)	
HARDNESS	~HB 300		HB 300~HB 380									
STRENGTH	~1000N/mm2		1000N/mm2~1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	13475	275	9430	190	10185	195	14260	205	10185	205	2715	55
4	10105	330	7070	230	7600	250	14260	255	7600	255	2005	55
5	8085	370	5660	260	6110	310	8655	310	6110	310	1630	80
6	6735	435	4715	385	5095	360	7130	360	5095	360	1355	95
8	5050	555	3535	385	3820	435	5345	465	3280	465	1015	125
10	4455	690	3115	480	3055	590	4275	585	3055	585	815	155
12	3710	695	2600	485	2545	565	3565	565	2545	565	675	150
14	3180	620	2225	435	2180	520	3055	520	2180	520	580	140
16	2785	590	1950	410	1910	480	2670	480	1910	480	505	130
18	2475	585	1730	410	1695	475	2375	475	1695	475	450	125
20	2225	580	1560	405	1525	470	2140	470	1525	470	405	125
25	1780	450	1245	315	1215	380	1710	380	1215	380	320	110

RPM=REVOLUTION PER MIN.
FEED=mm/min.

• ALLOY STEELS CAST IRON / STAINLESS STEELS 300, 400SERIES / TITANIUM



• INCONEL



• 1.2 x D Axial cutting depth should be applied for Short length series DIA over 8mm

TOLERANCE

136123, 137123, 138123, 139123

METRIC		INCH	
MILL DIA.	SHANK DIA.	MILL DIA.	MILL DIA.
0 ~ -0.03	h 6	0 ~ -.0012	h 6

ALU-XP
END MILLS

www.europatool.co.uk

Europa Tool 8TH EDITION

ALU-XP END MILL CONTENTS
(Carbide for aluminium & other non-ferrous materials)

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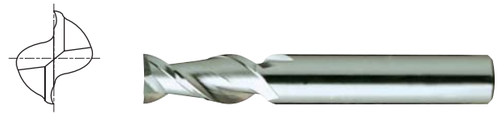
2 FLUTE 45° DEG HELIX FOR ALUMINIUM

MG HM | 30° | FLUTE 2 | PLAIN

Series No. 151303



PLAIN SHANK
MICROGRAIN SOLID CARBIDE

Suitable for high speed machining in aluminium and other non-ferrous materials. Exellent surface finishes, superior chip removal.

MILL DIAMETER h10	SHANK DIAMETER h6	LENGTH OF CUT	OVERALL LENGTH	EUROPA CODE
3	6	8	57	**1513030300**
4	6	11	57	**1513030400**
5	6	13	57	**1513030500**
6	6	13	57	**1513030600**
8	8	19	63	**1513030800**
10	10	22	72	**1513031000**
12	12	26	83	**1513031200**
14	14	26	83	**1513031400**
16	16	32	92	**1513031600**
18	18	32	92	**1513031800**
20	20	38	104	**1513032000**

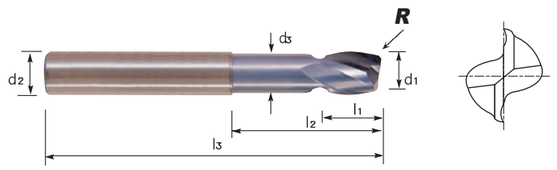
ALL DIMENSIONS ARE IN MM
AVAILABLE IN TIN, TICN & TIALN COATINGS - ON REQUEST

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

2 FLUTE, CORNER RADIUS FOR ALUMINIUM, TICN COATED

MG HM | 30° | FLUTE 2 | PLAIN

Series No. 155309



PLAIN SHANK
MICROGRAIN SOLID CARBIDE

Excellent cutting qualities on stainless steel, aluminium and copper

Increased tool life and higher cutting accuracy.

R	MILL DIA. d1(e8)	SHANK DIA. d2(h6)	LENGTH OF CUT l1	LENGTH BELOW SHANK l2	O/ALL LENGTH l3	NECK DIA. d3	EUROPA CODE
R0.3	4	6	5	10	50	3.6	**1553090400**
R0.5	6	6	8	20	60	5.4	**1553090600**
R0.6	8	8	10	30	70	7.2	**1553090800**
R0.8	10	10	12	36	80	9	**1553091000**
R1.0	12	12	14	40	90	11	**1553091200**
R1.3	16	16	18	45	100	14.5	**1553091600**
R1.6	20	20	24	45	100	18	**1553092000**

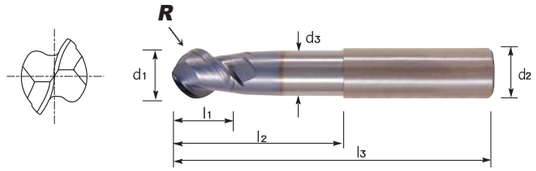
ALL DIMENSIONS ARE IN MM

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

2 FLUTE BALL NOSED FOR ALUMINIUM, TICN COATED

MG HM | 50° | FLUTE 2 | PLAIN

Series No. 112309



PLAIN SHANK
MICROGRAIN SOLID CARBIDE

Excellent cutting qualities on aluminium, copper & stainless steel

Increased tool life and higher cutting accuracy.

R +0.01 -0.01	MILL DIA. d1	SHANK DIA. d2(h6)	LENGTH OF CUT l1	LENGTH BELOW SHANK l2	O/ALL LENGTH l3	NECK DIA. d3	EUROPA CODE
R3.0	6	6	5.5	25	55	5.4	**1123090600**
R4.0	8	8	7	30	65	7.2	**1123090800**
R5.0	10	10	8.5	35	75	9	**1123091000**
R6.0	12	12	10.5	40	75	11	**1123091200**
R8.0	16	16	14	50	90	14.5	**1123091600**
R10.0	20	20	17	50	100	18	**1123092000**

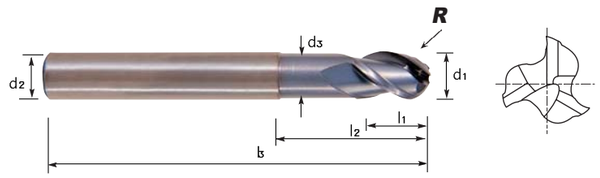
ALL DIMENSIONS ARE IN MM

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

3 FLUTE BALL NOSED FOR ALUMINIUM, TICN COATED

MG HM | 40° | FLUTE 3 | PLAIN

Series No. 116309



PLAIN SHANK
MICROGRAIN SOLID CARBIDE

Excellent cutting qualities on stainless steel, aluminium and copper

Increased tool life and higher cutting accuracy.

R +0.01 -0.01	MILL DIA. d1(e8)	SHANK DIA. d2(h6)	LENGTH OF CUT l1	LENGTH BELOW SHANK l2	O/ALL LENGTH l3	NECK DIA. d3	EUROPA CODE
R1.0	2.0	6	3	5	60	1.9	**1163090200**
R1.25	2.5	6	4	6	60	2.4	**1163090250**
R1.5	3.0	6	4.5	6.5	60	2.8	**1163090300**
R1.75	3.5	6	5	7	65	3.2	**1163090350**
R2.0	4.0	6	6	8	65	3.7	**1163090400**
R2.5	5.0	6	7.5	10	65	4.6	**1163090500**
R3.0	6.0	6	9	12	75	5.6	**1163090600**
R4.0	8.0	8	12	25	75	7.4	**1163090800**
R5.0	10.0	10	15	30	80	9.4	**1163091000**
R6.0	12.0	12	18	36	90	11.4	**1163091200**
R8.0	16.0	16	24	40	100	15.4	**1163091600**

ALL DIMENSIONS ARE IN MM

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

3 FLUTE LONG ROUGHING END MILLS FOR ALUMINIUM

MG HM | YG STD | WR | 40° | FLUTE 3 | DIN 6535HA | DIN 6535HB

Series No. 125103, 125303

FLATTED SHANK
MICROGRAIN SOLID CARBIDE

MILL DIAMETER h10	SHANK DIAMETER h6	LENGTH OF CUT	OVERALL LENGTH	EUROPA CODE	
				FLAT	PLAIN
6.0	6	16	57	**1251030600**	**1253030600**
8.0	8	16	63	**1251030800**	**1253030800**
10.0	10	22	72	**1251031000**	**1253031000**
12.0	12	26	83	**1251031200**	**1253031200**
14.0	14	26	83	**1251031400**	**1253031400**
16.0	16	32	92	**1251031600**	**1253031600**
20.0	20	38	104	**1251032000**	**1253032000**

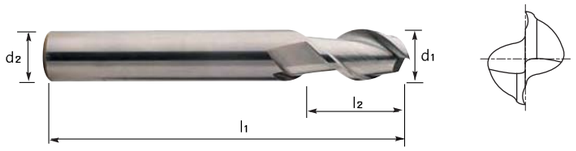
ALL DIMENSIONS ARE IN MM
AVAILABLE IN TIN, TICN & TIALN COATINGS - ON REQUEST

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

2 FLUTE, ALUMINIUM, SHORT REACH

MG HM | 45° | FLUTE 2 | PLAIN

Series No. 331303



TWO FLUTE MICRO GRAIN CARBIDE END MILLS FOR ALUMINIIUM
2 Flute, Helix 45° Center Cutting, with Straight Shank

VOLLHARTMETAL FRÄSER FÜR ALLUMINUM
2 Schneiden,Rechtsspirale 45° Zentrumschneidend, mit Zylinderschaft

FRAISES POUR ALLAGES CARBURE MONOBLOC
2 Dents, Hélice 45° Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN VOOR ALUMINIUM
2 groeven, helix 45° centerfrees met rechte schacht

FRESE PER MACCHINE ELU SCANALATURE IN CARBURO MONOBLOCCO
2 Taglienti, Elica 45° Tagliente al Centro a Codolo Gambo Cilindrico

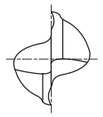
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	7.0	38.0	3313030300	3313230300	3313090300
3.5	6.0	7.0	57.0	3313030350	3313230350	3313090350
4.0		8.0		3313030400	3313230400	3313090400
4.5		8.0		3313030450	3313230450	3313090450
5.0		10.0		3313030500	3313230500	3313090500
6.0		10.0		3313030600	3313230600	3313090600
8.0	8.0	16.0	63.0	3313030800	3313230800	3313090800
10.0	10.0	19.0	72.0	3313031000	3313231000	3313091000
12.0	12.0	22.0	83.0	3313031200	3313231200	3313091200
14.0	14.0	22.0		3313031400	3313231400	3313091400
16.0	16.0	26.0	92.0	3313031600	3313231600	3313091600
20.0	20.0	32.0	104.0	3313032000	3313232000	3313092000

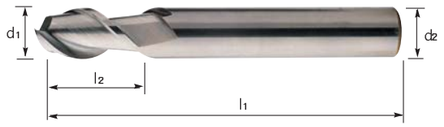
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 — 40	0 — 48	0 — 58	0 — 70	0 — 84
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13

2 FLUTE , STANDARD, STRAIGHT SHANK, FOR ALUMINIUM

MG HM | N | 45° | FLUTE 2 | PLAIN





Series No. 531303

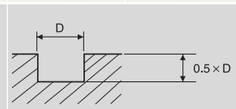
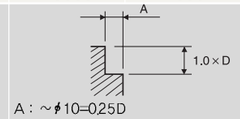
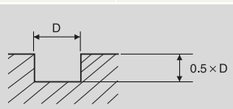
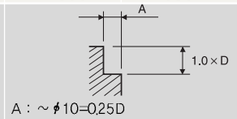
Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	7/16	1.1/2	5313030080	5313230080	5313090080
3/16	3/16	9/16	2	5313030120	5313230120	5313090120
1/4	1/4	3/4	2.1/2	5313030160	5313230160	5313090160
5/16	5/16	13/16	2.1/2	5313030200	5313230200	5313090200
3/8	3/8	7/8	2.1/2	5313030240	5313230240	5313090240
1/2	1/2	1	3	5313030320	5313230320	5313090320
5/8	5/8	1.1/4	3.1/2	5313030400	5313230400	5313090400
3/4	3/4	1.1/2	4	5313030480	5313230480	5313090480
1	1	1.1/2	4	5313030640	5313230640	5313090640

i Available Whilest Stocks Last.

ALU-XP cutting condition

2 FLUTE CORNER RADIUS TiCN COATED

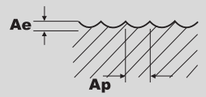
115309

MATERIAL	ALUMINUM ALUMINUM ALLOY				COPPER ALLOY			
DIAMETER	RPM	FEED(mm/min)	RPM	FEED(mm/min)	RPM	FEED(mm/min)	RPM	FEED(mm/min)
R0.3 ×4	13000	1200	13000	1400	3900	300	3900	350
R0.5 ×6	13000	1500	13000	2000	3900	380	3900	500
R0.6 ×8	10000	1800	10000	2300	3000	450	3000	580
R0.8 ×10	10000	2200	10000	2700	3000	550	3000	680
R1.0 ×12	10000	2700	10000	3400	3000	680	3000	850
R1.3 ×16	8000	2500	8000	3100	2400	630	2400	780
R1.6 ×20	5000	2000	5000	2500	1500	500	1500	630
								

RPM=REVOLUTION PER MIN.
FEED=mm/min.

2 FLUTE BALL NOSED TiCN COATED

112309

MATERIAL	ALUMINUM ALUMINUM ALLOY		COPPER ALLOY	
DIAMETER	RPM	FEED	RPM	FEED
R3.0 ×6	18000	1750	5500	440
R4.0 ×8	14000	2000	4200	500
R5.0 ×10	14000	2350	4200	580
R6.0 ×12	14000	3000	4200	750
R8.0 ×16	11000	2700	3300	670
R10.0 ×20	7000	2200	2100	550
	Ae=0.2×D Ap=0.5×D			

RPM=REVOLUTION PER MIN.
FEED=mm/min.

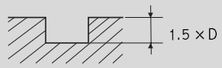
ALU-XP cutting condition

3 FLUTE ROUGHING FOR ALUMINIUM

125103

<Slotting>

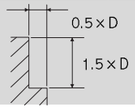
MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
6	10500	800
8	8000	700
10	6500	750
12	5250	800
16	4000	800
20	3200	800



RPM =rev/min, FEED =mm/min

<Side Cutting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
6	10500	800
8	8000	700
10	6500	750
12	5250	800
16	4000	800
20	3200	800

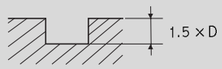


RPM =rev/min, FEED =mm/min

3 FLUTE, ROUGHING for ALUMINIUM, TiCN COATED

<Slotting>

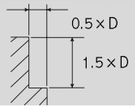
MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
6	13500	1050
8	10500	900
10	8500	1000
12	6800	1050
16	5200	1050
20	4200	1050



RPM =rev/min, FEED =mm/min

<Side Cutting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
6	13500	1050
8	10500	900
10	8500	950
12	6800	1050
16	5200	1050
20	4200	1050



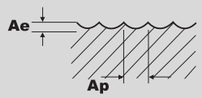
RPM =rev/min, FEED =mm/min

3 FLUTE, BALL NOSED TiCN COATED

116309

MATERIAL	ALUMINUM LOW SILICON ALUMINUM		COPEER ALLOYS	
DIAMETER	RPM	FEED	RPM	FEED
R1.0 ×2	27000	950	8000	240
R1.25 ×2.5	22000	950	6500	240
R1.5 ×3	18000	950	5500	240
R2.0 ×4	18000	1250	5500	310
R2.5 ×5	18000	1350	5500	340
R3.0 ×6	18000	1750	5500	440
R4.0 ×8	14000	2000	4200	500
R5.0 ×10	14000	2350	4200	580
R6.0 ×12	14000	3000	4200	750
R8.0 ×16	11000	2700	3300	670

Ae=0.2×D
Ap=0.5×D



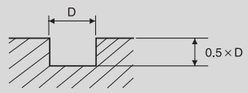
RPM=REVOLUTION PER MIN., FEED=mm/min.

ALU-XP cutting condition

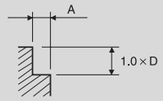
2 FLUTE, 45° HELIX for ALUMINUM

151303

MATERIAL	ALUMINUM LOW SILICON ALUMINUM			
DIAMETER	RPM	FEED	RPM	FEED
3	10000	700	10000	900
4	10000	900	10000	1100
5	10000	1000	10000	1300
6	10000	1200	10000	1500
8	8000	1400	8000	1800
10	8000	1700	8000	2100
12	8000	2100	8000	2600
14	6000	1800	6000	2200
16	6000	1900	6000	2400
18	4000	1400	4000	1800
20	4000	1600	4000	1900



A : ∮3~∮10=0.25×D
∮12~∮20=0.5×D

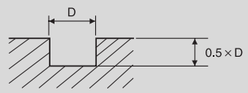


RPM=REVOLUTION PER MIN., FEED=mm/min.

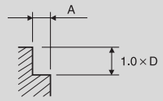
2 FLUTE, 45° HELIX for ALUMINUM, TiCN COATED

151303

MATERIAL	ALUMINUM LOW SILICON ALUMINUM			
DIAMETER	RPM	FEED	RPM	FEED
3	13000	900	13000	1200
4	13000	1200	13000	1400
5	13000	1300	13000	1700
6	13000	1500	13000	2000
8	10000	1800	10000	2300
10	10000	2200	10000	2700
12	10000	2700	10000	3400
14	8000	2300	8000	2800
16	8000	2500	8000	3100
18	5000	1800	5000	2300
20	5000	2000	5000	2500



A : ∮3~∮10=0.25×D
∮12~∮20=0.5×D



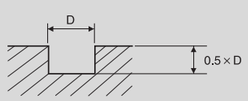
RPM=REVOLUTION PER MIN., FEED=mm/min.

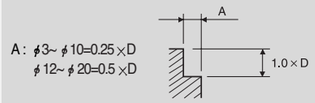
ALU-XP cutting condition

2 FLUTE, 45° HELIX for ALUMINUM

331303, 151303

MATERIAL	ALUMINUM LOW SILICON ALUMINUM			
DIAMETER	RPM	FEED	RPM	FEED
3	10000	700	10000	900
4	10000	900	10000	1100
5	10000	1000	10000	1300
6	10000	1200	10000	1500
8	8000	1400	8000	1800
10	8000	1700	8000	2100
12	8000	2100	8000	2600
14	6000	1800	6000	2200
16	6000	1900	6000	2400
18	4000	1400	4000	1800
20	4000	1600	4000	1900



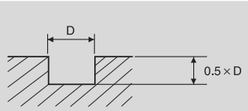


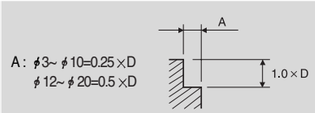
RPM=REVOLUTION PER MIN.
FEED=mm/min.

2 FLUTE, 45° HELIX for ALUMINUM, TiCN-COATED

331303, 151303

MATERIAL	ALUMINUM LOW SILICON ALUMINUM			
DIAMETER	RPM	FEED	RPM	FEED
3	13000	900	13000	1200
4	13000	1200	13000	1400
5	13000	1300	13000	1700
6	13000	1500	13000	2000
8	10000	1800	10000	2300
10	10000	2200	10000	2700
12	10000	2700	10000	3400
14	8000	2300	8000	2800
16	8000	2500	8000	3100
18	5000	1800	5000	2300
20	5000	2000	5000	2500





RPM=REVOLUTION PER MIN.
FEED=mm/min.

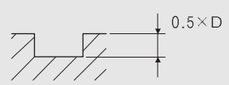
ALU-XP cutting condition

2 FLUTE, STANDARD, STRAIGHT SHANK, FOR ALUMINIUM

531303

Slotting

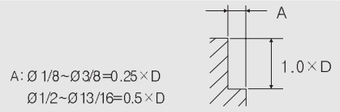
MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	10000	700
4	10000	900
5	10000	1000
6	10000	1200
8	8000	1400
10	8000	1700
12	8000	2100
14	6000	1800
16	6000	1900
18	4000	1400
20	4000	1600



※The FEED, in long & extra long types, should be raduced by around 50%

Side Cutting

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	10000	900
4	10000	1100
5	10000	1300
6	10000	1500
8	8000	1800
10	8000	2100
12	8000	2600
14	6000	2200
16	6000	2400
18	4000	1800
20	4000	1900



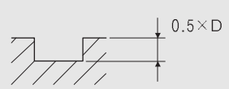
RPM=REVOLUTION PER MIN.
FEED=mm/min.

2 FLUTE, STANDARD, STRAIGHT SHANK, FOR ALUMINIUM, TiCN-COATED

531303

Slotting

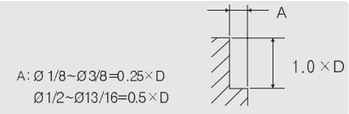
MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	15600	1080
4	15600	1440
5	15600	1560
6	15600	1800
8	12000	2160
10	12000	2640
12	12000	3240
14	9600	2760
16	9600	3000
18	6000	2160
20	6000	2400



※The FEED, in long & extra long types, should be raduced by around 50%

Side Cutting

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	12000	1440
4	12000	1680
5	12000	2040
6	12000	2400
8	9600	2760
10	9600	3240
12	9600	4078
14	7200	3359
16	7200	3722
18	4800	2760
20	4800	3000



RPM=REVOLUTION PER MIN.
FEED=mm/min.

STANDARD SOLID CARBIDE K30

END MILLS

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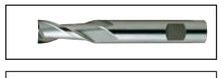
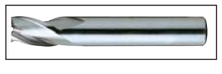
Europa Tool 8TH EDITION

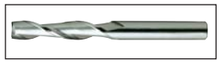
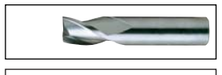
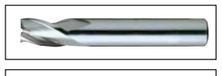
STANDARD SOLID CARBIDE K30

(General purpose carbide material up to Hrc 50)

PRODUCTS	SERIES	DESCRIPTION	PAGE
Europa Standard			
2 FLUTE MICRO GRAIN CARBIDE (METRIC)			
	300303	SHORT LENGTH STRAIGHT SHANK	102
	301303	STANDARD LENGTH STRAIGHT SHANK	103
	302303	LONG LENGTH STRAIGHT SHANK	104
3 FLUTE MICRO GRAIN CARBIDE (METRIC)			
	303303	SHORT LENGTH STRAIGHT SHANK	105
	304303	STANDARD LENGTH STRAIGHT SHANK	106
	305303	LONG LENGTH STRAIGHT SHANK	107
4 FLUTE MICRO GRAIN CARBIDE (METRIC)			
	309303	SHORT LENGTH STRAIGHT SHANK	108
	310303	STANDARD LENGTH STRAIGHT SHANK	109
	311303	LONG LENGTH STRAIGHT SHANK	110
2 FLUTE BALL NOSE MICRO GRAIN CARBIDE (METRIC)			
	312303	SHORT LENGTH STRAIGHT SHANK	111
	313303	STANDARD LENGTH STRAIGHT SHANK	112
	314303	LONG LENGTH STRAIGHT SHANK	113
3 FLUTE BALL NOSE MICRO GRAIN CARBIDE (METRIC)			
	306303	SHORT LENGTH STRAIGHT SHANK	114
	307303	STANDARD LENGTH STRAIGHT SHANK	115
	308303	LONG LENGTH STRAIGHT SHANK	116

STANDARD SOLID CARBIDE K30
(General purpose carbide material up to Hrc 50)

PRODUCTS	SERIES	DESCRIPTION	PAGE
4 FLUTE BALL NOSE MICRO GRAIN CARBIDE (METRIC)			
	317303	SHORT LENGTH STRAIGHT SHANK	117
	315303	STANDARD LENGTH STRAIGHT SHANK	118
	316303	LONG LENGTH STRAIGHT SHANK	119
3 FLUTE THROW AWAY MICRO GRAIN CARBIDE (METRIC)			
	128103	SHORT LENGTH WITH FLATTED SHANK DIN STD	120
DIN Standard			
2 FLUTE MICRO GRAIN CARBIDE (METRIC)			
	162303	EXTRA LONG SERIES 2 FLT BALL NOSED S/DRILL	121
	100103	SHORT LENGTH (DIN6527) FLATTED SHANK	122
	102103	LONG LENGTH (DIN6527) FLATTED SHANK	123
	101103	STANDARD LENGTH STRAIGHT SHANK	124
3 FLUTE MICRO GRAIN CARBIDE (METRIC)			
	140103	SHORT (DIN6527) 45° DEG.FLATTED SHANK	125
	141103	LONG (DIN6527) 45° DEG.FLATTED SHANK	126
	104103	STANDARD (DIN6528) STRAIGHT SHANK	127
4 FLUTE MICRO GRAIN CARBIDE (METRIC)			
	109103	SHORT (DIN6527) FLATTED SHANK	128
	111103	LONG (DIN6527) FLATTED SHANK	129
	110103	STANDARD (DIN6528) STRAIGHT SHANK	130

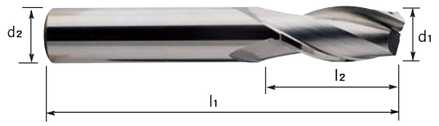
PRODUCTS	SERIES	DESCRIPTION	PAGE
Europa Standard			
2 FLUTE MICRO GRAIN CARBIDE (IMPERIAL)			
	500303	SHORT LENGTH STRAIGHT SHANK	131
	501303	STANDARD LENGTH STRAIGHT SHANK	132
	502303	LONG LENGTH STRAIGHT SHANK	133
3 FLUTE MICRO GRAIN CARBIDE (IMPERIAL)			
	506303	SHORT LENGTH STRAIGHT SHANK	134
	507303	STANDARD LENGTH STRAIGHT SHANK	135
	508303	LONG LENGTH STRAIGHT SHANK	136
4 FLUTE MICRO GRAIN CARBIDE (IMPERIAL)			
	509303	SHORT LENGTH STRAIGHT SHANK	137
	510303	STANDARD LENGTH STRAIGHT SHANK	138
	511303	LONG LENGTH STRAIGHT SHANK	139
2 FLUTE BALL NOSE MICRO GRAIN CARBIDE (IMPERIAL)			
	512303	SHORT LENGTH STRAIGHT SHANK	140
	513303	STANDARD LENGTH STRAIGHT SHANK	141
	514303	LONG LENGTH STRAIGHT SHANK	142
3 FLUTE BALL NOSE MICRO GRAIN CARBIDE (IMPERIAL)			
	518303	SHORT LENGTH STRAIGHT SHANK	143
	519303	STANDARD LENGTH STRAIGHT SHANK	144
	520303	LONG LENGTH STRAIGHT SHANK	145

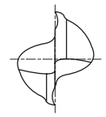
STANDARD SOLID CARBIDE K30

(General purpose carbide material up to Hrc 50)

PRODUCTS	SERIES	DESCRIPTION	PAGE
4 FLUTE BALL NOSE MICRO GRAIN CARBIDE (IMPERIAL)			
	516303	SHORT LENGTH STRAIGHT SHANK	146
	515303	STANDARD LENGTH STRAIGHT SHANK	147
	517303	LONG LENGTH STRAIGHT SHANK	148
3 FLUTE THROW AWAY MICRO GRAIN CARBIDE (IMPERIAL)			
	528103	SHORT LENGTH WITH FLATTED SHANK	149
		CUTTING DATA	150/162

2 FLUTE, SHORT, STRAIGHT SHANK





MG HM | 30° | FLUTE 2 | PLAIN

Series No. 300303

TWO FLUTE MICRO GRAIN CARBIDE END MILLS
Short Length, 2 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 2 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETALL SCHAFTFRÄSER
Kurze Ausführung, 2 Schneiden, Zentrumschneidend, mit Zylinderschaft

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Korte lengte, 2 groeven, centerfrees met rechte schacht

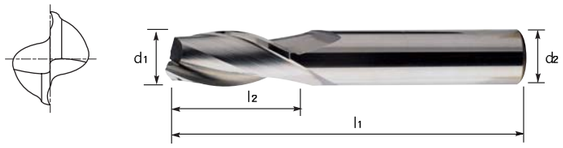
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3003030100	3003230100	3003090100
2.0		4.0		3003030200	3003230200	3003090200
3.0		6.0		3003030300	3003230300	3003090300
4.0	4.0	8.0	51.0	3003030400	3003230400	3003090400
5.0	6.0	10.0		3003030500	3003230500	3003090500
6.0		12.0		3003030600	3003230600	3003090600
8.0	10.0	12.0	51.0	3003030800	3003230800	3003090800
10.0	10.0	16.0	51.0	3003031000	3003231000	3003091000
12.0	12.0	19.0	63.0	3003031200	3003231200	3003091200

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / — 40	0 / — 48	0 / — 58	0 / — 70	0 / — 84
h6	0 / — 6	0 / — 8	0 / — 9	0 / — 11	0 / — 13

2 FLUTE, STANDARD, STRAIGHT SHANK

MG HM | 30° | FLUTE 2 | PLAIN



Series No. 301303

TWO FLUTE MICRO GRAIN CARBIDE END MILLS
Standard Length, 2 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 2 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 2 Schneiden, Zentrumschneidend, mit Zylinderschaft

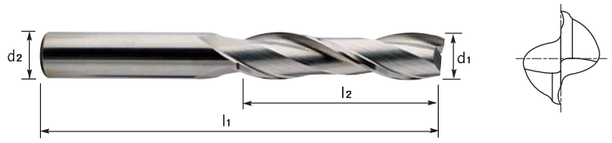
TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Korte lengte, 2 groeven, centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3013030100	3013230100	3013090100
1.5		4.5		3013030150	3013230150	3013090150
2.0		6.3		3013030200	3013230200	3013090200
2.5		9.5		3013030250	3013230250	3013090250
3.0		12.0		3013030300	3013230300	3013090300
3.5	4.0	12.0	50.0	3013030350	3013230350	3013090350
4.0		14.0		3013030400	3013230400	3013090400
4.5	6.0	16.0		3013030450	3013230450	3013090450
5.0		16.0		3013030500	3013230500	3013090500
6.0		19.0	58.0	3013030600	3013230600	3013090600
7.0	8.0	19.0	63.0	3013030700	3013230700	3013090700
8.0		20.0		3013030800	3013230800	3013090800
9.0	10.0	22.0	75.0	3013030900	3013230900	3013090900
10.0		22.0		3013031000	3013231000	3013091000
11.0	12.0	25.0		3013031100	3013231100	3013091100
12.0		25.0		3013031200	3013231200	3013091200
14.0	14.0	32.0	89.0	3013031400	3013231400	3013091400
16.0	16.0	32.0		3013031600	3013231600	3013091600
18.0	18.0	38.0	100.0	3013031800	3013231800	3013091800
20.0	20.0	38.0		3013032000	3013232000	3013092000
25.0	25.0	38.0		3013032500	3013232500	3013092500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, LONG, STRAIGHT SHANK



MG HM | 30° | FLUTE 2 | PLAIN

Series No. 302303

TWO FLUTE MICRO GRAIN CARBIDE END MILLS
Long Length, 2 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Longue, 2 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Lunge, 2 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausführung, 2 Schneiden, Zentrumschneidend, mit Zylinderschaft

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Lange lengte, 2 groeven, centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	65.0	3023030300	3023230300	3023090300
4.0	4.0	25.0		3023030400	3023230400	3023090400
5.0	5.0	25.0	75.0	3023030500	3023230500	3023090500
6.0	6.0	25.0		3023030600	3023230600	3023090600
8.0	8.0	25.0		3023030800	3023230800	3023090800
10.0	10.0	38.0	100.0	3023031000	3023231000	3023091000
12.0	12.0	50.0		3023031200	3023231200	3023091200
14.0	14.0	75.0	150.0	3023031400	3023231400	3023091400
16.0	16.0	75.0		3023031600	3023231600	3023091600
18.0	18.0	75.0		3023031800	3023231800	3023091800
20.0	20.0	75.0		3023032000	3023232000	3023092000
25.0	25.0	75.0		3023032500	3023232500	3023092500

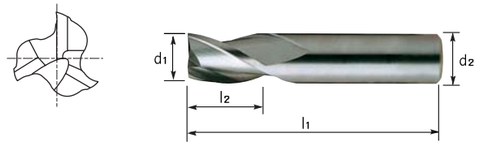
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, SHORT, STRAIGHT SHANK

MG HM | 30° | FLUTE 3 | PLAIN

Series No. 303303



3 FLUTE MICRO GRAIN CARBIDE END MILLS
Short Length, 3 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 3 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 3 Schneiden, Zentrumschneidend, mit Zylinderschaft

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Korte lengte, 3 groeven, centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3033030100	3033230100	3033090100
2.0		4.0		3033030200	3033230200	3033090200
3.0		6.0		3033030300	3033230300	3033090300
4.0	4.0	8.0	51.0	3033030400	3033230400	3033090400
5.0	6.0	10.0		3033030500	3033230500	3033090500
6.0		12.0		3033030600	3033230600	3033090600
8.0	8.0	12.0	51.0	3033030800	3033230800	3033090800
10.0	10.0	16.0	51.0	3033031000	3033231000	3033091000
12.0	12.0	19.0	63.0	3033031200	3033231200	3033091200

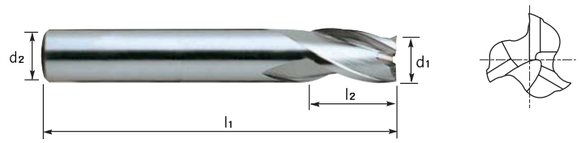
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, STANDARD, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 3 | PLAIN

Series No. 304303



THREE FLUTE MICRO GRAIN CARBIDE END MILLS
Standard Length, 3 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 3 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 3 Schneiden, Zentrumschneidend, mit Zylinderschaft

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Korte lengte, 2 groeven, centerfrees met rechte schacht

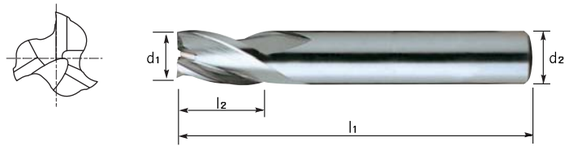
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3043030100	3043230100	3043090100
1.5		4.5		3043030150	3043230150	3043090150
2.0		6.3		3043030200	3043230200	3043090200
2.5		9.5		3043030250	3043230250	3043090250
3.0		12.0		3043030300	3043230300	3043090300
3.5	4.0	12.0	50.0	3043030350	3043230350	3043090350
4.0		14.0		3043030400	3043230400	3043090400
4.5	6.0	16.0		3043030450	3043230450	3043090450
5.0		16.0		3043030500	3043230500	3043090500
6.0		19.0	58.0	3043030600	3043230600	3043090600
7.0	8.0	19.0	63.0	3043030700	3043230700	3043090700
8.0		20.0		3043030800	3043230800	3043090800
9.0	10.0	22.0	75.0	3043030900	3043230900	3043090900
10.0		22.0		3043031000	3043231000	3043091000
11.0	12.0	25.0		3043031100	3043231100	3043091100
12.0		25.0		3043031200	3043231200	3043091200
14.0	14.0	32.0	89.0	3043031400	3043231400	3043091400
16.0	16.0	32.0		3043031600	3043231600	3043091600
18.0	18.0	38.0	100.0	3043031800	3043231800	3043091800
20.0	20.0	38.0		3043032000	3043232000	3043092000
25.0	25.0	38.0		3043032500	3043232500	3043092500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, LONG, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 3 | PLAIN



Series No. 305303

THREE FLUTE MICRO GRAIN CARBIDE END MILLS
Long Length, 3 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Longue, 3 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Lunga, 3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausführung, 3 Schneiden, Zentrumschneidend, mit Zylinderschaft

DRIE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Lange lengte, 3 groeven, centerfrees met rechte schacht

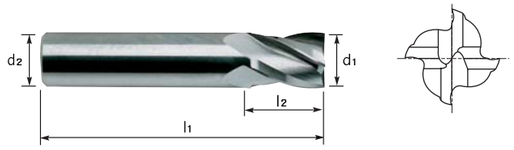
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	65.0	3053030300	3053230300	3053090300
4.0	4.0	25.0		3053030400	3053230400	3053090400
5.0	5.0	25.0	75.0	3053030500	3053230500	3053090500
6.0	6.0	25.0		3053030600	3053230600	3053090600
8.0	8.0	25.0		3053030800	3053230800	3053090800
10.0	10.0	38.0	100.0	3053031000	3053231000	3053091000
12.0	12.0	50.0		3053031200	3053231200	3053091200
14.0	14.0	75.0	150.0	3053031400	3053231400	3053091400
16.0	16.0	75.0		3053031600	3053231600	3053091600
18.0	18.0	75.0		3053031800	3053231800	3053091800
20.0	20.0	75.0		3053032000	3053232000	3053092000
25.0	25.0	75.0		3053032500	3053232500	3053092500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, SHORT, STRAIGHT SHANK

MG HM | 30° | FLUTE 4 | PLAIN



Series No. 309303

FOUR FLUTE MICRO GRAIN CARBIDE END MILLS
Short Length, 4 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 4 Schneiden, Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN
Korte lengte, 4 groeven, kogel vinger centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3093030100	3093230100	3093090100
2.0		4.0		3093030200	3093230200	3093090200
3.0		6.0		3093030300	3093230300	3093090300
4.0	4.0	8.0	51.0	3093030400	3093230400	3093090400
5.0	6.0	10.0		3093030500	3093230500	3093090500
6.0		12.0		3093030600	3093230600	3093090600
8.0	8.0	12.0		3093030800	3093230800	3093090800
10.0	10.0	16.0		3093031000	3093231000	3093091000
12.0	12.0	19.0	63.0	3093031200	3093231200	3093091200

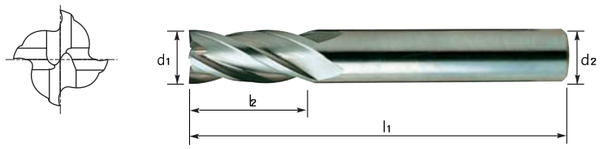
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, STANDARD, STRAIGHT SHANK

MG HM | 30° | FLUTE 4 | PLAIN

Series No. 310303



FOUR FLUTE MICRO GRAIN CARBIDE END MILLS
Standard Short Length, 4 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 4 Schneiden, Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN
Korte lengte, 4 groeven, kogel vinger centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3103030100	3103230100	3103090100
1.5		4.5		3103030150	3103230150	3103090150
2.0		6.3		3103030200	3103230200	3103090200
2.5		9.5		3103030250	3103230250	3103090250
3.0		12.0		3103030300	3103230300	3103090300
3.5	4.0	12.0	50.0	3103030350	3103230350	3103090350
4.0		14.0		3103030400	3103230400	3103090400
4.5	6.0	16.0		3103030450	3103230450	3103090450
5.0		16.0		3103030500	3103230500	3103090500
6.0		19.0	58.0	3103030600	3103230600	3103090600
7.0	8.0	19.0	63.0	3103030700	3103230700	3103090700
8.0		20.0		3103030800	3103230800	3103090800
9.0	10.0	22.0	75.0	3103030900	3103230900	3103090900
10.0		22.0		3103031000	3103231000	3103091000
11.0	12.0	25.0		3103031100	3103231100	3103091100
12.0		25.0		3103031200	3103231200	3103091200
14.0	14.0	32.0	89.0	3103031400	3103231400	3103091400
16.0	16.0	32.0		3103031600	3103231600	3103091600
18.0	18.0	38.0	100.0	3103031800	3103231800	3103091800
20.0	20.0	38.0		3103032000	3103232000	3103092000
25.0	25.0	38.0		3103032500	3103232500	3103092500

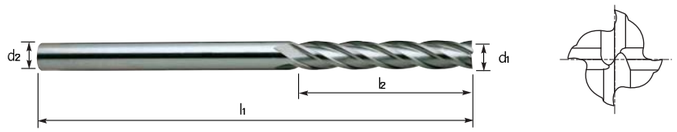
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, LONG, STRAIGHT SHANK

MG HM | 30° | FLUTE 4 | PLAIN

Series No. 311303



FOUR FLUTE MICRO GRAIN CARBIDE END MILLS
Long Length, 4 Flute, Centre Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC
Série Longue, 4 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Lunga, 4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausführung, 4 Schneiden, Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Lange lengte, 4 groeven, centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	65.0	3113030300	3113230300	3113090300
4.0	4.0	25.0		3113030400	3113230400	3113090400
5.0	5.0	25.0	75.0	3113030500	3113230500	3113090500
6.0	6.0	25.0		3113030600	3113230600	3113090600
8.0	8.0	25.0		3113030800	3113230800	3113090800
10.0	10.0	38.0	100.0	3113031000	3113231000	3113091000
12.0	12.0	50.0		3113031200	3113231200	3113091200
12.0		75.0	150.0	3113039001	3113239001	3113099001
14.0	14.0	75.0		3113031400	3113231400	3113091400
16.0	16.0	75.0		3113031600	3113231600	3113091600
18.0	18.0	75.0		3113031800	3113231800	3113091800
20.0	20.0	75.0		3113032000	3113232000	3113092000
25.0	25.0	75.0		3113032500	3113232500	3113092500

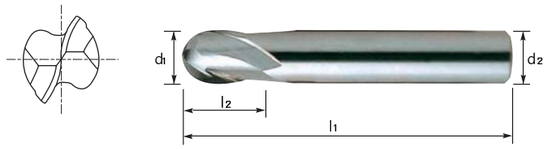
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, SHORT, BALL NOSE, SHORT REACH

MG HM | N | 30° | FLUTE 2 | PLAIN

Series No. 312303



TWO FLUTE MICRO GRAIN CARBIDE BALL END MILLS
Short Length, 2 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL RADIUSFRÄSER
KurzeAusführung, 2 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES À BOUT SPHERIQUE CARBURE MONOBLOC
Série Courte, 2 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN
Korte lengte, 2 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Corta, 2 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3123030100	3123230100	3123090100
2.0		4.0		3123030200	3123230200	3123090200
3.0		6.0		3123030300	3123230300	3123090300
4.0	4.0	8.0	51.0	3123030400	3123230400	3123090400
5.0	6.0	10.0		3123030500	3123230500	3123090500
6.0		12.0		3123030600	3123230600	3123090600
8.0	10.0	12.0		3123030800	3123230800	3123090800
10.0	10.0	16.0		3123031000	3123231000	3123091000
12.0	12.0	19.0	63.0	3123031200	3123231200	3123091200

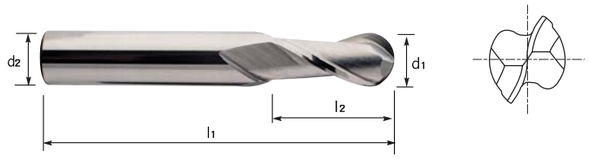
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, STANDARD, BALL NOSE

MG HM | N | 30° | FLUTE 2 | PLAIN

Series No. 313303



TWO FLUTE MICRO GRAIN CARBIDE BALL END MILLS
Standard Length, 2 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL RADIUSFRÄSER
KurzeAusführung, 2 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES À BOUT SPHERIQUE CARBURE MONOBLOC
Série Courte, 2 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN
Korte lengte, 2 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Corta, 2 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3133030100	3133230100	3133090100
1.5		4.5		3133030150	3133230150	3133090150
2.0		6.3		3133030200	3133230200	3133090200
2.5		9.5		3133030250	3133230250	3133090250
3.0		12.0		3133030300	3133230300	3133090300
3.5	4.0	12.0	50.0	3133030350	3133230350	3133090350
4.0		14.0		3133030400	3133230400	3133090400
4.5	6.0	16.0		3133030450	3133230450	3133090450
5.0		16.0		3133030500	3133230500	3133090500
6.0		19.0	58.0	3133030600	3133230600	3133090600
7.0	8.0	19.0	63.0	3133030700	3133230700	3133090700
8.0		20.0		3133030800	3133230800	3133090800
9.0	10.0	22.0	75.0	3133030900	3133230900	3133090900
10.0		22.0		3133031000	3133231000	3133091000
11.0	12.0	25.0		3133031100	3133231100	3133091100
12.0		25.0		3133031200	3133231200	3133091200
14.0	14.0	32.0	89.0	3133031400	3133231400	3133091400
16.0	16.0	32.0		3133031600	3133231600	3133091600
18.0	18.0	38.0	100.0	3133031800	3133231800	3133091800
20.0	20.0	38.0		3133032000	3133232000	3133092000
25.0	25.0	38.0		3133032500	3133232500	3133092500

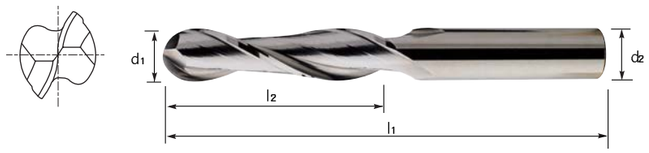
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, BALL NOSE, LONG REACH

MG HM | N | 30° | FLUTE 2 | PLAIN

Series No. 314303



TWO FLUTE MICRO GRAIN CARBIDE BALL END MILLS
Long Length, 2 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausführung, 2 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES À BOUT SPHERIQUE CARBURE MONOBLOC
Série Longue, 2 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN
Lange lengte, 2 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Lunga, 2 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	75.0	3143030300	3143230300	3143090300
4.0	4.0	25.0		3143030400	3143230400	3143090400
5.0	6.0	25.0		3143030500	3143230500	3143090500
6.0	6.0	25.0		3143030600	3143230600	3143090600
8.0	8.0	25.0		3143030800	3143230800	3143090800
10.0	10.0	38.0	100.0	3143031000	3143231000	3143091000
12.0	12.0	50.0		3143031200	3143231200	3143091200
14.0	14.0	75.0	150.0	3143031400	3143231400	3143091400
16.0	16.0	75.0		3143031600	3143231600	3143091600
18.0	18.0	75.0		3143031800	3143231800	3143091800
20.0	20.0	75.0		3143032000	3143232000	3143092000
25.0	25.0	75.0		3143032500	3143232500	3143092500

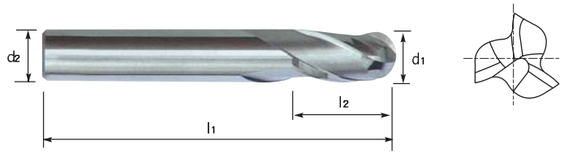
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, SHORT, BALL NOSE, SHORT REACH

MG HM | N | 30° | FLUTE 3 | PLAIN

Series No. 306303



THREE FLUTE MICRO GRAIN CARBIDE CUTTERS
Short Length, 3 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 3 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES POUR MATRICES CARBURE MONOBLOC
Série Courte, 3 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN
Korte lengte, 3 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Corta, 3 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3063030100	3063230100	3063090100
2.0		4.0		3063030200	3063230200	3063090200
3.0		6.0		3063030300	3063230300	3063090300
4.0	4.0	8.0	51.0	3063030400	3063230400	3063090400
5.0	6.0	10.0		3063030500	3063230500	3063090500
6.0		12.0		3063030600	3063230600	3063090600
8.0	8.0	12.0		3063030800	3063230800	3063090800
10.0	10.0	16.0		3063031000	3063231000	3063091000
12.0	12.0	19.0	63.0	3063031200	3063231200	3063091200

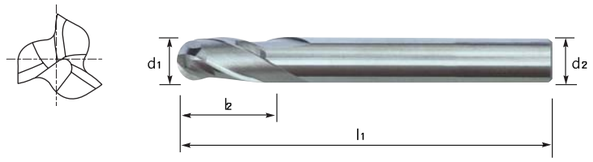
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, STANDARD, BALL NOSE

MG HM | N | 30° | FLUTE 3 | PLAIN

Series No. 307303



THREE FLUTE MICRO GRAIN CARBIDE CUTTERS
Standard Length, 3 Flute, Ball end, Center Cutting, with Straight Shank

FRAISES POUR MATRICES CARBURE MONOBLOC
Série Courte, 3 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Corta, 3 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETALL SCHAFTFRÄSER
Kurze Ausführung, 3 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN
Korte lengte, 3 groeven kogel vinger centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3073030100	3073230100	3073090100
2.0		6.3		3073030200	3073230200	3073090200
3.0		12.0		3073030300	3073230300	3073090300
4.0	4.0	14.0	50.0	3073030400	3073230400	3073090400
5.0	6.0	16.0		3073030500	3073230500	3073090500
6.0		19.0	58.0	3073030600	3073230600	3073090600
8.0	8.0	20.0	63.0	3073030800	3073230800	3073090800
10.0	10.0	22.0	75.0	3073031000	3073231000	3073091000
12.0	12.0	25.0		3073031200	3073231200	3073091200
16.0	16.0	32.0	89.0	3073031600	3073231600	3073091600

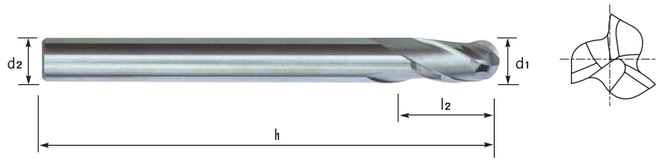
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, LONG, BALL NOSE

MG HM | N | 30° | FLUTE 3 | PLAIN

Series No. 308303



THREE FLUTE MICRO GRAIN CARBIDE CUTTERS
Long Length, 3 Flute, Ball end, Center Cutting, with Straight Shank

FRAISES POUR MATRICES CARBURE MONOBLOC
Série Longue, 3 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Lunga, 3 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETALL GESENKFRÄSER
Lange Ausführung, 3 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN
Lange lengte, 3 groeven kogel vinger centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	75.0	3083030300	3083230300	3083090300
4.0	4.0	25.0		3083030400	3083230400	3083090400
5.0	6.0	25.0		3083030500	3083230500	3083090500
6.0	6.0	25.0		3083030600	3083230600	3083090600
8.0	8.0	25.0		3083030800	3083230800	3083090800
10.0	10.0	38.0	100.0	3083031000	3083231000	3083091000
12.0	12.0	50.0		3083031200	3083231200	3083091200
16.0	16.0	75.0	150.0	3083031600	3083231600	3083091600
20.0	20.0	75.0		3083032000	3083232000	3083092000
25.0	25.0	75.0		3083032500	3083232500	3083092500

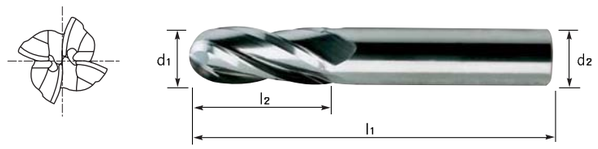
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, BALL NOSE, SHORT REACH

MG HM | N | 30° | FLUTE 4 | PLAIN

Series No. 317303



FOUR FLUTE MICRO GRAIN CARBIDE CUTTERS
Short Length, 4 Flute, Ball end, Center Cutting, with Straight Shank

FRAISES POUR MATRICES CARBURE MONOBLOC
Série Courte, 4 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Corta, 4 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETALL SCHAFTFRÄSER
Kurze Ausführung, 4 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN
Korte lengte, 4 groeven kogel vinger centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3173030100	3173230100	3173090100
2.0		4.0		3173030200	3173230200	3173090200
3.0		6.0		3173030300	3173230300	3173090300
4.0	4.0	8.0	51.0	3173030400	3173230400	3173090400
5.0	6.0	10.0		3173030500	3173230500	3173090500
6.0		12.0		3173030600	3173230600	3173090600
8.0	8.0	12.0		3173030800	3173230800	3173090800
10.0	10.0	16.0		3173031000	3173231000	3173091000
12.0	12.0	19.0	63.0	3173031200	3173231200	3173091200

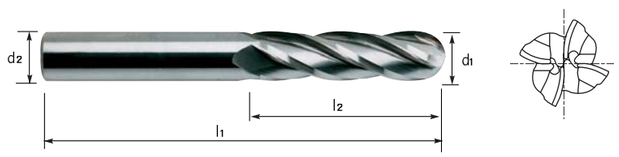
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, STANDARD, BALL NOSE

MG HM | N | 30° | FLUTE 4 | PLAIN

Series No. 315303



FOUR FLUTE MICRO GRAIN CARBIDE CUTTERS
Standard Length, 4 Flute, Ball end, Center Cutting, with Straight Shank

FRAISES POUR MATRICES CARBURE MONOBLOC
Série Courte, 4 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Corta, 4 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETALL SCHAFTFRÄSER
Kurze Ausführung, 4 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN
Korte lengte, 4 groeven kogel vinger centerfrees met rechte schacht

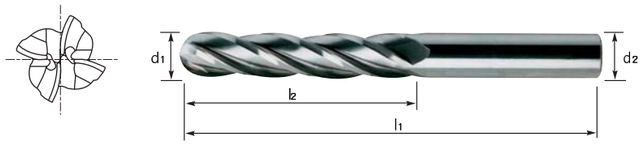
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3153030100	3153230100	3153090100
1.5		4.5		3153030150	3153230150	3153090150
2.0		6.3		3153030200	3153230200	3153090200
2.5		9.5		3153030250	3153230250	3153090250
3.0		12.0		3153030300	3153230300	3153090300
3.5	4.0	12.0	50.0	3153030350	3153230350	3153090350
4.0		14.0		3153030400	3153230400	3153090400
4.5	6.0	16.0		3153030450	3153230450	3153090450
5.0		16.0		3153030500	3153230500	3153090500
6.0		19.0	58.0	3153030600	3153230600	3153090600
7.0	8.0	19.0	63.0	3153030700	3153230700	3153090700
8.0		20.0		3153030800	3153230800	3153090800
9.0	10.0	22.0	75.0	3153030900	3153230900	3153090900
10.0		22.0		3153031000	3153231000	3153091000
11.0	12.0	25.0		3153031100	3153231100	3153091100
12.0		25.0		3153031200	3153231200	3153091200
14.0	14.0	32.0	89.0	3153031400	3153231400	3153091400
16.0	16.0	32.0		3153031600	3153231600	3153091600
18.0	18.0	38.0	100.0	3153031800	3153231800	3153091800
20.0	20.0	38.0		3153032000	3153232000	3153092000
25.0	25.0	38.0		3153032500	3153232500	3153092500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, BALL NOSE, LONG LENGTH

MG HM | N | 30° | FLUTE 4 | PLAIN



Series No. 316303

FOUR FLUTE MICRO GRAIN CARBIDE CUTTERS
Long Length, 4 Flute, Ball end, Center Cutting, with Straight Shank

FRAISES POUR MATRICES CARBURE MONOBLOC
Série Longue, 4 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

FRESE PER STAMPI IN CARBURO MONOBLOCCO
Serie Lunga, 4 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL GESENKFRÄSER
Lange Ausführung, 4 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

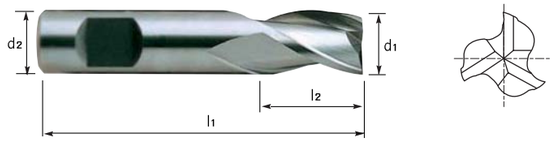
VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN
Lange lengte, 4 groeven kogel vinger centerfrees met rechte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	75.0	3163030300	3163230300	3163090300
4.0	4.0	25.0		3163030400	3163230400	3163090400
5.0	6.0	25.0		3163030500	3163230500	3163090500
6.0	6.0	25.0		3163030600	3163230600	3163090600
8.0	8.0	25.0		3163030800	3163230800	3163090800
10.0	10.0	38.0	100.0	3163031000	3163231000	3163091000
12.0	12.0	50.0		3163031200	3163231200	3163091200
16.0	16.0	75.0	150.0	3163031600	3163231600	3163091600
20.0	20.0	75.0		3163032000	3163232000	3163092000
25.0	25.0	75.0		3163032500	3163232500	3163092500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, SHORT LENGTH, THROW AWAY



MG HM | N | 30° | FLUTE 3 | FLAT

Series No. 128103

THREE FLUTE THROW AWAY MICRO GRAIN CARBIDE END MILLS
3 Flute, Center Cutting, with Flatted Shank

FRAISES À RAINURER CARBURE MONOBLOC
3 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

FRESE PER SCANALATURE CARBURO MONOBLOCCO
3 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

VOLLHARTMEATL SCHAFTFRÄSER
3 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DRIE GROEVEN, WERWERP MICROKORREL CARBIDE VINGERFREZEN
3 groeven centerfrees met geplette schacht

Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
2.0	6.0	4.0	35.0	1281030200	1281230200	1281090200
3.0		5.0	36.0	1281030300	1281230300	1281090300
4.0		7.0	38.0	1281030400	1281230400	1281090400
5.0		8.0	39.0	1281030500	1281230500	1281090500
6.0		8.0		1281030600	1281230600	1281090600
8.0	8.0	11.0	43.0	1281030800	1281230800	1281090800
10.0	10.0	13.0	50.0	1281031000	1281231000	1281091000

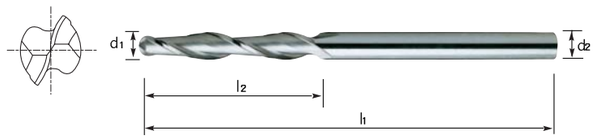
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	− 14 / − 28	− 20 / − 38	− 25 / − 47	− 32 / − 59	− 40 / − 73
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, BALL NOSE, EXTRA LONG LENGTH

MG HM | YG STD | N | 30° | FLUTE 2 | PLAIN

Series No. 162303



TWO FLUTE MICRO GRAIN CARBIDE END MILLS
2 Flute, Helix 30°, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC POUR ALLAGES
2 Dents, Hélice 30° Coupe au Centre, à Queue Cylindrique

FRESE PER MACCHINE ELU SCANALATURE IN CARBURO MONOBLOCCO
2 Taglienti, Elica 30° Tagliente al Centro, Gambo Cilindrico

VOLLHARTMERAL SCHAFTFRÄSER
2 Schneiden, Rechtsspirale 30°, Zentrumschneidend, mit Zylinderschaft

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN VOOR ALUMINIUM
2 groeven, helix 30°, centerfrees, met rerigte schacht

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	30	75	1623030300	1623230300	1623090300
4.0	4.0	30	75	1623030400	1623230400	1623090400
5.0	5.0	40	100	1623030500	1623230500	1623090500
6.0	6.0	50	150	1623030600	1623230600	1623090600
8.0	8.0	50	150	1623030800	1623230800	1623090800
10.0	10.0	60	150	1623031000	1623231000	1623091000
12.0	12.0	75	150	1623031200	1623231200	1623091200
14.0	14.0	75	150	1623031400	1623231400	1623091400
16.0	16.0	75	150	1623031600	1623231600	1623091600
18.0	18.0	75	150	1623031800	1623231800	1623091800
20.0	20.0	75	150	1623032000	1623232000	1623092000

▶ High alloy steels, steel casting, chill casting, malleable cast iron, CrNi-steels, brass, copper, aluminum with a high percentage of silicon and abrasive plastics.

▶ Applicable to the fields of K10, K20, K40, and P40

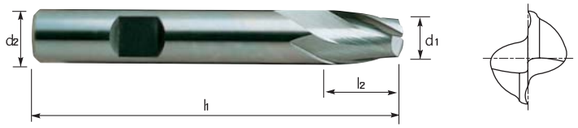
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, SHORT LENGTH

MG HM | DIN 6527 | N | ≈ 30° | FLUTE 2 | FLAT

Series No. 100103



DIN 6527, TWO FLUTE MICRO GRAIN CARBIDE END MILLS
Short Length, 2 Flute, Center Cutting with Flatted Shank

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, TWEE GROEVEN VINGERFREZEN
Korte lengte, 2 groeven, centerfrees met geplette schacht

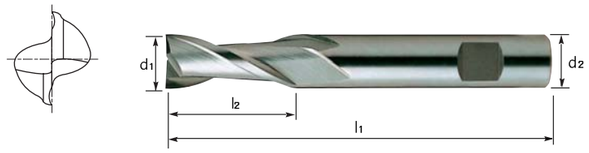
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	4.0	50.0	1001030300	1001230300	1001090300
3.5		4.0		1001030350	1001230350	1001090350
4.0		5.0	54.0	1001030400	1001230400	1001090400
4.5		5.0		1001030450	1001230450	1001090450
5.0		6.0		1001030500	1001230500	1001090500
6.0		7.0		1001030600	1001230600	1001090600
7.0	8.0	8.0	58.0	1001030700	1001230700	1001090700
8.0		9.0		1001030800	1001230800	1001090800
9.0	10.0	10.0	66.0	1001030900	1001230900	1001090900
10.0		11.0		1001031000	1001231000	1001091000
12.0	12.0	12.0	73.0	1001031200	1001231200	1001091200
14.0	14.0	14.0	75.0	1001031400	1001231400	1001091400
16.0	16.0	16.0	82.0	1001031600	1001231600	1001091600
18.0	18.0	18.0	84.0	1001031800	1001231800	1001091800
20.0	20.0	20.0	92.0	1001032000	1001232000	1001092000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, LONG LENGTH

MG HM | DIN 6527 | N | ≈ 30° | FLUTE 2 | FLAT



Series No. 102103

DIN 6527, TWO FLUTE MICRO GRAIN CARBIDE END MILLS
Long Length, 2 Flute, Center Cutting with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausfü hrung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Longue, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Lange lengte, 2 groeven, centerfrees met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Lunga, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

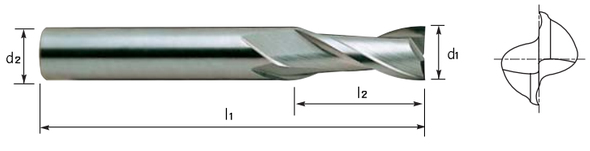
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	7.0	57.0	1021030300	1021230300	1021090300
3.5		7.0		1021030350	1021230350	1021090350
4.0		8.0		1021030400	1021230400	1021090400
4.5		8.0		1021030450	1021230450	1021090450
5.0		10.0		1021030500	1021230500	1021090500
6.0		10.0		1021030600	1021230600	1021090600
7.0	8.0	13.0	63.0	1021030700	1021230700	1021090700
8.0		16.0		1021030800	1021230800	1021090800
9.0	10.0	16.0	72.0	1021030900	1021230900	1021090900
10.0		19.0		1021031000	1021231000	1021091000
12.0	12.0	22.0	83.0	1021031200	1021231200	1021091200
14.0	14.0	22.0		1021031400	1021231400	1021091400
16.0	16.0	26.0	92.0	1021031600	1021231600	1021091600
18.0	18.0	26.0		1021031800	1021231800	1021091800
20.0	20.0	32.0	104.0	1021032000	1021232000	1021092000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, STANDARD LENGTH

MG HM | DIN 6528 | N | ≈ 30° | FLUTE 2 | PLAIN



Series No. 101103

DIN 6528, TWO FLUTE MICRO GRAIN CARBIDE END MILLS
2 Flute, Center Cutting, with Straight Shank

DIN 6528, VOLLHARTMETAL SCHAFTFRÄSER
2 Schneiden, Zentrumschneidend mit Zylinderschaft

DIN 6528, FRAISES À RAINURER CARBURE MONOBLOC
2 Dents, Coupe au Centre, à Queue Cylindrique

DIN 6528, TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
2 groeven, centerfrees met rechte schacht

DIN 6528, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
2 Taglienti, Tagliente al Centro, Codolo Gambo Cilindrico

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.5	3.5	7.0	50.0	1011030350	1011230350	1011090350
4.0	4.0	8.0		1011030400	1011230400	1011090400
4.5	4.5	8.0		1011030450	1011230450	1011090450
5.0	5.0	10.0		1011030500	1011230500	1011090500
5.5	5.5	10.0	57.0	1011030550	1011230550	1011090550
6.0	6.0	10.0		1011030600	1011230600	1011090600
6.5	6.5	13.0	60.0	1011030650	1011230650	1011090650
7.0	7.0	13.0		1011030700	1011230700	1011090700
7.5	7.5	16.0	63.0	1011030750	1011230750	1011090750
8.0	8.0	16.0		1011030800	1011230800	1011090800
8.5	8.5	16.0	67.0	1011030850	1011230850	1011090850
9.0	9.0	16.0		1011030900	1011230900	1011090900
9.5	9.5	19.0	72.0	1011030950	1011230950	1011090950
10.0	10.0	19.0		1011031000	1011231000	1011091000
11.0	11.0	22.0	83.0	1011031100	1011231100	1011091100
12.0	12.0	22.0		1011031200	1011231200	1011091200
13.0	13.0	22.0		1011031300	1011231300	1011091300
14.0	14.0	22.0		1011031400	1011231400	1011091400
15.0	15.0	26.0	92.0	1011031500	1011231500	1011091500
16.0	16.0	26.0		1011031600	1011231600	1011091600
18.0	18.0	26.0		1011031800	1011231800	1011091800
20.0	20.0	32.0	104.0	1011032000	1011232000	1011092000

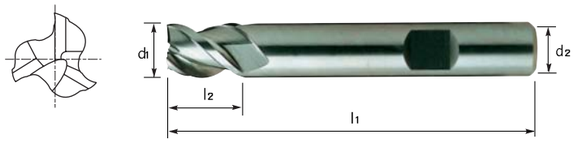
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, 45° HELIX, SHORT LENGTH

MG HM | DIN 6527 | N | 45° | FLUTE 3 | FLAT

Series No. 140103



DIN 6527, THREE FLUTE MICRO GRAIN CARBIDE 45° HELIX END MILLS
Short Length, 3 Flute, Center Cutting, 45° Helix, with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 3 Schneiden, Zentrumschneidend, 45° Rechtsspirale, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 3 Dents, Coupe au Centre, 45° Helice, à Queue Cylindrique avec Plats

DIN 6527, DRIE GROEVEN MICROKORREL CARBIDE 45° HELIX VINGERFREZEN
Korte lengte, 3 groeven, centerfrees, 45° helix met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 3 Taglienti, Tagliente al Centro, 45° Elica, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	4.0	50.0	1401030300	1401230300	1401090300
3.5		4.0		1401030350	1401230350	1401090350
4.0		5.0	54.0	1401030400	1401230400	1401090400
4.5		5.0		1401030450	1401230450	1401090450
5.0		6.0		1401030500	1401230500	1401090500
6.0		7.0		1401030600	1401230600	1401090600
7.0	8.0	8.0	58.0	1401030700	1401230700	1401090700
8.0		9.0		1401030800	1401230800	1401090800
9.0	10.0	10.0	66.0	1401030900	1401230900	1401090900
10.0		11.0		1401031000	1401231000	1401091000
12.0	12.0	12.0	73.0	1401031200	1401231200	1401091200
14.0	14.0	14.0	75.0	1401031400	1401231400	1401091400
16.0	16.0	16.0	82.0	1401031600	1401231600	1401091600
18.0	18.0	18.0	84.0	1401031800	1401231800	1401091800
20.0	20.0	20.0	92.0	1401032000	1401232000	1401092000

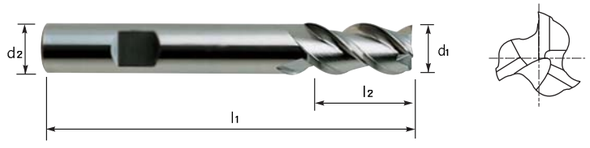
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, 45° HELIX, LONG LENGTH

MG HM | DIN 6527 | N | 45° | FLUTE 3 | FLAT

Series No. 141103



DIN 6527, THREE FLUTE MICRO GRAIN CARBIDE 45° HELIX END MILLS
Long Length, 3 Flute, Center Cutting, 45° Helix, with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausführung, 3 Schneiden, Zentrumschneidend, 45° Rechtsspirale, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Longue, 3 Dents, Coupe au Centre, 45° Helice, à Queue Cylindrique avec Plats

DIN 6527, DRIE GROEVEN MICROKORREL CARBIDE 45° HELIX VINGERFREZEN
Lange lengte, 3 groeven, centerfrees, 45° helix met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Lunga, 3 Taglienti, Tagliente al Centro, 45° Elica, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	7.0	57.0	1411030300	1411230300	1411090300
3.5		7.0		1411030350	1411230350	1411090350
4.0		8.0		1411030400	1411230400	1411090400
4.5		8.0		1411030450	1411230450	1411090450
5.0		10.0		1411030500	1411230500	1411090500
6.0		10.0		1411030600	1411230600	1411090600
7.0	8.0	13.0	63.0	1411030700	1411230700	1411090700
8.0		16.0		1411030800	1411230800	1411090800
9.0	10.0	16.0	72.0	1411030900	1411230900	1411090900
10.0		19.0		1411031000	1411231000	1411091000
12.0	12.0	22.0	83.0	1411031200	1411231200	1411091200
14.0	14.0	22.0		1411031400	1411231400	1411091400
16.0	16.0	26.0	92.0	1411031600	1411231600	1411091600
18.0	18.0	26.0		1411031800	1411231800	1411091800
20.0	20.0	32.0	104.0	1411032000	1411232000	1411092000

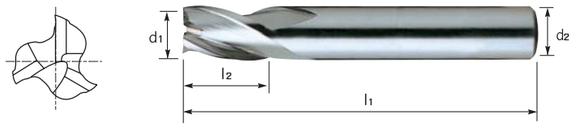
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

3 FLUTE, LONG LENGTH

MG HM | DIN 6528 | N | ≈ 30° | FLUTE 3 | PLAIN

Series No. 104103



DIN 6528, THREE FLUTE MICRO GRAIN CARBIDE END MILLS
3 Flute, Center Cutting, with Straight Shank

DIN 6528, VOLLHARTMETAL SCHAFTFRÄSER
3 Schneiden, Zentrumschneidend mit Zylinderschaft

DIN 6528, FRAISES À RAINURER CARBURE MONOBLOC
3 Dents, Coupe au Centre, à Queue Cylindrique

DIN 6528, TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
3 groeven, centerfrees met rechte schacht

DIN 6528, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.5	3.5	7.0	50.0	1041030350	1041230350	1041090350
4.0	4.0	8.0		1041030400	1041230400	1041090400
4.5	4.5	8.0		1041030450	1041230450	1041090450
5.0	5.0	10.0		1041030500	1041230500	1041090500
5.5	5.5	10.0	57.0	1041030550	1041230550	1041090550
6.0	6.0	10.0		1041030600	1041230600	1041090600
6.5	6.5	13.0	60.0	1041030650	1041230650	1041090650
7.0	7.0	13.0		1041030700	1041230700	1041090700
7.5	7.5	16.0	63.0	1041030750	1041230750	1041090750
8.0	8.0	16.0		1041030800	1041230800	1041090800
8.5	8.5	16.0	67.0	1041030850	1041230850	1041090850
9.0	9.0	16.0		1041030900	1041230900	1041090900
9.5	9.5	19.0	72.0	1041030950	1041230950	1041090950
10.0	10.0	19.0		1041031000	1041231000	1041091000
11.0	11.0	22.0	83.0	1041031100	1041231100	1041091100
12.0	12.0	22.0		1041031200	1041231200	1041091200
13.0	13.0	22.0		1041031300	1041231300	1041091300
14.0	14.0	22.0		1041031400	1041231400	1041091400
15.0	15.0	26.0	92.0	1041031500	1041231500	1041091500
16.0	16.0	26.0		1041031600	1041231600	1041091600
18.0	18.0	26.0		1041031800	1041231800	1041091800
20.0	20.0	32.0	104.0	1041032000	1041232000	1041092000

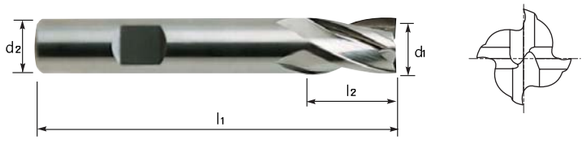
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, SHORT LENGTH

MG HM | DIN 6527 | N | ≈ 30° | FLUTE 4 | FLAT

Series No. 109103



DIN 6527, FOUR FLUTE MICRO GRAIN CARBIDE END MILLS
Short Length, 4 Flute, Center Cutting, with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 4 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, VIER GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Korte lengthe, 4 groeven, centerfrees met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 4 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

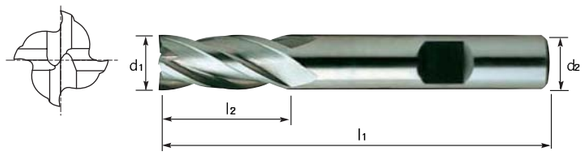
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	5.0	50.0	1091030300	1091230300	1091090300
3.5		6.0		1091030350	1091230350	1091090350
4.0		8.0	54.0	1091030400	1091230400	1091090400
4.5		8.0		1091030450	1091230450	1091090450
5.0		9.0		1091030500	1091230500	1091090500
6.0		10.0		1091030600	1091230600	1091090600
7.0	8.0	11.0	58.0	1091030700	1091230700	1091090700
8.0		12.0		1091030800	1091230800	1091090800
9.0	10.0	13.0	66.0	1091030900	1091230900	1091090900
10.0		14.0		1091031000	1091231000	1091091000
12.0	12.0	16.0	73.0	1091031200	1091231200	1091091200
14.0	14.0	18.0	75.0	1091031400	1091231400	1091091400
16.0	16.0	22.0	82.0	1091031600	1091231600	1091091600
18.0	18.0	24.0	84.0	1091031800	1091231800	1091091800
20.0	20.0	26.0	92.0	1091032000	1091232000	1091092000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, LONG LENGTH

MG HM | DIN 6527 | N | ≈ 30° | FLUTE 4 | FLAT



Series No. 111103

DIN 6527, FOUR FLUTE MICRO GRAIN CARBIDE END MILLS
Long Length, 4 Flute, Center Cutting, with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausführung, 4 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, VIER GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Lange lengte, 4 groeven, centerfrees met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Lunga, 4 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

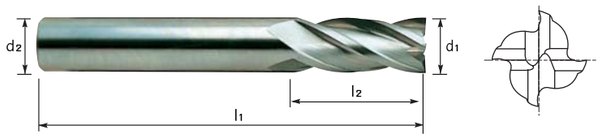
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	8.0	57.0	1111030300	1111230300	1111090300
3.5		10.0		1111030350	1111230350	1111090350
4.0		11.0		1111030400	1111230400	1111090400
4.5		11.0		1111030450	1111230450	1111090450
5.0		13.0		1111030500	1111230500	1111090500
6.0		13.0		1111030600	1111230600	1111090600
7.0	8.0	16.0	63.0	1111030700	1111230700	1111090700
8.0		19.0		1111030800	1111230800	1111090800
9.0	10.0	19.0	72.0	1111030900	1111230900	1111090900
10.0		22.0		1111031000	1111231000	1111091000
12.0	12.0	26.0	83.0	1111031200	1111231200	1111091200
14.0	14.0	26.0		1111031400	1111231400	1111091400
16.0	16.0	32.0	92.0	1111031600	1111231600	1111091600
18.0	18.0	32.0		1111031800	1111231800	1111091800
20.0	20.0	38.0	104.0	1111032000	1111232000	1111092000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

4 FLUTE, SHORT LENGTH

MG HM | DIN 6528 | N | ≈ 30° | FLUTE 4 | PLAIN



Series No. 110103

DIN 6528, FOUR FLUTE MICRO GRAIN CARBIDE END MILLS
4 Flute, Center Cutting, with Straight Shank

DIN 6528, VOLLHARTMETAL SCHAFTFRÄSER
4 Schneiden, Zentrumschneidend, mit Zylinderschaft

DIN 6528, FRAISES À RAINURER CARBURE MONOBLOC
4 Dents, Coupe au Centre, à Queue Cylindrique

DIN 6528, TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
4 groeven, centerfrees met rechte schacht

DIN 6528, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

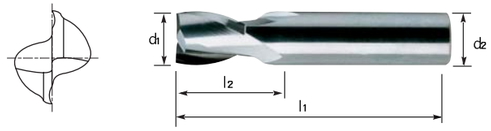
Mill Dia. h10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
3.5	3.5	10.0	50.0	1101030350	1101230350	1101090350
4.0	4.0	11.0		1101030400	1101230400	1101090400
4.5	4.5	11.0		1101030450	1101230450	1101090450
5.0	5.0	13.0		1101030500	1101230500	1101090500
5.5	5.5	13.0	57.0	1101030550	1101230550	1101090550
6.0	6.0	16.0		1101030600	1101230600	1101090600
6.5	6.5	16.0	60.0	1101030650	1101230650	1101090650
7.0	7.0	19.0		1101030700	1101230700	1101090700
7.5	7.5	19.0	63.0	1101030750	1101230750	1101090750
8.0	8.0	19.0		1101030800	1101230800	1101090800
8.5	8.5	19.0	67.0	1101030850	1101230850	1101090850
9.0	9.0	19.0		1101030900	1101230900	1101090900
9.5	9.5	22.0	72.0	1101030950	1101230950	1101090950
10.0	10.0	22.0		1101031000	1101231000	1101091000
11.0	11.0	26.0	83.0	1101031100	1101231100	1101091100
12.0	12.0	26.0		1101031200	1101231200	1101091200
13.0	13.0	26.0		1101031300	1101231300	1101091300
14.0	14.0	26.0		1101031400	1101231400	1101091400
15.0	15.0	32.0	92.0	1101031500	1101231500	1101091500
16.0	16.0	32.0		1101031600	1101231600	1101091600
18.0	18.0	32.0		1101031800	1101231800	1101091800
20.0	20.0	32.0	104.0	1101032000	1101232000	1101092000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 / − 40	0 / − 48	0 / − 58	0 / − 70	0 / − 84
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13

2 FLUTE, SHORT, STRAIGHT SHANK

MG HM | 30° | FLUTE 2 | PLAIN

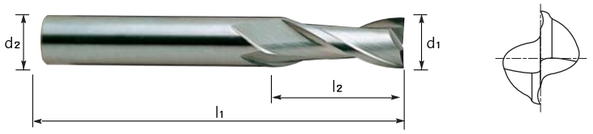


Series No. 500303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5003030040	5003230040	5003090040
1/8	1/8	1/4	1.1/2	5003030080	5003230080	5003090080
3/16	3/16	3/8	2	5003030120	5003230120	5003090120
1/4	1/4	1/2	2	5003030160	5003230160	5003090160
3/8	3/8	1/2	2	5003030240	5003230240	5003090240
1/2	1/2	1/2	2	5003030320	5003230320	5003090320

2 FLUTE, STANDARD, STRAIGHT SHANK

MG HM | 30° | FLUTE 2 | PLAIN



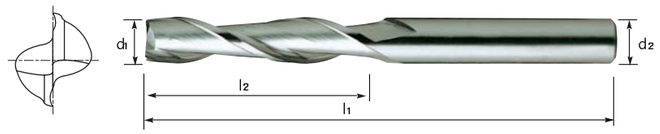
Series No. 501303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5013030040	5013230040	5013090040
3/32	1/8	9/32	1.1/2	5013030060	5013230060	5013090060
1/8	1/8	1/2	1.1/2	5013030080	5013230080	5013090080
5/32	3/16	1/2	2	5013030100	5013230100	5013090100
3/16	3/16	5/8	2	5013030120	5013230120	5013090120
7/32	1/4	5/8	2.1/2	5013030140	5013230140	5013090140
1/4	1/4	3/4	2.1/2	5013030160	5013230160	5013090160
9/32	5/16	3/4	2.1/2	5013030180	5013230180	5013090180
5/16	5/16	13/16	2.1/2	5013030200	5013230200	5013090200
11/32	3/8	1	2.1/2	5013030220	5013230220	5013090220
3/8	3/8	1	2.1/2	5013030240	5013230240	5013090240
13/32	7/16	1	2.3/4	5013030260	5013230260	5013090260
7/16	7/16	1	2.3/4	5013030280	5013230280	5013090280
15/32	1/2	1	3	5013030300	5013230300	5013090300
1/2	1/2	1	3	5013030320	5013230320	5013090320
9/16	9/16	1.1/8	3.1/2	5013030360	5013230360	5013090360
5/8	5/8	1.1/4	3.1/2	5013030400	5013230400	5013090400
11/16	3/4	1.3/8	4	5013030440	5013230440	5013090440
3/4	3/4	1.1/2	4	5013030480	5013230480	5013090480
1	1	1.1/2	4	5013030640	5013230640	5013090640

STANDRD SOLID CARBIDE K30

2 FLUTE, LONG, STRAIGHT SHANK

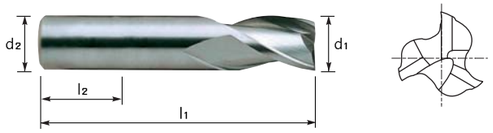
MG HM | 30° | FLUTE 2 | PLAIN



Series No. 502303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5023030080	5023230080	5023090080
3/16	3/16	3/4	2.1/2	5023030120	5023230120	5023090120
1/4	1/4	1.1/8	3	5023030160	5023230160	5023090160
5/16	5/16	1.1/8	3	5023030200	5023230200	5023090200
3/8	3/8	1.1/8	3	5023030240	5023230240	5023090240
7/16	7/16	2	4.1/2	5023030280	5023230280	5023090280
1/2	1/2	2	4.1/2	5023030320	5023230320	5023090320
5/8	5/8	1.1/4	5	5023030400	5023230400	5023090400
3/4	3/4	1.1/4	5	5023030480	5023230480	5023090480
1	1	1.1/4	5	5023030640	5023230640	5023090640

3 FLUTE, SHORT, STRAIGHT SHANK



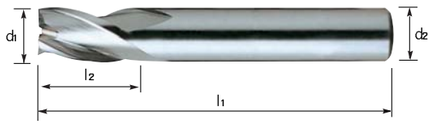
MG HM | 30° | FLUTE 3 | PLAIN

Series No. 506303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5063030040	5063230040	5063090040
1/8	1/8	1/4	1.1/2	5063030080	5063230080	5063090080
3/16	3/16	3/8	2	5063030120	5063230120	5063090120
1/4	1/4	1/2	2	5063030160	5063230160	5063090160
3/8	3/8	1/2	2	5063030240	5063230240	5063090240
1/2	1/2	1/2	2	5063030320	5063230320	5063090320

3 FLUTE, STANDARD, STRAIGHT SHANK

MG HM | 30° | FLUTE 3 | PLAIN

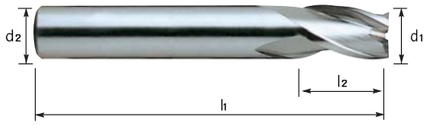


Series No. 507303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5073030040	5073230040	5073090040
1/8	1/8	1/2	1.1/2	5073030080	5073230080	5073090080
3/16	3/16	5/8	2	5073030120	5073230120	5073090120
1/4	1/4	3/4	2.1/2	5073030160	5073230160	5073090160
5/16	5/16	13/16	2.1/2	5073030200	5073230200	5073090200
3/8	3/8	1	2.1/2	5073030240	5073230240	5073090240
7/16	7/16	1	2.3/4	5073030280	5073230280	5073090280
1/2	1/2	1	3	5073030320	5073230320	5073090320
5/8	5/8	1.1/4	3.1/2	5073030400	5073230400	5073090400
3/4	3/4	1.1/2	4	5073030480	5073230480	5073090480
1	1	1.1/2	4	5073030640	5073230640	5073090640

3 FLUTE, LONG, STRAIGHT SHANK

MG HM | 30° | FLUTE 3 | PLAIN



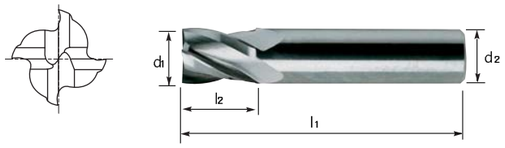
Series No. 508303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5083030080	5083230080	5083090080
1/4	1/4	1	3	5083030160	5083230160	5083090160
3/8	3/8	1.1/2	4	5083030240	5083230240	5083090240
1/2	1/2	2	4	5083030320	5083230320	5083090320
1	1	1.1/4	5	5083030640	5083230640	5083090640

4 FLUTE, SHORT, STRAIGHT SHANK

MG HM | 30° | FLUTE 4 | PLAIN

Series No. 509303

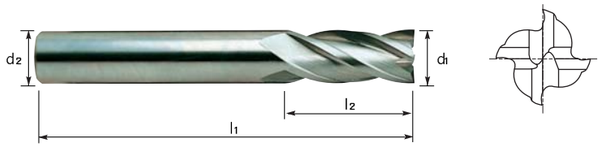


Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5093030040	5093230040	5093090040
1/8	1/8	1/4	1.1/2	5093030080	5093230080	5093090080
3/16	3/16	3/8	2	5093030120	5093230120	5093090120
1/4	1/4	1/2	2	5093030160	5093230160	5093090160
3/8	3/8	1/2	2	5093030240	5093230240	5093090240
1/2	1/2	1/2	2	5093030320	5093230320	5093090320

4 FLUTE, STANDARD, STRAIGHT SHANK

MG HM | 30° | FLUTE 4 | PLAIN

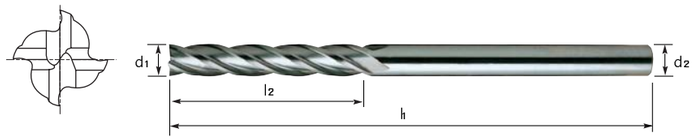
Series No. 510303



Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5103030040	5103230040	5103090040
3/32	1/8	9/32	1.1/2	5103030060	5103230060	5103090060
1/8	1/8	1/2	1.1/2	5103030080	5103230080	5103090080
5/32	3/16	1/2	2	5103030100	5103230100	5103090100
3/16	3/16	5/8	2	5103030120	5103230120	5103090120
7/32	1/4	5/8	2.1/2	5103030140	5103230140	5103090140
1/4	1/4	3/4	2.1/2	5103030160	5103230160	5103090160
9/32	5/16	3/4	2.1/2	5103030180	5103230180	5103090180
5/16	5/16	13/16	2.1/2	5103030200	5103230200	5103090200
11/32	3/8	1	2.1/2	5103030220	5103230220	5103090220
3/8	3/8	1	2.1/2	5103030240	5103230240	5103090240
13/32	7/16	1	2.3/4	5103030260	5103230260	5103090260
7/16	7/16	1	2.3/4	5103030280	5103230280	5103090280
15/32	1/2	1	3	5103030300	5103230300	5103090300
1/2	1/2	1	3	5103030320	5103230320	5103090320
9/16	9/16	1.1/8	3.1/2	5103030360	5103230360	5103090360
5/8	5/8	1.1/4	3.1/2	5103030400	5103230400	5103090400
11/16	3/4	1.3/8	4	5103030440	5103230440	5103090440
3/4	3/4	1.1/2	4	5103030480	5103230480	5103090480
1	1	1.1/2	4	5103030640	5103230640	5103090640

4 FLUTE, LONG, STRAIGHT SHANK

MG HM | 30° | FLUTE 4 | PLAIN

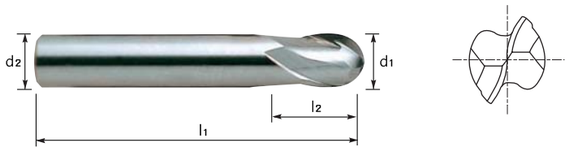


Series No. 511303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5113030080	5113230080	5113090080
3/16	3/16	3/4	2.1/2	5113030120	5113230120	5113090120
1/4	1/4	1.1/8	3	5113030160	5113230160	5113090160
5/16	5/16	1.1/8	3	5113030200	5113230200	5113090200
3/8	3/8	1.1/8	3	5113030240	5113230240	5113090240
7/16	7/16	2	4.1/2	5113030280	5113230280	5113090280
1/2	1/2	2	4.1/2	5113030320	5113230320	5113090320
5/8	5/8	1.1/4	5	5113030400	5113230400	5113090400
3/4	3/4	1.1/4	5	5113030480	5113230480	5113090480
1	1	1.1/4	5	5113030640	5113230640	5113090640

2 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 2 | PLAIN

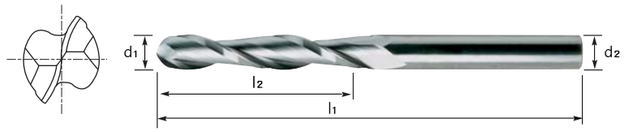


Series No. 512303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5123030040	5123230040	5123090040
1/8	1/8	1/4	1.1/2	5123030080	5123230080	5123090080
3/16	3/16	3/8	2	5123030120	5123230120	5123090120
1/4	1/4	1/2	2	5123030160	5123230160	5123090160
3/8	3/8	1/2	2	5123030240	5123230240	5123090240
1/2	1/2	1/2	2	5123030320	5123230320	5123090320

2 FLUTE, STANDARD, BALL NOSE, STRAIGHT SHANK

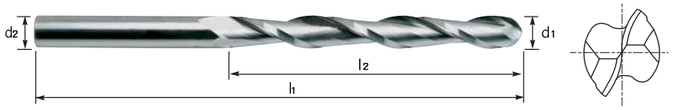
MG HM | N | 30° | FLUTE 2 | PLAIN



Series No. 513303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5133030040	5133230040	5133090040
3/32	1/8	9/32	1.1/2	5133030060	5133230060	5133090060
1/8	1/8	1/2	1.1/2	5133030080	5133230080	5133090080
5/32	3/16	1/2	2	5133030100	5133230100	5133090100
3/16	3/16	5/8	2	5133030120	5133230120	5133090120
7/32	1/4	5/8	2.1/2	5133030140	5133230140	5133090140
1/4	1/4	3/4	2.1/2	5133030160	5133230160	5133090160
9/32	5/16	3/4	2.1/2	5133030180	5133230180	5133090180
5/16	5/16	13/16	2.1/2	5133030200	5133230200	5133090200
3/8	3/8	1	2.1/2	5133030240	5133230240	5133090240
7/16	7/16	1	2.3/4	5133030280	5133230280	5133090280
1/2	1/2	1	3	5133030320	5133230320	5133090320
9/16	9/16	1.1/8	3.1/2	5133030360	5133230360	5133090360
5/8	5/8	1.1/4	3.1/2	5133030400	5133230400	5133090400
11/16	3/4	1.3/8	4	5133030440	5133230440	5133090440
3/4	3/4	1.1/2	4	5133030480	5133230480	5133090480
1	1	1.1/2	4	5133030640	5133230640	5133090640

2 FLUTE, LONG, BALL NOSE, STRAIGHT SHANK



MG HM | N | 30° | FLUTE 2 | PLAIN

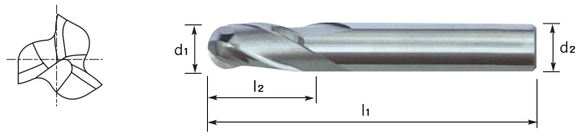
Series No. 514303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5143030080	5143230080	5143090080
3/16	3/16	3/4	2.1/2	5143030120	5143230120	5143090120
1/4	1/4	1.1/8	3	5143030160	5143230160	5143090160
5/16	5/16	1.1/8	3	5143030200	5143230200	5143090200
3/8	3/8	1.1/8	3	5143030240	5143230240	5143090240
7/16	7/16	2	4.1/2	5143030280	5143230280	5143090280
1/2	1/2	2	4.1/2	5143030320	5143230320	5143090320
5/8	5/8	1.1/4	5	5143030400	5143230400	5143090400
3/4	3/4	1.1/4	5	5143030480	5143230480	5143090480

3 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 3 | PLAIN

Series No. 518303



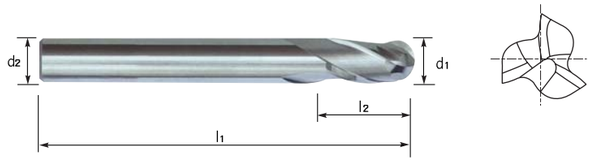
Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5183030040	5183230040	5183090040
1/8	1/8	1/4	1.1/2	5183030080	5183230080	5183090080
3/16	3/16	3/8	2	5183030120	5183230120	5183090120
1/4	1/4	1/2	2	5183030160	5183230160	5183090160
3/8	3/8	1/2	2	5183030240	5183230240	5183090240
1/2	1/2	1/2	2	5183030320	5183230320	5183090320

STANDRD SOLID CARBIDE K30

3 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 3 | PLAIN

Series No. 519303

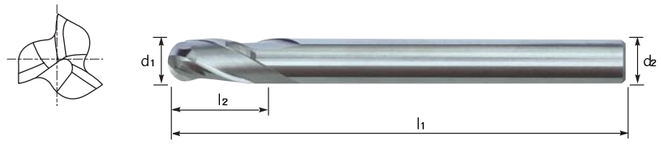


Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5193030040	5193230040	5193090040
1/8	1/8	1/2	1.1/2	5193030080	5193230080	5193090080
3/16	3/16	5/8	2	5193030120	5193230120	5193090120
1/4	1/4	3/4	2.1/2	5193030160	5193230160	5193090160
5/16	5/16	13/16	2.1/2	5193030200	5193230200	5193090200
3/8	3/8	1	2.1/2	5193030240	5193230240	5193090240
7/16	7/16	1	2.3/4	5193030280	5193230280	5193090280
1/2	1/2	1	3	5193030320	5193230320	5193090320
3/4	3/4	1.1/2	4	5193030480	5193230480	5193090480
1	1	1.1/2	4	5193030640	5193230640	5193090640

3 FLUTE, STANDARD, BALL NOSE, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 3 | PLAIN

Series No. 520303

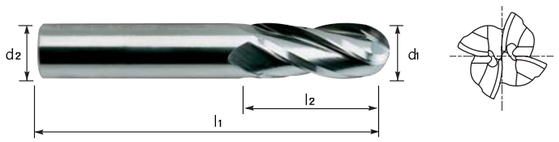


Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5203030080	5203230080	5203090080
1/4	1/4	1.1/8	3	5203030160	5203230160	5203090160
3/8	3/8	1.1/2	4	5203030240	5203230240	5203090240
1/2	1/2	2	4	5203030320	5203230320	5203090320
3/4	3/4	1.1/4	5	5203030480	5203230480	5203090480

4 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 4 | PLAIN

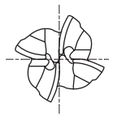
Series No. 516303

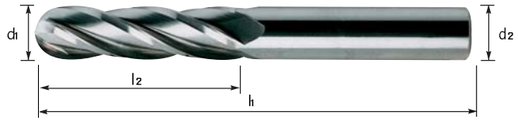


Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5163030040	5163230040	5163090040
1/8	1/8	1/4	1.1/2	5163030080	5163230080	5163090080
3/16	3/16	3/8	2	5163030120	5163230120	5163090120
1/4	1/4	1/2	2	5163030160	5163230160	5163090160
3/8	3/8	1/2	2	5163030240	5163230240	5163090240
1/2	1/2	1/2	2	5163030320	5163230320	5163090320

4 FLUTE, STANDARD, BALL NOSE, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 4 | PLAIN



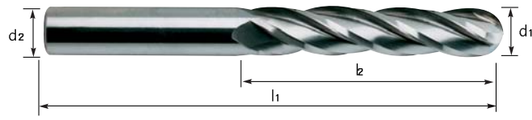


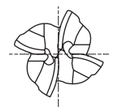
Series No. 515303

Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5153030040	5153230040	5153090040
3/32	1/8	9/32	1.1/2	5153030060	5153230060	5153090060
1/8	1/8	1/2	1.1/2	5153030080	5153230080	5153090080
5/32	3/16	1/2	2	5153030100	5153230100	5153090100
3/16	3/16	5/8	2	5153030120	5153230120	5153090120
7/32	1/4	5/8	2.1/2	5153030140	5153230140	5153090140
1/4	1/4	3/4	2.1/2	5153030160	5153230160	5153090160
9/32	5/16	3/4	2.1/2	5153030180	5153230180	5153090180
5/16	5/16	13/16	2.1/2	5153030200	5153230200	5153090200
3/8	3/8	1	2.1/2	5153030240	5153230240	5153090240
7/16	7/16	1	2.3/4	5153030280	5153230280	5153090280
1/2	1/2	1	3	5153030320	5153230320	5153090320
9/16	9/16	1.1/8	3.1/2	5153030360	5153230360	5153090360
5/8	5/8	1.1/4	3.1/2	5153030400	5153230400	5153090400
11/16	3/4	1.3/8	4	5153030440	5153230440	5153090440
3/4	3/4	1.1/2	4	5153030480	5153230480	5153090480
1	1	1.1/2	4	5153030640	5153230640	5153090640

4 FLUTE, LONG, BALL NOSE, STRAIGHT SHANK

MG HM | N | 30° | FLUTE 4 | PLAIN





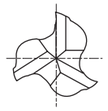
Series No. 517303

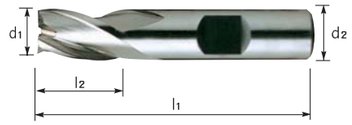
Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5173030080	5173230080	5173090080
1/4	1/4	1	3	5173030160	5173230160	5173090160
3/8	3/8	1.1/2	4	5173030240	5173230240	5173090240
1/2	1/2	2	4	5173030320	5173230320	5173090320
1	1	2.1/4	5	5173030640	5173030640	5173030640

3 FLUTE , SHORT, THROW AWAY, FLATTED SHANK

MG HM | N | 30° | FLUTE 3 | BS

Series No. 528103





Mill Dia. (d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/4	3/32	31/32	5281030040	5281230040	5281090040
3/32	1/4	5/32	1.1/16	5281030060	5281230060	5281090060
1/8	1/4	3/16	1.3/32	5281030080	5281230080	5281090080
5/32	1/4	1/4	1.9/32	5281030100	5281230100	5281090100
3/16	1/4	9/32	1.11/32	5281030120	5281230120	5281090120
7/32	1/4	5/16	1.13/32	5281030140	5281230140	5281090140
1/4	1/4	3/8	1.13/32	5281030160	5281230160	5281090160

ⁱ Available Whilest Stocks Last.

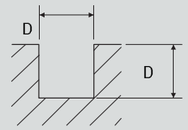
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

2 FLUTE, STRAIGHT SHANK

300303, 301303, 302303, 502303, 501303

500303, 100103, 102103, 101103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc20		HRc20~HRc30		HRc30~HRc40									
STRENGTH	500 ~800N/mm²		800 ~1000N/mm²		1000 ~1300N/mm²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	80	4800	70	4000	55	8000	65	6500	150	16000	320	12000	240
3	3700	90	3200	80	2600	60	5300	65	4200	150	11000	320	8000	240
4	2800	90	2400	80	2000	60	4000	65	3200	150	8000	320	6000	240
5	2200	90	1900	80	1600	60	3200	65	2500	150	6400	320	4800	240
6	1800	90	1600	80	1300	60	2600	65	2100	180	5300	340	4000	260
8	1400	90	1200	80	1000	60	2000	65	1600	190	4000	340	3000	260
10	1100	90	950	80	800	60	1600	65	1300	200	3200	340	2400	260
12	900	90	800	80	660	60	1300	65	1000	210	2600	340	2000	260
14	800	90	700	80	570	60	1100	65	900	220	2300	340	1700	260
16	700	100	600	85	500	75	1000	75	800	225	2000	340	1500	260
20	550	100	480	85	400	75	800	80	640	240	1600	340	1200	260



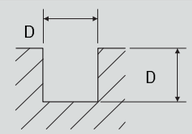
RPM=REVOLUTION PER MIN.
Feed=mm / min

2 FLUTE, STRAIGHT SHANK, TiCN-COATED

300303, 301303, 302303, 502303, 501303

500303, 100103, 102103, 101103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~HRc20		HRc20~HRc30		HRc30~HRc40									
STRENGTH	500 ~800N/mm²		800 ~1000N/mm²		1000 ~1300N/mm²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	100	6200	90	5200	70	10000	85	8500	200	20000	420	15000	310
3	4800	120	4200	105	3400	80	6900	85	5500	200	14000	420	10000	310
4	3640	120	3100	105	2600	80	5200	85	4200	200	10000	420	8000	310
5	2860	120	2500	105	2000	80	4200	85	3300	200	8300	420	6200	310
6	2400	120	2000	105	1700	80	3400	85	2700	230	6900	440	5200	340
8	1800	120	1500	105	1300	80	2600	85	2000	250	5200	440	4000	340
10	1400	120	1200	105	1000	80	2000	85	1700	260	4200	440	3100	340
12	1200	120	1000	105	860	80	1700	85	1300	270	3400	440	2600	340
14	1000	120	900	105	740	80	1400	85	1200	280	3000	440	2200	340
16	900	130	800	110	650	100	1300	100	1000	290	2600	440	2000	340
20	720	130	620	110	520	100	1000	100	830	310	2000	440	1560	340



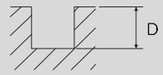
RPM=REVOLUTION PER MIN. Feed=mm / min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SLOTTING

304303, 104103, 128103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	70	4800	60	4000	50	8000	55	6500	140	16000	290	12000	220
3	3700	80	3200	75	2600	55	5300	55	4200	140	11000	300	8000	220
4	2800	80	2400	75	2000	55	4000	55	3200	130	8000	290	6000	220
5	2200	80	1900	70	1600	55	3200	55	2500	135	6400	290	4800	220
6	1800	80	1600	70	1300	55	2600	60	2100	160	5300	305	4000	240
8	1400	80	1200	70	1000	55	2000	60	1600	170	4000	310	3000	230
10	1100	80	950	70	800	55	1600	60	1300	180	3200	305	2400	230
12	900	80	800	70	660	55	1300	60	1000	190	2600	300	2000	230
14	800	80	700	70	570	55	1100	60	900	200	2300	300	1700	230
16	700	90	600	75	500	65	1000	70	800	200	2000	300	1500	230
20	550	90	480	75	400	65	800	70	640	215	1600	300	1200	230



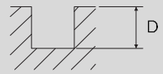
※The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

3 FLUTE, FINISH SLOTTING, TiCN-COATED

304303, 104103, 128103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	90	6200	80	5200	65	10000	70	8500	180	20000	380	15000	280
3	4800	105	4200	100	3400	70	6900	70	5500	180	14000	390	10000	280
4	3640	105	3100	100	2600	70	5200	70	4200	170	10000	380	8000	280
5	2860	105	2500	90	2000	70	4200	70	3300	180	8300	380	6200	280
6	2400	105	2000	90	1700	70	3400	80	2700	210	6900	400	5200	310
8	1800	105	1500	90	1300	70	2600	80	2000	220	5200	400	4000	300
10	1400	105	1200	90	1000	70	2000	80	1700	230	4200	400	3100	300
12	1200	105	1000	90	860	70	1700	80	1300	250	3400	390	2600	300
14	1000	105	900	90	740	70	1400	80	1200	260	3000	390	2200	300
16	900	120	800	100	650	85	1300	90	1000	260	2600	390	2000	300
20	720	120	620	100	520	85	1000	90	830	280	2000	390	1560	300



※The FEED, in long & extra long types, should be reduced by around 50%

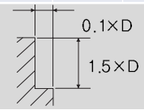
RPM =rev/min
FEED =mm/min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SIDE CUTTING

304303, 104103, 128103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	180	4800	160	4000	120	8000	140	6500	330	16000	720	12000	540
3	3700	200	3200	170	2600	130	5300	140	4200	330	11000	690	8000	530
4	2800	200	2400	180	2000	130	4000	140	3200	340	8000	720	6000	540
5	2200	200	1900	180	1600	130	3200	140	2500	340	6400	710	4800	530
6	1800	200	1600	180	1300	130	2600	150	2100	400	5300	760	4000	580
8	1400	200	1200	180	1000	130	2000	150	1600	430	4000	760	3000	580
10	1100	200	950	180	800	130	1600	150	1300	450	3200	760	2400	580
12	900	200	800	180	660	130	1300	150	1000	470	2600	760	2000	580
14	800	200	700	180	570	130	1100	150	900	490	2300	760	1700	580
16	700	220	600	190	500	160	1000	170	800	510	2000	760	1500	580
20	550	220	480	190	400	160	800	180	640	540	1600	760	1200	580



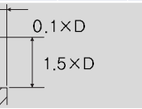
※The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

3 FLUTE, FINISH SIDE CUTTING, TiCN-COATED

304303, 104103, 128103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	230	6200	210	5200	160	10000	180	8500	430	20000	940	15000	700
3	4800	260	4200	220	3400	170	6900	180	5500	430	14000	900	10000	690
4	3640	260	3100	230	2600	170	5200	180	4200	440	10000	940	8000	700
5	2860	260	2500	230	2000	170	4200	180	3300	440	8300	920	6200	690
6	2400	260	2000	230	1700	170	3400	200	2700	520	6900	1000	5200	750
8	1800	260	1500	230	1300	170	2600	200	2000	560	5200	1000	4000	750
10	1400	260	1200	230	1000	170	2000	200	1700	580	4200	1000	3100	750
12	1200	260	1000	230	860	170	1700	200	1300	610	3400	1000	2600	750
14	1000	260	900	230	740	170	1400	200	1200	640	3000	1000	2200	750
16	900	280	800	250	650	210	1300	220	1000	660	2600	1000	2000	750
20	720	280	620	250	520	210	1000	230	830	700	2000	1000	1560	750



※The FEED, in long & extra long types, should be reduced by around 50%

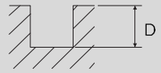
RPM =rev/min
FEED =mm/min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SLOTTING, 45° HELIX

140103, 141103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1600	95	1300	65	2100	220	5300	410	4000	310
8	1200	95	1000	65	1600	230	4000	410	3000	310
10	950	95	800	65	1300	240	3200	410	2400	310
12	800	95	660	65	1000	250	2600	410	2000	310
14	700	95	570	65	900	260	2300	410	1700	310
16	600	100	500	80	800	270	2000	410	1500	310
20	480	100	400	80	640	290	1600	410	1200	310

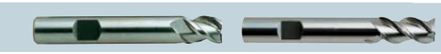


※The FEED, in long & extra long types, should be reduced by around 50%

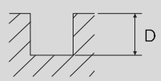
RPM=rev/min
FEED=mm/min.

3 FLUTE, FINISH SLOTTING, 45° HELIX, TiCN-COATED

140103, 141103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2000	125	1700	85	2700	280	6900	530	5200	400
8	1560	125	1300	85	2000	300	5200	530	3900	400
10	1240	125	1000	85	1700	310	4200	530	3100	400
12	1000	125	860	85	1300	330	3400	530	2600	400
14	900	125	740	85	1200	340	3000	530	2200	400
16	800	130	650	100	1000	350	2600	530	2000	400
20	620	130	520	100	830	380	2000	530	1560	400



※The FEED, in long & extra long types, should be reduced by around 50%

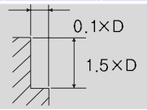
RPM=rev/min
FEED=mm/min.

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SIDE CUTTING, 45° HELIX

140103, 141103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1600	190	1300	130	2100	440	5300	820	4000	620
8	1200	190	1000	130	1600	460	4000	820	3000	620
10	950	190	800	130	1300	480	3200	820	2400	620
12	800	190	660	130	1000	500	2600	820	2000	620
14	700	190	570	130	900	520	2300	820	1700	620
16	600	200	500	160	800	540	2000	820	1500	620
20	480	200	400	160	640	580	1600	820	1200	620



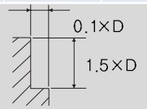
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=rev/min
FEED=mm/min.

3 FLUTE, FINISH SIDE CUTTING, 45° HELIX, TiCN-COATED

140103, 141103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2000	250	1700	170	2700	570	6900	1000	5200	800
8	1560	250	1300	170	2000	600	5200	1000	3900	800
10	1240	250	1000	170	1700	620	4200	1000	3100	800
12	1000	250	860	170	1300	650	3400	1000	2600	800
14	900	250	740	170	1200	680	3000	1000	2200	800
16	800	260	650	210	1000	700	2600	1000	2000	800
20	620	260	520	210	830	750	2000	1000	1560	800



※The FEED, in long & extra long types, should be reduced by around 50%

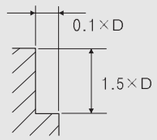
RPM=rev/min
FEED=mm/min.

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, STRAIGHT SHANK

511303, 510303, 509303,

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500~800N/㎟		800 ~ 1000N/㎟		1000 ~ 1300N/㎟									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	240	4800	210	4000	160	8000	200	6500	450	16000	960	12000	720
3	3700	270	3200	240	2600	180	5300	200	4200	450	11000	960	8000	720
4	2800	270	2400	240	2000	180	4000	200	3200	450	8000	960	6000	720
5	2200	270	1900	240	1600	180	3200	200	2500	450	6400	960	4800	720
6	1800	270	1600	240	1300	180	2600	200	2100	540	5300	1020	4000	780
8	1400	270	1200	240	1000	180	2000	200	1600	570	4000	1020	3000	780
10	1100	270	950	240	800	180	1600	200	1300	600	3200	1020	2400	780
12	900	270	800	240	660	180	1300	200	1000	630	2600	1020	2000	780
14	800	270	700	240	570	180	1100	200	900	660	2300	1020	1700	780
16	700	300	600	260	500	220	1000	225	800	680	2000	1020	1500	780
20	550	300	480	260	400	220	800	240	640	720	1600	1020	1200	780



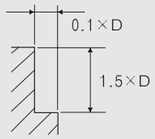
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

4 FLUTE, STRAIGHT SHANK, TiCN-COATED

511303, 510303, 509303,

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500~800N/㎟		800 ~ 1000N/㎟		1000 ~ 1300N/㎟									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	310	6200	270	5200	210	10000	260	8500	580	20000	1200	15000	940
3	4800	350	4200	310	3400	230	6900	260	5500	580	14000	1200	10000	940
4	3640	350	3100	310	2600	230	5200	260	4200	580	10000	1200	8000	940
5	2860	350	2500	310	2000	230	4200	260	3300	580	8600	1200	6200	940
6	2400	350	2000	310	1700	230	3400	260	2700	700	6900	1300	5200	1000
8	1800	350	1500	310	1300	230	2600	260	2000	740	5200	1300	4000	1000
10	1400	350	1200	310	1000	230	200	260	1700	480	4200	1300	3100	1000
12	1200	350	1000	310	860	230	1700	260	1300	820	3400	1300	2600	1000
14	1000	350	900	310	740	230	1400	260	1200	860	3000	1300	2200	1000
16	900	390	800	340	650	290	1300	290	1000	880	2600	1300	2000	1000
20	720	390	620	340	520	290	1000	310	830	940	2000	1300	1560	1000



※The FEED, in long & extra long types, should be reduced by around 50%

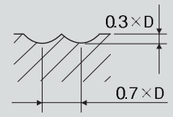
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, STRAIGHT SHANK

309303, 310303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30~HRc40					
STRENGTH	~1000N/mm²		1000 ~1300N/mm²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R1.0 × 2.0	5200	90	4400	45	7300	150	21500	280
R1.5 × 3.0	3500	100	2900	45	4900	160	14300	280
R2.0 × 4.0	2600	100	2100	45	3600	200	10900	280
R2.5 × 5.0	2100	105	1700	45	2900	230	8800	330
R3.0 × 6.0	1700	100	1430	45	2400	250	7260	330
R4.0 × 8.0	1270	95	1100	45	1800	320	5500	380
R5.0 × 10.0	1000	95	870	45	1430	320	4300	380
R6.0 × 12.0	870	85	730	45	1200	320	3600	440
R7.0 × 14.0	750	85	620	45	1000	325	3000	440
R8.0 × 16.0	650	85	540	45	920	325	2700	380
R9.0 × 18.0	580	85	480	45	810	325	2400	380
R10.0 × 20.0	500	85	430	45	730	290	2100	380

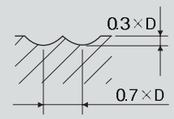


RPM=REVOLUTION PER MIN.
Feed=mm / min

4 FLUTE, STRAIGHT SHANK, TiCN-COATED

309303, 310303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30~HRc40					
STRENGTH	~1000N/mm²		1000 ~1300N/mm²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 × 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 × 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 × 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 × 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 × 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 ×10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 ×12.0	1100	110	950	60	1600	420	4700	570
R 7.0 ×14.0	980	110	800	60	1300	420	3900	570
R 8.0 ×16.0	850	110	700	60	1200	420	3500	490
R 9.0 ×18.0	750	110	620	60	1000	420	3100	490
R 10.0 × 20.0	650	110	560	60	950	380	2700	490



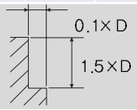
RPM=REVOLUTION PER MIN.
Feed=mm / min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, FINISH SIDE CUTTING

109103, 111103, 110103, 311303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	240	4800	210	4000	160	8000	200	6500	450	16000	960	12000	720
3	3700	270	3200	240	2600	180	5300	200	4200	450	11000	960	8000	720
4	2800	270	2400	240	2000	180	4000	200	3200	450	8000	960	6000	720
5	2200	270	1900	240	1600	180	3200	200	2500	450	6400	960	4800	720
6	1800	270	1600	240	1300	180	2600	200	2100	540	5300	1020	4000	780
8	1400	270	1200	240	1000	180	2000	200	1600	570	4000	1020	3000	780
10	1100	270	950	240	800	180	1600	200	1300	600	3200	1020	2400	780
12	900	270	800	240	660	180	1300	200	1000	630	2600	1020	2000	780
14	800	270	700	240	570	180	1100	200	900	660	2300	1020	1700	780
16	700	300	600	260	500	220	1000	225	800	680	2000	1020	1500	780
20	550	300	480	260	400	220	800	240	640	720	1600	1020	1200	780

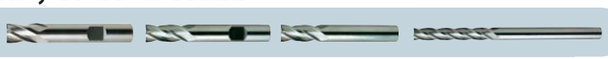


※The FEED, in long & extra long types, should be reduced by around 50%

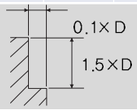
RPM =rev/min
FEED =mm/min

4 FLUTE, FINISH SIDE CUTTING, TiCN-COATED

109103, 111103, 110103, 311303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	310	6200	270	5200	210	10000	260	8500	580	20000	1200	15000	940
3	4800	350	4200	310	3400	230	6900	260	5500	580	14000	1200	10000	940
4	3640	350	3100	310	2600	230	5200	260	4200	580	10000	1200	8000	940
5	2860	350	2500	310	2000	230	4200	260	3300	580	8300	1200	6200	940
6	2400	350	2000	310	1700	230	3400	260	2700	700	6900	1300	5200	1000
8	1800	350	1500	310	1300	230	2600	260	2000	740	5200	1300	4000	1000
10	1400	350	1200	310	1000	230	2000	260	1700	780	4200	1300	3100	1000
12	1200	350	1000	310	860	230	1700	260	1300	820	3400	1300	2600	1000
14	1000	350	900	310	740	230	1400	260	1200	860	3000	1300	2200	1000
16	900	390	800	340	650	290	1300	290	1000	880	2600	1300	2000	1000
20	720	390	620	340	520	290	1000	310	830	940	2000	1300	1560	1000



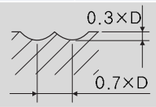
※The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

2 FLUTE, BALL NOSE

162303, 314303, 312303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRc30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	5200	90	4400	45	7300	150	21500	280
R 1.5 × 3.0	3500	100	2900	45	4900	160	14300	280
R 2.0 × 4.0	2600	100	2100	45	3600	200	10900	280
R 2.5 × 5.0	2100	105	1700	45	2900	230	8800	330
R 3.0 × 6.0	1700	100	1430	45	2400	250	7260	330
R 4.0 × 8.0	1270	95	1100	45	1800	320	5500	380
R 5.0 ×10.0	1000	95	870	45	1430	320	4300	380
R 6.0 ×12.0	870	85	730	45	1200	320	3600	440
R 7.0 ×14.0	750	85	620	45	1000	325	3000	440
R 8.0 ×16.0	650	85	540	45	920	325	2700	380
R 9.0 ×18.0	580	85	480	45	810	325	2400	380
R 10.0 ×20.0	500	85	430	45	730	290	2100	380



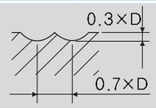
※The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

2 FLUTE, BALL NOSE, TiCN-COATED

162303, 314303, 312303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRc30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 × 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 × 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 × 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 × 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 × 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 ×10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 ×12.0	1100	110	950	60	1600	420	4700	570
R 7.0 ×14.0	980	110	800	60	1300	420	3900	570
R 8.0 ×16.0	850	110	700	60	1200	420	3500	490
R 9.0 ×18.0	750	110	620	60	1000	420	3100	490
R 10.0 ×20.0	650	110	560	60	950	380	2700	490



※The FEED, in long & extra long types, should be reduced by around 50%

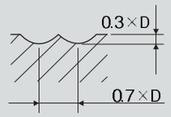
RPM =rev/min
FEED =mm/min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

2 FLUTE, STANDARD, BALL NOSE

313303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30~HRc40					
STRENGTH	~1000N/mm²		1000 ~1300N/mm²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R1.0 × 2.0	5200	90	4400	45	7300	150	21500	280
R1.5 × 3.0	3500	100	2900	45	4900	160	14300	280
R2.0 × 4.0	2600	100	2100	45	3600	200	10900	280
R2.5 × 5.0	2100	105	1700	45	2900	230	8800	330
R3.0 × 6.0	1700	100	1430	45	2400	250	7260	330
R4.0 × 8.0	1270	95	1100	45	1800	320	5500	380
R5.0 × 10.0	1000	95	870	45	1430	320	4300	380
R6.0 × 12.0	870	85	730	45	1200	320	3600	440
R7.0 × 14.0	750	85	620	45	1000	325	3000	440
R8.0 × 16.0	650	85	540	45	920	325	2700	380
R9.0 × 18.0	580	85	480	45	810	325	2400	380
R10.0 × 20.0	500	85	430	45	730	290	2100	380

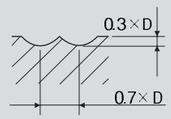


RPM=REVOLUTION PER MIN.
Feed=mm / min

2 FLUTE, STANDARD, BALL NOSE, TiCN-COATED

313303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30~HRc40					
STRENGTH	~1000N/mm²		1000 ~1300N/mm²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 × 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 × 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 × 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 × 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 × 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 × 10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 × 12.0	1100	110	950	60	1600	420	4700	570
R 7.0 × 14.0	980	110	800	60	1300	420	3900	570
R 8.0 × 16.0	850	110	700	60	1200	420	3500	490
R 9.0 × 18.0	750	110	620	60	1000	420	3100	490
R 10.0 × 20.0	650	110	560	60	950	380	2700	490



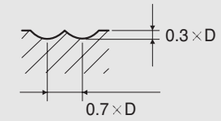
RPM=REVOLUTION PER MIN.
Feed=mm / min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

2 FLUTE, BALL NOSE, STRAIGHT SHANK

512303,513303, 514303,

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/㎟		1000 ~ 1300N/㎟					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	5200	90	4400	45	7300	150	21500	280
R 1.5 × 3.0	3500	100	2900	45	4900	160	14300	280
R 2.0 × 4.0	2600	100	2100	45	3600	200	10900	280
R 2.5 × 5.0	2100	105	1700	45	2900	230	8800	330
R 3.0 × 6.0	1700	100	1430	45	2400	250	7260	330
R 4.0 × 8.0	1270	95	1100	45	1800	320	5500	380
R 5.0 × 10.0	1000	95	870	45	1430	320	4300	380
R 6.0 × 12.0	870	85	730	45	1200	320	3600	440
R 7.0 × 14.0	750	85	620	45	1000	325	3000	440
R 8.0 × 16.0	650	85	540	45	920	325	2700	380
R 9.0 × 18.0	580	85	480	45	810	325	2400	380
R 10.0 × 20.0	500	85	430	45	730	290	2100	380



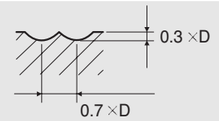
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

2 FLUTE, BALL NOSE, STRAIGHT SHANK, TiCN-COATED

512303,513303, 514303,

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/㎟		1000 ~ 1300N/㎟					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 × 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 × 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 × 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 × 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 × 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 × 10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 × 12.0	1100	110	950	60	1600	420	4700	570
R 7.0 × 14.0	980	110	800	60	1300	420	3900	570
R 8.0 × 16.0	850	110	700	60	1200	420	3500	490
R 9.0 × 18.0	750	110	620	60	1000	420	3100	490
R 10.0 × 20.0	650	110	560	60	950	380	2700	490



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

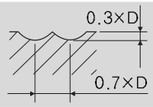
STANDRD SOLID CARBIDE K30

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, BALL NOSE

317303, 316303, 315303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRc30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	5200	140	4400	70	7300	230	21500	420
R 1.5 × 3.0	3500	150	2900	70	4900	240	14300	420
R 2.0 × 4.0	2600	150	2100	70	3600	300	10900	420
R 2.5 × 5.0	2100	160	1700	70	2900	350	8800	500
R 3.0 × 6.0	1700	150	1430	70	2400	380	7260	500
R 4.0 × 8.0	1270	140	1100	70	1800	480	5500	570
R 5.0 × 10.0	1000	140	870	70	1430	480	4300	570
R 6.0 × 12.0	870	130	730	70	1200	480	3600	660
R 7.0 × 14.0	750	130	620	70	1000	490	3000	660
R 8.0 × 16.0	650	130	540	70	920	490	2700	570
R 9.0 × 18.0	580	130	480	70	810	490	2400	570
R 10.0 × 20.0	500	130	430	70	730	440	2100	570



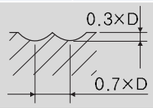
※The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

4 FLUTE, BALL NOSE, TiCN-COATED

317303, 316303, 315303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRc30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	180	5700	90	9500	300	28000	550
R 1.5 × 3.0	4500	200	3800	90	6400	310	18600	550
R 2.0 × 4.0	3400	200	2700	90	4700	390	14000	550
R 2.5 × 5.0	2700	210	2200	90	3800	450	11000	650
R 3.0 × 6.0	2200	200	1860	90	3100	490	9400	650
R 4.0 × 8.0	1600	180	1400	90	2300	620	7200	740
R 5.0 × 10.0	1300	180	1100	90	1860	620	5600	740
R 6.0 × 12.0	1100	170	950	90	1600	620	4700	860
R 7.0 × 14.0	980	170	800	90	1300	640	3900	860
R 8.0 × 16.0	850	170	700	90	1200	640	3500	740
R 9.0 × 18.0	750	170	620	90	1000	640	3100	740
R 10.0 × 20.0	650	170	560	90	950	570	2700	740



※The FEED, in long & extra long types, should be reduced by around 50%

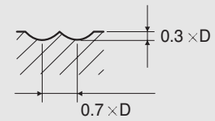
RPM =rev/min
FEED =mm/min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, BALL NOSE, STRAIGHT SHANK

516303,515303, 517303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/㎟		1000 ~ 1300N/㎟					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	5200	140	4400	70	7300	230	21500	420
R 1.5 × 3.0	3500	150	2900	70	4900	240	14300	420
R 2.0 × 4.0	2600	150	2100	70	3600	300	10900	420
R 2.5 × 5.0	2100	160	1700	70	2900	350	8800	500
R 3.0 × 6.0	1700	150	1430	70	2400	380	7260	500
R 4.0 × 8.0	1270	140	1100	70	1800	480	5500	570
R 5.0 × 10.0	1000	140	870	70	1430	480	4300	570
R 6.0 × 12.0	870	130	730	70	1200	480	3600	660
R 7.0 × 14.0	750	130	620	70	1000	490	3000	660
R 8.0 × 16.0	650	130	540	70	920	490	2700	570
R 9.0 × 18.0	580	130	480	70	810	490	2400	570
R 10.0 × 20.0	500	130	430	70	730	440	2100	570



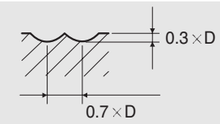
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

4 FLUTE, BALL NOSE, STRAIGHT SHANK, TiCN-COATED

516303,515303, 517303

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/㎟		1000 ~ 1300N/㎟					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	180	5700	90	9500	300	28000	550
R 1.5 × 3.0	4500	200	3800	90	6400	310	186000	550
R 2.0 × 4.0	3400	200	2700	90	4700	390	14000	550
R 2.5 × 5.0	2700	210	2200	90	3800	450	11000	650
R 3.0 × 6.0	2200	200	1860	90	3100	490	9400	650
R 4.0 × 8.0	1600	180	1400	90	2300	620	7200	740
R 5.0 × 10.0	1300	180	1100	90	1860	620	5600	740
R 6.0 × 12.0	1100	170	950	90	1600	620	4700	860
R 7.0 × 14.0	980	170	800	90	1300	640	3900	860
R 8.0 × 16.0	850	170	700	90	1200	640	3500	740
R 9.0 × 18.0	750	170	620	90	1000	640	3100	740
R 10.0 × 20.0	650	170	560	90	950	570	2700	740



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

SABRE ROUGHING
END MILLS

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Europa Tool 8TH EDITION

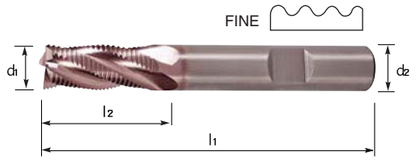
SABRE ROUGHING CUTTERS
(New material & coating high speed & feed roughing)

PRODUCTS	SERIES	DESCRIPTION	PAGE
	190140	MULTI FLUTE, SHORT LENGTH FINE PITCH ROUGHING END MILL	165
	191140	MULTI FLUTE, LONG LENGTH FINE PITCH ROUGHING END MILL	166
		CUTTING DATA	167

MULTI FLUTE, SHORT, FINE PITCH ROUGHING END MILL

PREMIUM PM | FLUTE 3~5 | DIN 844 | 30° | DIN 1835B | ~ ϕ20 | ϕ22~

Series No. 190140



SUITABLE FOR HIGH-FEED ROUGHING MILLING.
GEEIGNET ZUM HSC - SCHRUPPEN - FRÄSEN.

PROVIDING EXCELLENT FINISHED SURFACES IN MANY CASES.
LIEFERT IN VIELEN FÄLLEN EXZELLENT BEARBEITETE OBERFLÄCHEN.

UP TO ϕ20 : CENTER CUT, OVER ϕ20 : NON CENTER CUT
BIS D<=20MM ZENTRUMSCHNITT, ÜBER ϕ20 : OHNE MITTESCHNITT.

DESIGNED TO MACHINE CARBON STEELS, ALLOYED STEELS, STAINLESS STEELS.
GEEIGNET ZUM FRÄSEN STÄHLE, LEGIERTE STÄHLE, EDELSTÄHLE.

EUROPA'S NEW DEVELOPED SABRE ROUGHER COATING SUITABLE FOR HIGH SPEED CUTTING.
NEUENTWICKELTE BESCHICHTUNG FÜR HOCHGESCHWINDIGKEITSAUSSCHNITT.

EDP No.	d1	d2	l1	l2	No.of flutes
1901400600	6	6	13	57	3
1901400700	7	10	16	66	3
1901400800	8	10	19	69	3
1901400900	9	10	19	69	3
1901401000	10	10	22	72	4
1901401200	12	12	26	83	4
1901401400	14	12	26	83	4
1901401600	16	16	32	92	4
1901401800	18	16	32	92	4
1901402000	20	20	38	104	4
1901402200	22	20	38	104	5
1901402500	25	25	45	121	5

UP TO & INCL. 20MM-CENTRE CUTTING, OVER 20MM NON CENTRE CUTTING

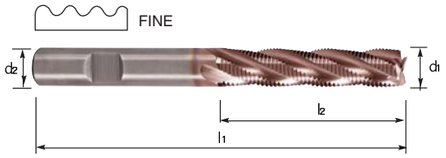
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	± 50	± 60	± 75	±90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI FLUTE, LONG, FINE PITCH ROUGHING END MILL

PREMIUM PM | FLUTE 3~5 | DIN 844 | 30° | DIN 1835B | ~ ϕ20 | ϕ22~

Series No. 191140



SUITABLE FOR HIGH-FEED ROUGHING MILLING.
GEEIGNET ZUM HSC - SCHRUPPEN - FRÄSEN.

PROVIDING EXCELLENT FINISHED SURFACES IN MANY CASES.
LIEFERT IN VIELEN FÄLLEN EXZELLENT BEARBEITETE OBERFLÄCHEN.

UP TO ϕ20 : CENTER CUT, OVER ϕ20 : NON CENTER CUT
BIS D<=20MM ZENTRUMSCHNITT, ÜBER ϕ20 : OHNE MITTESCHNITT.

DESIGNED TO MACHINE CARBON STEELS, ALLOYED STEELS, STAINLESS STEELS.
GEEIGNET ZUM FRÄSEN STÄHLE, LEGIERTE STÄHLE, EDELSTÄHLE.

EUROPA'S NEW DEVELOPED SABRE ROUGHER COATING SUITABLE FOR HIGH SPEED CUTTING.
NEUENTWICKELTE BESCHICHTUNG FÜR HOCHGESCHWINDIGKEITSAUSSCHNITT.

EDP No.	d1	d2	l1	l2	No.of flutes
1911400600	6	6	24	68	3
1911400700	7	10	30	80	3
1911400800	8	10	38	88	3
1911400900	9	10	38	88	3
1911401000	10	10	45	95	4
1911401200	12	12	53	110	4
1911401400	14	12	53	110	4
1911401600	16	16	63	123	4
1911401800	18	16	63	123	4
1911402000	20	20	75	141	4
1911402200	22	20	75	141	5
1911402500	25	25	90	166	5

UP TO & INCL. 20MM-CENTRE CUTTING, OVER 20MM NON CENTRE CUTTING

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

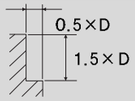
Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	± 50	± 60	± 75	±90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

SABRE ROUGHING cutting condition

MULTI FLUTE, ROUGHING, SIDE CUTTING

190140, 191140

MATERIAL	STRUCTURAL STEELS CARBON STEELS		STRUCTURAL STEELS CARBON STEELS CAST IRONS		CARBON STEELS ALLOY STEELS TOOL STEELS		PREHARDENED STEELS ALLOY STEELS TOOL STEELS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40	
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2800	230	2200	180	1600	115	1300	105
8	2400	290	1900	230	1400	160	1050	125
10	1900	415	1500	315	1050	195	890	160
12	1600	415	1200	330	900	230	740	180
14	1400	415	1050	330	760	230	630	180
16	1200	415	950	330	660	230	550	180
18	1050	415	890	330	610	230	490	180
20	960	425	760	330	530	230	440	180
22	890	425	650	330	470	230	400	180
25	790	415	600	315	420	220	360	180



RPM=REVOLUTION PER MIN.
FEED=mm/min.

EUROPA TOOL

COBALT MILLING CUTTER

END MILLS

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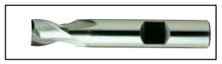
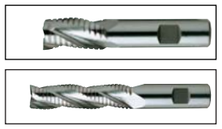
Europa Tool 8TH EDITION

COBALT MILLING CUTTERS

(Standard cobalt milling cutter range)

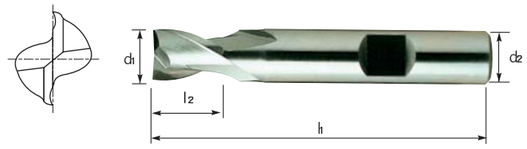
	PRODUCTS	SERIES	DESCRIPTION	PAGE
2 FLUTE / DIN STANDARDS / 8% COBALT HSS				
		100102	SHORT LENGTH (DIN 327) WITH FLATTED SHANK	173/174
		101102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	175
		102102	EXTRA LONG LENGTH (DIN 844) WITH FLATTED SHANK	176
3 FLUTE / DIN STANDARDS / 8% COBALT HSS				
		103102	STUB LENGTH (DIN 327) WITH FLATTED SHANK	177
		104102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	178
		105102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	179
MULTI FLUTE / DIN STANDARDS / 8% COBALT HSS				
		107102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	180
		108102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	181
2 FLUTE BALL NOSE / DIN STANDARDS / 8% COBALT HSS				
		112102	SHORT LENGTH (DIN 327) WITH FLATTED SHANK	182
		113102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	183
		114102	EXTRA LONG LENGTH (DIN 844) WITH FLATTED SHANK	184
MULTI FLUTE BALL NOSE / DIN STANDARDS / 8% COBALT HSS				
		115102	SHORT LENGTH (DIN 1889) WITH FLATTED SHANK	185
		116102	LONG LENGTH (DIN 1889) WITH FLATTED SHANK	186
MULTI FLUTE 50° HELIX SHORT / 8% COBALT HSS				
		132102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	187

COBALT MILLING CUTTERS
(Standard cobalt milling cutter range)

PRODUCTS	SERIES	DESCRIPTION	PAGE
3 FLUTE / THROW AWAY TYPE / 8% COBALT HSS			
	128102	SHORT LENGTH WITH FLATTED SHANK	188
	129102	LONG LENGTH WITH FLATTED SHANK	189
	130102	SHORT LENGTH BALL NOSE WITH FLATTED SHANK	190
1 FLUTE FOR ALUMINIUM / 5% COBALT HSS			
	135316	SHORT LENGTH WITH STRAIGHT SHANK	191
	136316	LONG LENGTH WITH STRAIGHT SHANK	192
2 FLUTE FOR ALUMINIUM / DIN STANDARDS / 8% COBALT HSS			
	131102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	193
MULTI FLUTE / COARSE PITCH ROUGHING END MILL / DIN STANDARDS / 8% COBALT HSS			
	118102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	194
	119102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	195
3 FLUTE / COARSE PITCH ROUGHING END MILL / DIN STANDARDS / 8% COBALT HSS			
	133102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	196
	134102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	197
3 FLUTE / COARSE PITCH ROUGHING END MILLS FOR ALUMINIUM / DIN STANDARDS / 8% COBALT HSS			
	124102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	198
	125102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	199
MULTI FLUTE / COARSE PITCH ROUGHING BALL END MILLS DIE SINKING CUTTERS / DIN STANDARDS / 8% COBALT HSS			
	127102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	200
MULTI FLUTE / FINE PITCH ROUGHING END MILLS / DIN STANDARDS / 8% COBALT HSS			
	121102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	201
	122102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	202
MULTI FLUTE / COARSE PITCH ROUGHING & FINISHING / DIN STANDARDS / 8% COBALT HSS			
	126102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	203
	137102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	204
3 FLUTE / COARSE PITCH ROUGHING & FINISHING / DIN STANDARDS / 8% COBALT HSS			
	138102	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	205
	139102	LONG LENGTH (DIN 844) WITH FLATTED SHANK	206
MULTI FLUTE / DIN STANDARDS / ASP-52			
	107113	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	207
MULTI FLUTE / FINE PITCH END MILLS/ DIN STANDARDS / ASP-52			
	121113	SHORT LENGTH (DIN 844) WITH FLATTED SHANK	208
CUTTING DATA			209 ~ 220

2 FLUTE, SHORT LENGTH

HSS Co8 | DIN 327 | N | ≈ 30° | FLUTE 2 | DIN 1835B



Series No. 100102

TWO FLUTE END MILLS
Short Length, 2 Flute, Centre Cutting, with Flatted Shank

BOHRNUTENFRÄSER
Kurze Ausführung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES À RAINURER
Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

TWEE GROEVEN VINGERFREZEN
Korte lengte, 2 groeven, centerfrees met geplette schacht

FRESE FRONTALE
Serie Corta, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
1.0	6.0	2.5	47.0	1001020100	1001210100	1001070100
1.5		3.0		1001020150	1001210150	1001070150
2.0		4.0	48.0	1001020200	1001210200	1001070200
2.5		5.0	49.0	1001020250	1001210250	1001070250
2.8		5.0		1001020280	1001210280	1001070280
3.0		5.0		1001020300	1001210300	1001070300
3.5		6.0	50.0	1001020350	1001210350	1001070350
3.8		7.0	51.0	1001020380	1001210380	1001070380
4.0		7.0		1001020400	1001210400	1001070400
4.5		7.0		1001020450	1001210450	1001070450
4.8		8.0	52.0	1001020480	1001210480	1001070480
5.0		8.0		1001020500	1001210500	1001070500
5.5		8.0		1001020550	1001210550	1001070550
5.75		8.0		1001020575	1001210575	1001070575
6.0		8.0		1001020600	1001210600	1001070600
6.5	10.0	10.0	60.0	1001020650	1001210650	1001070650
6.75		10.0		1001020675	1001210675	1001070675
7.0		10.0		1001020700	1001210700	1001070700
7.5		10.0		1001020750	1001210750	1001070750
7.75		11.0	61.0	1001020775	1001210775	1001070775
8.0		11.0		1001020800	1001210800	1001070800
8.5		11.0		1001020850	1001210850	1001070850
8.7		11.0		1001020870	1001210870	1001070870
9.0		11.0		1001020900	1001210900	1001070900
9.5		11.0		1001020950	1001210950	1001070950
9.7		13.0	63.0	1001020970	1001210970	1001070970
10.0		13.0		1001021000	1001211000	1001071000
11.0	12.0	13.0	70.0	1001021100	1001211100	1001071100
11.7		16.0	73.0	1001021170	1001211170	1001071170

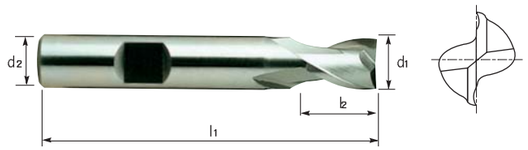
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaß bereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	– 14 – 28	– 20 – 38	– 25 – 47	– 32 – 59	– 40 – 73	– 50 – 89
h6	0 – 6	0 – 8	0 – 9	0 – 11	0 – 13	0 – 16

COBALT MILLING CUTTERS

2 FLUTE, SHORT LENGTH

HSS Co8 | DIN 327 | N | ≈ 30° | FLUTE 2 | DIN 1835B



Series No. 100102

TWO FLUTE END MILLS
Short Length, 2 Flute, Centre Cutting, with Flatted Shank

BOHRNUTENFRÄSER
Kurze Ausführung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES À RAINURER
Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

TWEE GROEVEN VINGERFREZEN
Korte lengte, 2 groeven, centerfrees met geplette schacht

FRESE FRONTALE
Serie Corta, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

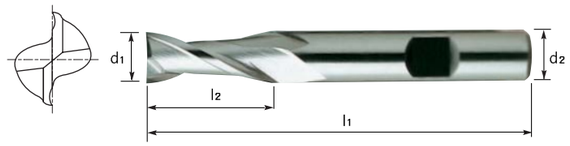
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
8.0	8.0	11.0	55.0	1001029002	1001219002	1001079002
8.0		11.0	61.0	1001029003	1001219003	1001079003
12.0	12.0	16.0	73.0	1001021200	1001211200	1001071200
13.0		16.0		1001021300	1001211300	1001071300
13.7		16.0		1001021370	1001211370	1001071370
14.0		16.0		1001021400	1001211400	1001071400
15.0		16.0		1001021500	1001211500	1001071500
15.7	16.0	19.0	79.0	1001021570	1001211570	1001071570
16.0		19.0		1001021600	1001211600	1001071600
17.0		19.0		1001021700	1001211700	1001071700
17.7		19.0		1001021770	1001211770	1001071770
18.0		19.0		1001021800	1001211800	1001071800
19.0		19.0		1001021900	1001211900	1001071900
19.7	20.0	22.0	88.0	1001021970	1001211970	1001071970
20.0		22.0		1001022000	1001212000	1001072000
22.0		22.0		1001022200	1001212200	1001072200
24.0	25.0	26.0	102.0	1001022400	1001212400	1001072400
25.0		26.0		1001022500	1001212500	1001072500
26.0		26.0		1001022600	1001212600	1001072600
28.0		26.0		1001022800	1001212800	1001072800
30.0		26.0		1001023000	1001213000	1001073000
32.0		32.0		1001023200	1001213200	1001073200

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaß bereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	– 14 – 28	– 20 – 38	– 25 – 47	– 32 – 59	– 40 – 73	– 50 – 89
h6	0 – 6	0 – 8	0 – 9	0 – 11	0 – 13	0 – 16

2 FLUTE, LONG LENGTH

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 2 | DIN 1835B



Series No. 101102

TWO FLUTE END MILLS
Long Length, 2 Flute, Centre Cutting, with Flatted Shank

FRAISES À RAINURER
Série Longue, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Lunga, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

BOHRNUTENFRÄSER
Lange Ausführung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

TWEE GROEVEN VINGERFREZEN
Lange lengte, 2 groeven, centerfrees met geplette schacht

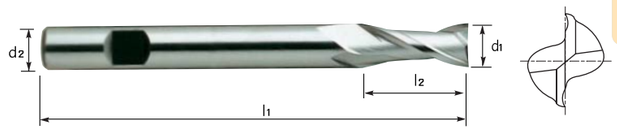
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
2.0	6.0	7.0	51.0	1011020200	1011210200	1011070200
3.0		8.0	52.0	1011020300	1011210300	1011070300
4.0		11.0	55.0	1011020400	1011210400	1011070400
5.0		13.0	57.0	1011020500	1011210500	1011070500
6.0		13.0		1011020600	1011210600	1011070600
7.0	10.0	16.0	66.0	1011020700	1011210700	1011070700
8.0		19.0	69.0	1011020800	1011210800	1011070800
10.0		22.0	72.0	1011021000	1011211000	1011071000
12.0	12.0	26.0	83.0	1011021200	1011211200	1011071200
14.0		26.0		1011021400	1011211400	1011071400
16.0	16.0	32.0	92.0	1011021600	1011211600	1011071600
18.0		32.0		1011021800	1011211800	1011071800
20.0	20.0	38.0	104.0	1011022000	1011212000	1011072000
22.0		38.0		1011022200	1011212200	1011072200
25.0	25.0	45.0	121.0	1011022500	1011212500	1011072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	– 14 – 28	– 20 – 38	– 25 – 47	– 32 – 59	– 40 – 73	– 50 – 89
h6	0 – 6	0 – 8	0 – 9	0 – 11	0 – 13	0 – 16

2 FLUTE, EXTRA LONG LENGTH

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 2 | DIN 1835B



Series No. 102102

TWO FLUTE END MILLS
Extra Long Length, 2 Flute, Centre Cutting, with Flatted Shank

FRAISES À RAINURER
Série Extra Longue, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Extra Lunga, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

BOHRNUTENFRÄSER
Extra Lange Ausführung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

TWEE GROEVEN VINGERFREZEN
Extra lang, 2 groeven, centerfrees met geplette schacht

Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
3.0	6.0	8.0	56.0	1021020300	1021210300	1021070300
3.5		10.0	59.0	1021020350	1021210350	1021070350
4.0		11.0	63.0	1021020400	1021210400	1021070400
4.5		11.0		1021020450	1021210450	1021070450
5.0		13.0	68.0	1021020500	1021210500	1021070500
5.5		13.0		1021020550	1021210550	1021070550
6.0		13.0		1021020600	1021210600	1021070600
6.5	10.0	16.0	80.0	1021020650	1021210650	1021070650
7.0		16.0		1021020700	1021210700	1021070700
8.0		19.0	88.0	1021020800	1021210800	1021070800
8.5		19.0		1021020850	1021210850	1021070850
9.0		19.0		1021020900	1021210900	1021070900
10.0		22.0	95.0	1021021000	1021211000	1021071000
12.0	12.0	26.0	110.0	1021021200	1021211200	1021071200
14.0		26.0		1021021400	1021211400	1021071400
16.0	16.0	32.0	123.0	1021021600	1021211600	1021071600
18.0		32.0		1021021800	1021211800	1021071800
20.0	20.0	38.0	141.0	1021022000	1021212000	1021072000
22.0		38.0		1021022200	1021212200	1021072200
25.0	25.0	45.0	166.0	1021022500	1021212500	1021072500

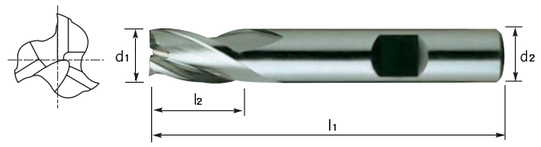
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	– 14 – 28	– 20 – 38	– 25 – 47	– 32 – 59	– 40 – 73	– 50 – 89
h6	0 – 6	0 – 8	0 – 9	0 – 11	0 – 13	0 – 16

3 FLUTE, STUB LENGTH

HSS Co8 | DIN 327 | N | ≈ 30° | FLUTE 3 | DIN 1835B

Series No. 103102



THREE FLUTE END MILLS
Stub Length, 3 Flute, Centre Cutting, with Flatted Shank

FRAISES
Série Courte, 3 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Corta, 3 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

BOHRNUTENFRÄSER
Kurze Ausführung, 3 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DRIE GROEVEN VINGERFREZEN
Stomplengte, 3 groeven, centerfrees met geplette schacht

Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
2.0	6.0	4.0	48.0	1031020200	1031210200	1031070200
3.0		5.0	49.0	1031020300	1031210300	1031070300
4.0		7.0	51.0	1031020400	1031210400	1031070400
5.0		8.0	52.0	1031020500	1031210500	1031070500
6.0		8.0		1031020600	1031210600	1031070600
7.0	10.0	10.0	60.0	1031020700	1031210700	1031070700
8.0		11.0	61.0	1031020800	1031210800	1031070800
10.0		13.0	63.0	1031021000	1031211000	1031071000
12.0	12.0	16.0	73.0	1031021200	1031211200	1031071200
14.0		16.0		1031021400	1031211400	1031071400
16.0	16.0	19.0	79.0	1031021600	1031211600	1031071600
18.0		19.0		1031021800	1031211800	1031071800
20.0	20.0	22.0	88.0	1031022000	1031212000	1031072000
22.0		22.0		1031022200	1031212200	1031072200
25.0	25.0	26.0	102.0	1031022500	1031212500	1031072500

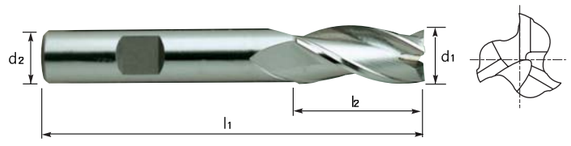
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, SHORT LENGTH

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 3 | DIN 1835B

Series No. 104102



THREE FLUTE END MILLS
Short Length, 3 Flute, Centre Cutting, with Flatted Shank

FRAISES
Série Courte, 3 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Corta, 3 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

BOHRNUTENFRÄSER
Kurze Ausführung, 3 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DRIE GROEVEN VINGERFREZEN
Korte lengte, 3 groeven, centerfrees met geplette schacht

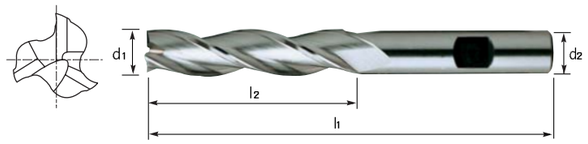
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
1.5	6.0	7.0	51.0	1041020150	1041210150	1041070150
2.0		7.0		1041020200	1041210200	1041070200
2.5		8.0	52.0	1041020250	1041210250	1041070250
3.0		8.0		1041020300	1041210300	1041070300
3.5		10.0	54.0	1041020350	1041210350	1041070350
4.0		11.0	55.0	1041020400	1041210400	1041070400
4.5		11.0		1041020450	1041210450	1041070450
5.0		13.0	57.0	1041020500	1041210500	1041070500
5.5		13.0		1041020550	1041210550	1041070550
6.0		13.0		1041020600	1041210600	1041070600
6.5	10.0	16.0	66.0	1041020650	1041210650	1041070650
7.0		16.0		1041020700	1041210700	1041070700
7.5		16.0		1041020750	1041210750	1041070750
8.0		19.0	69.0	1041020800	1041210800	1041070800
8.5		19.0		1041020850	1041210850	1041070850
9.0		19.0		1041020900	1041210900	1041070900
10.0		22.0	72.0	1041021000	1041211000	1041071000
12.0	12.0	26.0	83.0	1041021200	1041211200	1041071200
14.0		26.0		1041021400	1041211400	1041071400
16.0	16.0	32.0	92.0	1041021600	1041211600	1041071600
18.0		32.0		1041021800	1041211800	1041071800
20.0	20.0	38.0	104.0	1041022000	1041212000	1041072000
22.0		38.0		1041022200	1041212200	1041072200
25.0	25.0	45.0	121.0	1041022500	1041212500	1041072500
28.0		45.0		1041022800	1041212800	1041072800
30.0		45.0		1041023000	1041213000	1041073000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, LONG LENGTH

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 3 | DIN 1835B



Series No. 105102

THREE FLUTE END MILLS
Long Length, 3 Flute, Centre Cutting, with Flatted Shank

FRAISES
Série Longue, 3 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Lunga, 3 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

BOHRNUTENFRÄSER
Lange Ausführung, 3 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DRIE GROEVEN VINGERFREZEN
Lang, 3 groeven, centerfrees met geplette schacht

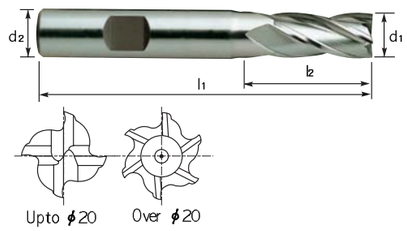
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
3.0	6.0	12.0	56.0	1051020300	1051210300	1051070300
4.0		19.0	63.0	1051020400	1051210400	1051070400
5.0		24.0	68.0	1051020500	1051210500	1051070500
6.0		24.0		1051020600	1051210600	1051070600
7.0	10.0	30.0	80.0	1051020700	1051210700	1051070700
8.0		38.0	88.0	1051020800	1051210800	1051070800
9.0		38.0		1051020900	1051210900	1051070900
10.0		45.0	95.0	1051021000	1051211000	1051071000
12.0	12.0	53.0	110.0	1051021200	1051211200	1051071200
14.0		53.0		1051021400	1051211400	1051071400
16.0	16.0	63.0	123.0	1051021600	1051211600	1051071600
18.0		63.0		1051021800	1051211800	1051071800
20.0	20.0	75.0	141.0	1051022000	1051212000	1051072000
22.0		75.0		1051022200	1051212200	1051072200
25.0	25.0	90.0	166.0	1051022500	1051212500	1051072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

4&6 FLUTE, SHORT LENGTH

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 4&6 | DIN 1835B



Series No. 107102

MULTI FLUTE END MILLS
Short Length, 4 & 6 Flute, with Flatted Shank

FRAISES
Série Courte, 4 & 6 Dents, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Corta, 4 & 6 Taglienti, Gambo Cilindrico con Trascinmento Laterale

SCHAFTFRÄSER
Kurze Ausführung, 4 & 6 Schneiden, Zylinderschaft mit Mitnahmefläche

MEERGROEVIG VINGERFREZEN
Korte lengte, 4 & 6 groeven, met geplette schacht

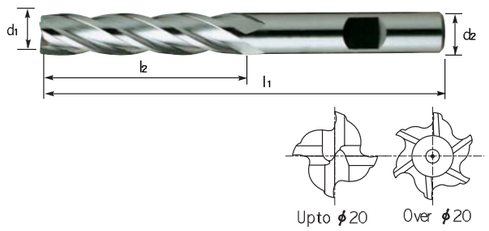
Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
2.0	6.0	7.0	51.0	4	1071020200	1071210200	1071070200
2.5		8.0	52.0	4	1071020250	1071210250	1071070250
3.0		8.0		4	1071020300	1071210300	1071070300
3.5		10.0	54.0	4	1071020350	1071210350	1071070350
4.0		11.0	55.0	4	1071020400	1071210400	1071070400
5.0		13.0	57.0	4	1071020500	1071210500	1071070500
6.0		13.0		4	1071020600	1071210600	1071070600
7.0	10.0	16.0	66.0	4	1071020700	1071210700	1071070700
8.0		19.0	69.0	4	1071020800	1071210800	1071070800
9.0		19.0		4	1071020900	1071210900	1071070900
10.0		22.0	72.0	4	1071021000	1071211000	1071071000
11.0	12.0	22.0	79.0	4	1071021100	1071211100	1071071100
12.0		26.0	83.0	4	1071021200	1071211200	1071071200
13.0		26.0		4	1071021300	1071211300	1071071300
14.0		26.0		4	1071021400	1071211400	1071071400
16.0	16.0	32.0	92.0	4	1071021600	1071211600	1071071600
18.0		32.0		4	1071021800	1071211800	1071071800
20.0	20.0	38.0	104.0	4	1071022000	1071212000	1071072000
22.0		38.0		6	1071022200	1071212200	1071072200
25.0	25.0	45.0	121.0	6	1071022500	1071212500	1071072500
28.0		45.0		6	1071022800	1071212800	1071072800
30.0		45.0		6	1071023000	1071213000	1071073000
32.0	32.0	53.0	133.0	6	1071023200	1071213200	1071073200

TOLERANCE	
MILL DIA.	+0.040 −0
SHANK DIA.	h6

4&6 FLUTE, LONG LENGTH

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 4&6 | DIN 1835B

Series No. 108102



MULTI FLUTE END MILLS
Long Length, 4 & 6 Flute, with Flatted Shank

FRAISES
Série Longue, 4 & 6 Dents, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Lunga, 4 & 6 Taglienti, Gambo Cilindrico con Trascinmento Laterale

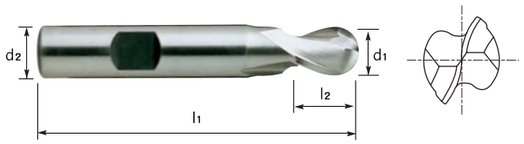
SCHAFTFRÄSER
Lange Ausführung, 4 & 6 Schneiden, Zylinderschaft mit Mitnahmefläche

MEERGROEVIG VINGERFREZEN
Lange lengte, 4 & 6 groeven, met geplette schacht

Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
3.0	6.0	12.0	56.0	4	1081020300	1081210300	1081070300
3.5		15.0	59.0	4	1081020350	1081210350	1081070350
4.0		19.0	63.0	4	1081020400	1081210400	1081070400
4.5		19.0		4	1081020450	1081210450	1081070450
5.0		24.0	68.0	4	1081020500	1081210500	1081070500
6.0		24.0		4	1081020600	1081210600	1081070600
7.0	10.0	30.0	80.0	4	1081020700	1081210700	1081070700
8.0		38.0	88.0	4	1081020800	1081210800	1081070800
9.0		38.0		4	1081020900	1081210900	1081070900
10.0		45.0	95.0	4	1081021000	1081211000	1081071000
11.0	12.0	45.0	102.0	4	1081021100	1081211100	1081071100
12.0		53.0	110.0	4	1081021200	1081211200	1081071200
14.0		53.0		4	1081021400	1081211400	1081071400
16.0	16.0	63.0	123.0	4	1081021600	1081211600	1081071600
18.0		63.0		4	1081021800	1081211800	1081071800
20.0	20.0	75.0	141.0	4	1081022000	1081212000	1081072000
22.0		75.0		6	1081022200	1081212200	1081072200
24.0	25.0	90.0	166.0	6	1081022400	1081212400	1081072400
25.0		90.0		6	1081022500	1081212500	1081072500

TOLERANCE		
MILL DIA.	ϕ2.0~ ϕ6.0	+0.040 −0
	ϕ6.5~	+0.050 −0
SHANK DIA.	h6	

2 FLUTE, BALL NOSE, SHORT LENGTH



HSS Co8 | DIN 327 | N | ≈ 30° | FLUTE 2 | DIN 1835B

Series No. 112102

BALL END MILLS
Short Length, 2 Flute, Ball End, with Flatted Shank

FRAISES À BOUT SPHERIQUE
Série Courte, 2 Dents, à Bout Spherique, à Queue Cylindrique avec Plats

FRESE PER STAMPI
Serie Corta, 2 Taglienti, Per Stampi, Gambo Cilindrico con Trascinmento Laterale

RADIUSFRÄSER
Kurze Ausführung, 2 Schneiden, Runder Stirn, Zylinderschaft mit Mitnahmefläche

KOGELVINGERFREZEN
Korte lengte, 2 groeven, kogel vinger, met geplette schacht

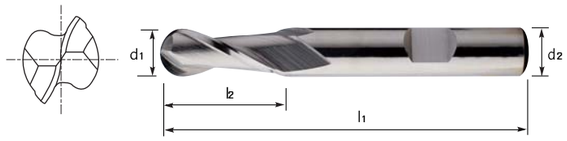
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
3.0	6.0	5.0	49.0	1121020300	1121210300	1121070300
3.5		6.0	50.0	1121020350	1121210350	1121070350
4.0		7.0	51.0	1121020400	1121210400	1121070400
4.5		7.0		1121020450	1121210450	1121070450
5.0		8.0	52.0	1121020500	1121210500	1121070500
5.5		8.0		1121020550	1121210550	1121070550
6.0		8.0		1121020600	1121210600	1121070600
7.0	10.0	10.0	60.0	1121020700	1121210700	1121070700
8.0		11.0	61.0	1121020800	1121210800	1121070800
9.0		11.0		1121020900	1121210900	1121070900
10.0		13.0	63.0	1121021000	1121211000	1121071000
12.0	12.0	16.0	73.0	1121021200	1121211200	1121071200
13.0		16.0		1121021300	1121211300	1121071300
14.0		16.0		1121021400	1121211400	1121071400
15.0		16.0		1121021500	1121211500	1121071500
16.0	16.0	19.0	79.0	1121021600	1121211600	1121071600
17.0		19.0		1121021700	1121211700	1121071700
18.0		19.0		1121021800	1121211800	1121071800
19.0		19.0		1121021900	1121211900	1121071900
20.0	20.0	22.0	88.0	1121022000	1121212000	1121072000
22.0		22.0		1121022200	1121212200	1121072200
24.0	25.0	26.0	102.0	1121022400	1121212400	1121072400
25.0		26.0		1121022500	1121212500	1121072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

2 FLUTE, BALL NOSE LONG LENGTH

HSS Co8 | DIN 844 | N | 30° | FLUTE 2 | DIN 1835B



Series No. 113102

BALL END MILLS
Long Length, 2 Flute, Ball End, with Flatted Shank

FRAISES À BOUT SPHERIQUE
Série Longue, 2 Dents, à Bout Spherique, à Queue Cylindrique avec Plats

FRESE PER STAMPI
Serie Lunga, 2 Taglienti, Per Stampi, Gambo Cilindrico con Trascinmento Laterale

RADIUSFRÄSER
Lange Ausführung, 2 Schneiden, Runder Stirn, Zylinderschaft mit Mitnahmefläche

KOGELVINGERFREZEN
Lange lengte, 2 groeven, kogel vinger, met geplette schacht

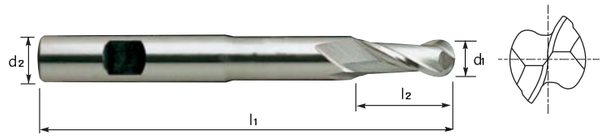
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
3.0	6.0	8.0	52.0	1131020300	1131210300	1131070300
4.0		11.0	55.0	1131020400	1131210400	1131070400
5.0		13.0	57.0	1131020500	1131210500	1131070500
6.0		13.0		1131020600	1131210600	1131070600
8.0	10.0	19.0	69.0	1131020800	1131210800	1131070800
10.0		22.0	72.0	1131021000	1131211000	1131071000
12.0	12.0	26.0	83.0	1131021200	1131211200	1131071200
14.0		26.0		1131021400	1131211400	1131071400
16.0	16.0	32.0	92.0	1131021600	1131211600	1131071600
18.0		32.0		1131021800	1131211800	1131071800
20.0	20.0	38.0	98.0	1131022000	1131212000	1131072000
22.0		38.0	114.0	1131022200	1131212200	1131072200
25.0	25.0	45.0	121.0	1131022500	1131212500	1131072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

2 FLUTE, BALL NOSE LONG LENGTH

HSS Co8 | DIN 1889 | N | ≈ 30° | FLUTE 2 | DIN 1835B



Series No. 114102

BALL END MILLS
Extra Long Length, 2 Flute, Ball End, with Flatted Shank

FRAISES À BOUT SPHERIQUE
Série Extra Longue 2 Dents, à Bout Spherique, à Queue Cylindrique avec Plats

FRESE PER STAMPI
Serie Extra Lunga, 2 Taglienti, per Stampi, Gambo Cilindrico con Trascinmento Laterale

RADIUSFRÄSER
Extra Lange Ausführung, 2 Schneiden, Runder Stirn, Zylinderschaft mit Mitnahmefläche

KOGELVINGERFREZEN
Extra Lange lengte, 2 groeven, kogel vinger, met geplette schacht

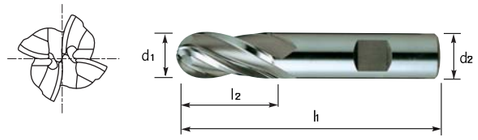
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
3.0	6.0	8.0	56.0	1141020300	1141210300	1141070300
4.0		11.0	63.0	1141020400	1141210400	1141070400
5.0		13.0	68.0	1141020500	1141210500	1141070500
6.0		13.0		1141020600	1141210600	1141070600
8.0	10.0	19.0	88.0	1141020800	1141210800	1141070800
10.0		22.0	95.0	1141021000	1141211000	1141071000
12.0	12.0	26.0	110.0	1141021200	1141211200	1141071200
13.0		26.0		1141021300	1141211300	1141071300
14.0		26.0		1141021400	1141211400	1141071400
15.0		26.0		1141021500	1141211500	1141071500
16.0	16.0	32.0	123.0	1141021600	1141211600	1141071600
18.0		32.0		1141021800	1141211800	1141071800
20.0	20.0	38.0	141.0	1141022000	1141212000	1141072000
22.0		38.0		1141022200	1141212200	1141072200
25.0	25.0	45.0	166.0	1141022500	1141212500	1141072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

4&6 FLUTE, BALL NOSE SHORT LENGTH

HSS Co8 | DIN 1889 | N | ≈ 30° | FLUTE 4&6 | DIN 1835B



Series No. 115102

BALL END MILLS
Short Length, Multi Flute, Ball End, with Flatted Shank

RADIUSFRÄSER
Kurze Ausführung, 2 Schneiden, Runder Strin, Zylinderschaft mit Mitnahmefläche

FRAISES À BOUT SPHERIQUE
Série Courte, 4 & 6 Dents, à Bout Spherique, à Queue Cylindrique avec Plats

KOGELVINGERFREZEN
Korte lengte, 4 & 6 groeven, kogel vinger, met geplette schacht

FRESE PER STAMPI
Serie Corta, 4 & 6 Taglienti, per Stampi, Gambo Cilindrico con Trascinmento Laterale

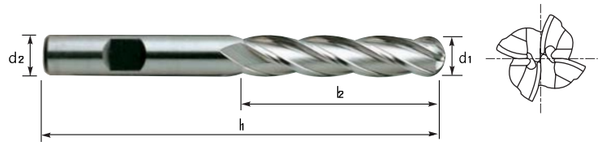
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	13.0	57.0	4	1151020600	1151210600	1151070600
8.0	10.0	19.0	69.0	4	1151020800	1151210800	1151070800
10.0		22.0	72.0	4	1151021000	1151211000	1151071000
12.0	12.0	26.0	83.0	4	1151021200	1151211200	1151071200
16.0	16.0	32.0	92.0	4	1151021600	1151211600	1151071600
20.0	20.0	38.0	104.0	4	1151022000	1151212000	1151072000
25.0	25.0	45.0	121.0	6	1151022500	1151212500	1151072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

4&6 FLUTE, BALL NOSE LONG LENGTH

HSS Co8 | DIN 1889 | N | ≈ 30° | FLUTE 4&6 | DIN 1835B



Series No. 116102

BALL END MILLS
Long Length, Multi Flute, Ball End, with Flatted Shank

RADIUSFRÄSER
Lange Ausführung, 4 & 6 Schneiden, Runder Strin, Zylinderschaft mit Mitnahmefläche

FRAISES À BOUT SPHERIQUE
Série Longue, 4 & 6 Dents, à Bout Spherique, à Queue Cylindrique avec Plats

KOGELVINGERFREZEN
Lange lengte, 4 & 6 groeven, kogel vinger, met geplette schacht

FRESE PER STAMPI
Serie Lunga, 4 & 6 Taglienti, per Stampi, Gambo Cilindrico con Trascinmento Laterale

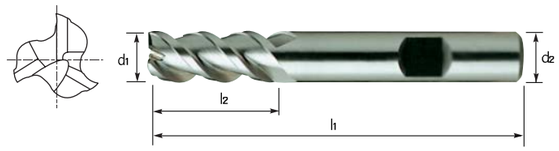
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
10.0	10.0	45.0	95.0	4	1161021000	1161211000	1161071000
12.0	12.0	53.0	110.0	4	1161021200	1161211200	1161071200
16.0	16.0	63.0	123.0	4	1161021600	1161211600	1161071600
20.0	20.0	75.0	141.0	4	1161022000	1161212000	1161072000
25.0	25.0	90.0	166.0	6	1161022500	1161212500	1161072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI FLUTE, 50° HELIX SHORT LENGTH

HSS Co8 | DIN 844 | N | 50° | FLUTE 2 - 4 | DIN 1835B



Series No. 132102

END MILLS HIGH HELIX
Multi-Flute, High Helical 50°,Centre Cutting, with Flatted Shank

SCHAFTFRÄSER
Mehrschneidig, Rechtsspirale 50°, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES
Plusieurs Dents, Hélice 50°, Coupe au Centre, à Queue Cylindrique avec Plats

VINGERFREZEN HOGE HELIX
Meergroevig, hoge schroeflijn 50°, centerfrees, met geplette schacht

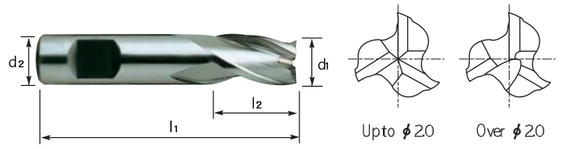
FRESE FRONTALE
Piu Taglienti, Elica 50°, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
2.0	6.0	7.0	51.0	2	1321020200	1321210200	1321070200
3.0		8.0	52.0	2	1321020300	1321210300	1321070300
4.0		11.0	55.0	2	1321020400	1321210400	1321070400
5.0		13.0	57.0	2	1321020500	1321210500	1321070500
6.0		13.0		3	1321020600	1321210600	1321070600
7.0		16.0	66.0	3	1321020700	1321210700	1321070700
8.0	10.0	19.0	69.0	3	1321020800	1321210800	1321070800
9.0		19.0		3	1321020900	1321210900	1321070900
10.0	12.0	22.0	72.0	3	1321021000	1321211000	1321071000
12.0		26.0	83.0	3	1321021200	1321211200	1321071200
14.0		26.0		3	1321021400	1321211400	1321071400
15.0		26.0		3	1321021500	1321211500	1321071500
16.0	16.0	32.0	92.0	3	1321021600	1321211600	1321071600
18.0		32.0		3	1321021800	1321211800	1321071800
20.0	20.0	38.0	104.0	3	1321022000	1321212000	1321072000
25.0	25.0	45.0	121.0	4	1321022500	1321212500	1321072500
30.0		45.0		4	1321023000	1321213000	1321073000

TOLERANCE		
MILL DIA.	ϕ2.0~ ϕ3.0	+0.040 −0
	ϕ4.0~ ϕ6.0	+0.048 −0
	ϕ7.0~ ϕ10.0	+0.058 −0
	ϕ10.5~ ϕ18.0	+0.070 −0
	ϕ18.5~ ϕ30.0	+0.084 −0
SHANK DIA.	h6	

3 FLUTE, SHORT LENGTH, THROW AWAY

HSS Co8 | N | 30° | FLUTE 3 | DIN 1835B



Series No. 128102

THREE FLUTE THROW AWAY END MILLS
Short Length, 3 Flute, Centre Cutting, with Flatted Shank

BOHRNUTENFRÄSER
Kurze Ausführung, 3 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES
Série Courte, 3 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DRIE GROEVEN WEGWERP VINGERFREZEN
Korte lengte, 3 groeven, centerfrees met geplette schacht

FRESE FRONTALE
Serie Corta, 3 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
1.0	6.0	2.0	34.0	1281020100	1281210100	1281070100
1.5		3.0		1281020150	1281210150	1281070150
1.8		3.0		1281020180	1281210180	1281070180
2.0		4.0	35.0	1281020200	1281210200	1281070200
2.3		4.0		1281020230	1281210230	1281070230
2.5		5.0	36.0	1281020250	1281210250	1281070250
2.8		5.0		1281020280	1281210280	1281070280
3.0		5.0		1281020300	1281210300	1281070300
3.3		6.0	37.0	1281020330	1281210330	1281070330
3.5		6.0		1281020350	1281210350	1281070350
3.8		7.0	38.0	1281020380	1281210380	1281070380
4.0		7.0		1281020400	1281210400	1281070400
4.3		7.0		1281020430	1281210430	1281070430
4.5		7.0		1281020450	1281210450	1281070450
4.8		8.0	39.0	1281020480	1281210480	1281070480
5.0		8.0		1281020500	1281210500	1281070500
5.5		8.0		1281020550	1281210550	1281070550
5.75		8.0		1281020575	1281210575	1281070575
6.0		8.0		1281020600	1281210600	1281070600
6.5	8.0	10.0	42.0	1281020650	1281210650	1281070650
7.0		10.0		1281020700	1281210700	1281070700
7.5		10.0		1281020750	1281210750	1281070750
8.0		11.0	43.0	1281020800	1281210800	1281070800
8.5		11.0	48.0	1281020850	1281210850	1281070850
9.0	10.0	11.0		1281020900	1281210900	1281070900
9.5		11.0		1281020950	1281210950	1281070950
10.0		13.0	50.0	1281021000	1281211000	1281071000
12.0	12.0	16.0	58.0	1281021200	1281211200	1281071200
16.0	16.0	19.0	64.0	1281021600	1281211600	1281071600
20.0	20.0	22.0	78.0	1281022000	1281212000	1281072000

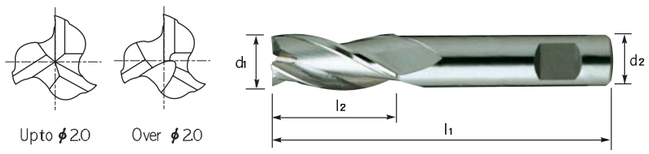
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaß bereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, LONG LENGTH, THROW AWAY

HSS Co8 | N | 30° | FLUTE 3 | DIN 1835B

Series No. 129102



THREE FLUTE THROW AWAY END MILLS
Long Length, 3 Flute, Centre Cutting, with Flatted Shank

BOHRNUTENFRÄSER
Lange Ausführung, 3 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES
Série Longue, 3 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DRIE GROEVEN WEGWERP VINGERFREZEN
Lange lengte, 3 groeven, centerfrees, met geplette schacht

FRESE FRONTALE
Serie Lunga, 3 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
2.0	6.0	7.0	38.0	1291020200	1291210200	1291070200
2.5		8.0	39.0	1291020250	1291210250	1291070250
3.0		8.0		1291020300	1291210300	1291070300
3.5		10.0	41.0	1291020350	1291210350	1291070350
4.0		11.0	42.0	1291020400	1291210400	1291070400
4.5		11.0		1291020450	1291210450	1291070450
5.0		13.0	44.0	1291020500	1291210500	1291070500
5.5		13.0		1291020550	1291210550	1291070550
6.0		13.0		1291020600	1291210600	1291070600
6.5	8.0	16.0	48.0	1291020650	1291210650	1291070650
7.0		16.0		1291020700	1291210700	1291070700
7.5		16.0		1291020750	1291210750	1291070750
8.0		19.0	51.0	1291020800	1291210800	1291070800
8.5	10.0	19.0	56.0	1291020850	1291210850	1291070850
9.0		19.0		1291020900	1291210900	1291070900
10.0		22.0	59.0	1291021000	1291211000	1291071000

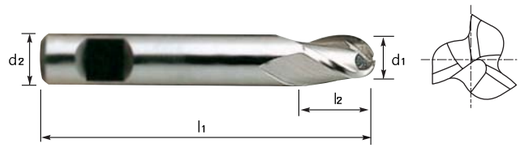
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, BALL NOSE, SHORT LENGTH, THROW AWAY

HSS Co8 | N | 30° | FLUTE 3 | DIN 1835B

Series No. 130102



THREE FLUTE THROW AWAY BALL END MILLS
Short Length, 3 Flute, Ball End, with Flatted Shank

RADIUSFRÄSER
Kurze Ausführung, 3 Schneiden,Runder Stirn, Zylinderschaft mit Mitnahmefläche

FRAISES À BOUT SPHERIQUE
Série Courte, 3 Dents, à Bout Spherique, à Queue Cylindrique avec Plats

DRIE GROEVEN WEGWERP KOGEL VINGERFREZEN
Korte lengte, 3 groeven, kogel vinger met geplette schacht

FRESE PER STAMPI
Serie Corta, 3 Taglienti, per Stampi, Gambo Cilindrico con Trascinmento Laterale

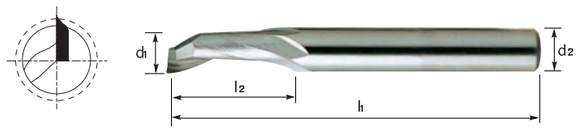
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
2.0	6.0	4.0	35.0	2	1301020200	1301210200	1301070200
2.5		5.0	36.0	2	1301020250	1301210250	1301070250
3.0		5.0		3	1301020300	1301210300	1301070300
4.0		7.0	38.0	3	1301020400	1301210400	1301070400
5.0		8.0	39.0	3	1301020500	1301210500	1301070500
6.0		8.0		3	1301020600	1301210600	1301070600

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

1 FLUTE END MILLS

HSS Co5 | W | FLUTE 1 | DIN 1835A



Series No. 135316

ONE FLUTE END MILLS
Short Length, 1 Flute, with Straight Shank for Aluminium Machining

FRAISES À UNE DENT
Série Courte, 1 Dent, à Queue Cylindrique pour Machines ELU

FRESE AD UN SOLO DENTE
Serie Corta, Taglienti, Gambo Cilindrico per Macchine ELU

EINZAHNFRÄSER
Kurze Ausführung, 1 Schneide mit Zylinderschaft für Alu. Maschinen

EENGROEVIGE VINGERFREZEN
Korte lengte, 1 groef met rechte schacht voor machinale bewerking van aluminium

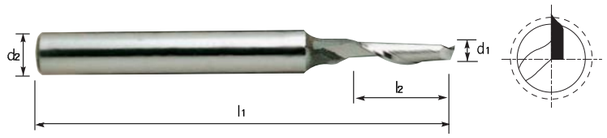
Mill Dia. js14(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co5	TiAlN HSS Co5	TiCN HSS Co5
3.0	8.0	12.0	60.0	1353160300	1353270300	1353180300
4.0		12.0		1353160400	1353270400	1353180400
5.0		14.0		1353160500	1353270500	1353180500
6.0		14.0		1353160600	1353270600	1353180600
8.0		14.0	80.0	1353160800	1353270800	1353180800
10.0		14.0		1353161000	1353271000	1353181000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js14	± 125	± 150	± 180	± 215	± 260	± 310
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

1 FLUTE END MILLS for ALUMINIUM

HSS Co5 | W | FLUTE 1 | DIN 1835A



Series No. 136316

ONE FLUTE END MILLS
Short Length, 1 Flute, with Straight Shank for Aluminium Machining

FRAISES À UNE DENT
Série Courte, 1 Dent, à Queue Cylindrique pour Machines ELU

FRESE AD UN SOLO DENTE
Serie Corta, Taglienti, Gambo Cilindrico per Macchine ELU

EINZAHNFRÄSER
Kurze Ausführung, 1 Schneide mit Zylinderschaft für Alu. Maschinen

EENGROEVIGE VINGERFREZEN
Korte lengte, 1 groef met rechte schacht voor machinale bewerking van aluminium

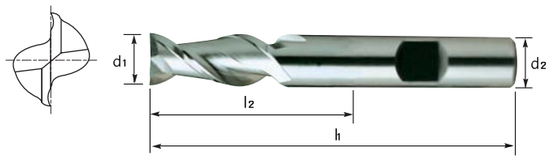
Mill Dia. js14(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co5	TiAlN HSS Co5	TiCN HSS Co5
5.0	8.0	18.0	80.0	1363160500	1363270500	1363180500
5.0		40.0	100.0	1363169001	1363279001	1363189001
8.0		14.0	120.0	1363160800	1363270800	1363180800

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js14	± 125	± 150	± 180	± 215	± 260	± 310
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

2 FLUTE, SHORT LENGTH, for ALUMINIUM

HSS Co8 | DIN 844 | W | 42° | FLUTE 2 | DIN 1835B



Series No. 131102

END MILLS FOR ALUMINIUM
Short Length, 2 Flute, Helix 42°, Centre Cutting, with Flatted Shank

FRASER FÜR ALUMINIUM
Kurze Ausführung, 2 Schneiden, Rechtsspirale 42°, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES POUR ALLAGES
Série Courte, 2 Dents, Hélice 42°,Coupe au Centre, à Queue Cylindrique avec Plats

VINGERFREZEN VOOR ALUMINIUM
Korte lengte, 2 groeven, Helix 42°, centerfrees met geplette schacht

FRESE PER MACCHINE ELU
Serie Corta, 2 Taglienti, Elica 42°, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

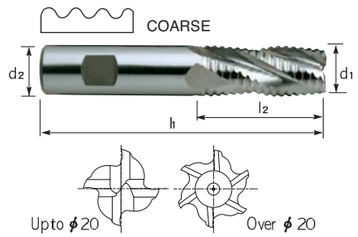
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
2.0	6.0	7.0	51.0	1311020200	1311210200	1311070200
2.5		8.0	52.0	1311020250	1311210250	1311070250
3.0		8.0		1311020300	1311210300	1311070300
3.5		10.0	54.0	1311020350	1311210350	1311070350
4.0		11.0	55.0	1311020400	1311210400	1311070400
4.5		11.0		1311020450	1311210450	1311070450
5.0		13.0	57.0	1311020500	1311210500	1311070500
5.5		13.0		1311020550	1311210550	1311070550
6.0		13.0		1311020600	1311210600	1311070600
6.5	10.0	16.0	66.0	1311020650	1311210650	1311070650
7.0		16.0		1311020700	1311210700	1311070700
7.5		16.0		1311020750	1311210750	1311070750
8.0		19.0	69.0	1311020800	1311210800	1311070800
8.5		19.0		1311020850	1311210850	1311070850
9.0		19.0		1311020900	1311210900	1311070900
10.0		22.0	72.0	1311021000	1311211000	1311071000
11.0	12.0	22.0	79.0	1311021100	1311211100	1311071100
12.0		26.0	83.0	1311021200	1311211200	1311071200
13.0		26.0		1311021300	1311211300	1311071300
14.0		26.0		1311021400	1311211400	1311071400
15.0		26.0		1311021500	1311211500	1311071500
16.0	16.0	32.0	92.0	1311021600	1311211600	1311071600
17.0		32.0		1311021700	1311211700	1311071700
18.0		32.0		1311021800	1311211800	1311071800
19.0		32.0		1311021900	1311211900	1311071900
20.0	20.0	38.0	104.0	1311022000	1311212000	1311072000
21.0		38.0		1311022100	1311212100	1311072100
22.0		38.0		1311022200	1311212200	1311072200
23.0		38.0		1311022300	1311212300	1311072300
24.0	25.0	45.0	121.0	1311022400	1311212400	1311072400
25.0		45.0		1311022500	1311212500	1311072500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI. FLUTE, ROUGHING, SHORT LENGTH

HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 - 6 | DIN 1835B | ~ϕ20 | ϕ22~



Series No. 118102

ROUGHING END MILLS
Short Length, Multi-Flute, Coarse Pitch, Round Profile, with Flatted Shank

SCHRUPP-SCHAFTFRÄSER
Kurze Ausführung, Mehrschneidig, Schrupp-Profil, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT RAVAGEUSES
Série Courte, à Plusieurs Dents, Profil Ébauche, à Queue Cylindrique avec Plats

VOORDRAAIVINGERFREZEN
Korte lengte, meergroevig, grove steek, rond profiel, met geplette schacht

FRESE FRONTALE
Serie Corta, a piu Taglienti, per Sgrossare, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	13.0	57.0	3	1181020600	1181210600	1181070600
7.0	10.0	16.0	66.0	3	1181020700	1181210700	1181070700
8.0		19.0	69.0	3	1181020800	1181210800	1181070800
9.0		19.0		3	1181020900	1181210900	1181070900
10.0		22.0	72.0	4	1181021000	1181211000	1181071000
11.0	12.0	22.0	79.0	4	1181021100	1181211100	1181071100
12.0		26.0	83.0	4	1181021200	1181211200	1181071200
13.0		26.0		4	1181021300	1181211300	1181071300
14.0		26.0		4	1181021400	1181211400	1181071400
15.0		26.0		4	1181021500	1181211500	1181071500
16.0	16.0	32.0	92.0	4	1181021600	1181211600	1181071600
17.0		32.0		4	1181021700	1181211700	1181071700
18.0		32.0		4	1181021800	1181211800	1181071800
19.0		32.0		4	1181021900	1181211900	1181071900
20.0		38.0	98.0	4	1181029001	1181219001	1181079001
20.0	20.0	38.0	104.0	4	1181022000	1181212000	1181072000
22.0		38.0		5	1181022200	1181212200	1181072200
22.0	25.0	38.0	114.0	5	1181029002	1181219002	1181079002
24.0		45.0	121.0	5	1181022400	1181212400	1181072400
25.0		45.0		5	1181022500	1181212500	1181072500
26.0		45.0		6	1181022600	1181212600	1181072600
28.0		45.0		6	1181022800	1181212800	1181072800
30.0		45.0		6	1181023000	1181213000	1181073000
32.0	32.0	53.0	133.0	6	1181023200	1181213200	1181073200
35.0		53.0		6	1181023500	1181213500	1181073500
36.0		53.0		6	1181023600	1181213600	1181073600
38.0		63.0	155.0	6	1181023800	1181213800	1181073800
38.0	40.0	63.0		6	1181029003	1181219003	1181079003
40.0	32.0	63.0		6	1181024000	1181214000	1181074000
40.0	40.0	63.0		6	1181029004	1181219004	1181079004
50.0	50.0	75.0	177.0	6	1181025000	1181215000	1181075000

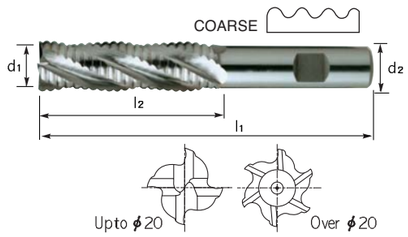
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI. FLUTE, ROUGHING, LONG LENGTH

HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 - 6 | DIN 1835B | ϕ20 | ϕ22~

Series No. 119102



ROUGHING END MILLS
Long Length, Multi-Flute, Coarse Pitch, Round Profile, with Flatted Shank

SCHRUPP-SCHAFTFRÄSER
Lange Ausführung, Mehrschneidig, Schrupp-Profil, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT RAVAGEUSES
Série Longue, à Plusieurs Dents, Profil Ébauche, à Queue Cylindrique avec Plats

VOORDRAAIVINGERFREZEN
Lange lengte, meergroevig, grove steek, rond profiel, met geplette schacht

FRESE FRONTALE
Serie Lunga, a piu Taglienti, per Sgrossare, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	24.0	68.0	3	1191020600	1191210600	1191070600
7.0	10.0	30.0	80.0	3	1191020700	1191210700	1191070700
8.0		38.0	88.0	3	1191020800	1191210800	1191070800
9.0		38.0		3	1191020900	1191210900	1191070900
10.0		45.0	95.0	4	1191021000	1191211000	1191071000
11.0	12.0	45.0	102.0	4	1191021100	1191211100	1191071100
12.0		53.0	110.0	4	1191021200	1191211200	1191071200
13.0		53.0		4	1191021300	1191211300	1191071300
14.0		53.0		4	1191021400	1191211400	1191071400
15.0		53.0		4	1191021500	1191211500	1191071500
16.0	16.0	63.0	123.0	4	1191021600	1191211600	1191071600
17.0		63.0		4	1191021700	1191211700	1191071700
18.0		63.0		4	1191021800	1191211800	1191071800
19.0		63.0		4	1191021900	1191211900	1191071900
20.0		75.0	135.0	4	1191029001	1191219001	1191079001
20.0	20.0	75.0	141.0	4	1191022000	1191212000	1191072000
22.0		75.0		5	1191022200	1191212200	1191072200
22.0	25.0	75.0	151.0	5	1191029002	1191219002	1191079002
24.0		90.0	166.0	5	1191022400	1191212400	1191072400
25.0		90.0		5	1191022500	1191212500	1191072500
26.0		90.0		6	1191022600	1191212600	1191072600
28.0		90.0		6	1191022800	1191212800	1191072800
30.0		90.0		6	1191023000	1191213000	1191073000
32.0	32.0	106.0	186.0	6	1191023200	1191213200	1191073200
35.0		106.0		6	1191023500	1191213500	1191073500
36.0		106.0		6	1191023600	1191213600	1191073600
38.0		125.0	217.0	6	1191023800	1191213800	1191073800
38.0	40.0	125.0		6	1191029003	1191219003	1191079003
40.0	32.0	125.0		6	1191024000	1191214000	1191074000
40.0	40.0	125.0		6	1191029004	1191219004	1191079004

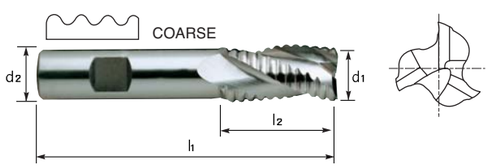
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13	0 / − 16

3 FLUTE, ROUGHING, SHORT LENGTH

HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 | DIN 1835B

Series No. 133102



ROUGHING END MILLS
Short Length, 3 Flute, Coarse Pitch, Round Profile, with Flatted Shank

SCHRUPP-SCHAFTFRÄSER
Kurze Aüsfuhrung, 3 Schneiden, Schrupp-Profil, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT RAVAGEUSES
Série Courte, 3 Dents, avec Profil Ébauche, à Queue Cylindrique avec Plats

VOORDRAAIVINGERFREZEN
Korte lengte, 3 groeven, grove steek, rond profiel, met geplette schacht

FRESE FRONTALE
Serie Corta, 3 Taglienti, per Sgrossare, Gambo Cilindrico con Trascinmento Laterale

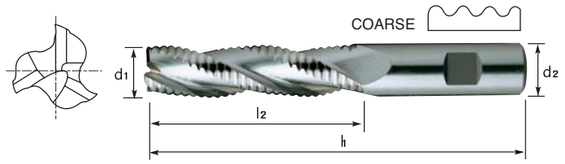
Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
10.0	10.0	22.0	72.0	1331021000	1331211000	1331071000
12.0	12.0	26.0	83.0	1331021200	1331211200	1331071200
14.0		26.0		1331021400	1331211400	1331071400
16.0	16.0	32.0	92.0	1331021600	1331211600	1331071600
18.0		32.0		1331021800	1331211800	1331071800
20.0	20.0	38.0	104.0	1331022000	1331212000	1331072000
22.0		38.0		1331022200	1331212200	1331072200
25.0	25.0	45.0	121.0	1331022500	1331212500	1331072500
28.0		45.0		1331022800	1331212800	1331072800
30.0		45.0		1331023000	1331213000	1331073000
32.0	32.0	53.0	133.0	1331023200	1331213200	1331073200
36.0		53.0		1331023600	1331213600	1331073600
40.0		63.0	155.0	1331024000	1331214000	1331074000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13	0 / − 16

3 FLUTE, ROUGHING, LONG LENGTH

HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 | DIN 1835B



Series No. 134102

ROUGHING END MILLS
Long Length, 3 Flute, Coarse Pitch, Round Profile, with Flatted Shank

FRAISES EN BOUT RAVAGEUSES
Série Longue, 3 Dents, avec Profil Ébauche, à Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Lunga, 3 Taglienti, per Sgrossare, Gambo Cilindrico con Trascinmento Laterale

SCHRUPP-SCHAFTFRÄSER
Lange Ausführung, 3 Schneiden, Schrupp-Profil, Zylinderschaft mit Mitnahmefläche

VOORDRAAIVINGERFREZEN
Lange lengte, 3 groeven, grove steek, rond profiel, met geplette schacht

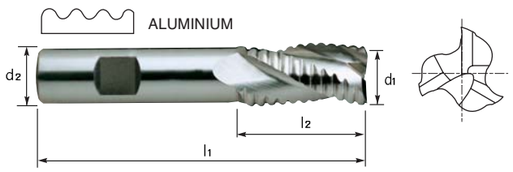
Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
10.0	10.0	45.0	95.0	1341021000	1341211000	1341071000
12.0	12.0	53.0	110.0	1341021200	1341211200	1341071200
14.0		53.0		1341021400	1341211400	1341071400
16.0	16.0	63.0	123.0	1341021600	1341211600	1341071600
18.0		63.0		1341021800	1341211800	1341071800
20.0	20.0	75.0	141.0	1341022000	1341212000	1341072000
22.0		75.0		1341022200	1341212200	1341072200
25.0	25.0	90.0	166.0	1341022500	1341212500	1341072500
28.0		90.0		1341022800	1341212800	1341072800
30.0		90.0	186.0	1341023000	1341213000	1341073000
36.0		106.0		1341023600	1341213600	1341073600
40.0	32.0	125.0	217.0	1341024000	1341214000	1341074000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, ROUGHING, SHORT LENGTH for ALUMINIUM

HSS Co8 | DIN 844 | WR | 37° | FLUTE 3 | DIN 1835B



Series No. 124102

ROUGHING END MILLS FOR ALUMINIUM
Short Length, 3 Flute, Coarse Pitch, Helix 37°, Round Profile, with Flatted Shank

FRAISES EN BOUT RAVAGEUSES POUR ALLAGES
Série Courte, 3 Dents, avec Profil Ébauche, Hélice 37°, à Queue Cylindrique avec Plats

FRESE FRONTALE PER MACCHINE ELU
Serie Corta, 3 Taglienti, Per Sgrossare Elica 37°, Gambo Cilindrico con Trascinmento Laterale

SCHRUPP-SCHAFTFRÄSER FÜR ALUMINIUM
Kurze Ausführung, 3 Schneiden, Schrupp-Profil, Rechtsspirale 37°, Zylinderschaft mit Mitnahmefläche

VOORDRAAVINGERFREZEN VOOR ALUMINIUM
Korte lengte, 3 groeven, grove steek, helix 37°, rond profiel, met geplette schacht

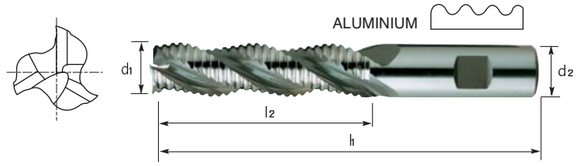
Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	13.0	57.0	1241020600	1241210600	1241070600
8.0	10.0	19.0	69.0	1241020800	1241210800	1241070800
10.0		22.0	72.0	1241021000	1241211000	1241071000
12.0	12.0	26.0	83.0	1241021200	1241211200	1241071200
14.0		26.0		1241021400	1241211400	1241071400
16.0	16.0	32.0	92.0	1241021600	1241211600	1241071600
18.0		32.0		1241021800	1241211800	1241071800
20.0	20.0	38.0	104.0	1241022000	1241212000	1241072000
22.0		38.0		1241022200	1241212200	1241072200
25.0	25.0	45.0	121.0	1241022500	1241212500	1241072500
30.0		45.0		1241023000	1241213000	1241073000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, ROUGHING, LONG LENGTH for ALUMINIUM

HSS Co8 | DIN 844 | WR | 37° | FLUTE 3 | DIN 1835B



Series No. 125102

ROUGHING END MILLS FOR ALUMINIUM
Long Length, 3 Flute, Coarse Pitch, Helix 37°, Round Profile, with Flatted Shank

FRAISES EN BOUT RAVAGEUSES POUR ALLAGES
Série Courte, 3 Dents, avec Profil Ébauche, Hélice 37°, à Queue Cylindrique avec Plats

FRESE FRONTALE PER MACCHINE ELU
Serie Lunga, 3 Taglienti, per Sgrossare Elica 37°, Gambo Cilindrico con Trascinmento Lateraleb

SCHRUPP-SCHAFTFRÄSER FÜR ALUMINUM
Lange Ausführung, 3 Schneiden, Schrupp-Profil, Rechtsspirale 37°, Zylinderschaft mit Mitnahmefläche

VOORDRAAVINGERFREZEN VOOR ALUMINIUM
Lange lengte, 3 groeven, gorve steek, helix 37°, rond profiel, met geplette schacht

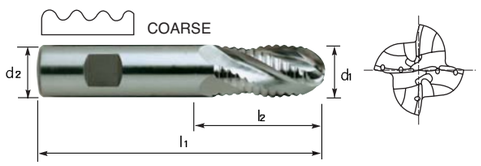
Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
10.0	10.0	45.0	95.0	1251021000	1251211000	1251071000
12.0	12.0	53.0	110.0	1251021200	1251211200	1251071200
14.0		53.0		1251021400	1251211400	1251071400
16.0	16.0	63.0	123.0	1251021600	1251211600	1251071600
18.0		63.0		1251021800	1251211800	1251071800
20.0	20.0	75.0	141.0	1251022000	1251212000	1251072000
22.0		75.0		1251022200	1251212200	1251072200
25.0	25.0	90.0	166.0	1251022500	1251212500	1251072500
30.0		90.0		1251023000	1251213000	1251073000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3&4 FLUTE, BALL NOSE ROUGHING SHORT LENGTH

HSS Co8 | DIN 1889 | NR | 30° | FLUTE 3&4 | DIN 1835B



Series No. 127102

ROUGHING DIE-SINKING CUTTERS
Short Length, Multi-Flute Coarse Pitch, Round Profile, Ball End Centre Cutting, with Flatted Shank

FRAISES EN BOUT RAVAGEUSES POUR MATRICES
Série Courte, à Plusieurs Dents avec Profil Ébauche, à Bout Spherique Coupe au Centre, à Queue Cylindrique avec Plats

FRESE FRONTALE PER STAMPI
Serie Corta, a piu Taglienti, per Sgrossare, stampi Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

SCHRUPP-GESENKFRÄSER
Kurze Ausführung, Mehrschneidig & mit runder stirn, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

VOORDRAAI MATRIJZENFREZEN
Korte lengte, meergroevig, fijne steek, rond profiel, met geplette schacht

Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
8.0	10.0	19.0	69.0	3	1271020800	1271210800	1271070800
10.0		22.0	72.0	3	1271021000	1271211000	1271071000
12.0	12.0	26.0	83.0	4	1271021200	1271211200	1271071200
16.0	16.0	32.0	92.0	4	1271021600	1271211600	1271071600
20.0	20.0	38.0	104.0	4	1271022000	1271212000	1271072000
25.0	25.0	45.0	121.0	4	1271022500	1271212500	1271072500
32.0	32.0	53.0	133.0	4	1271023200	1271213200	1271073200
40.0		63.0	155.0	4	1271024000	1271214000	1271074000

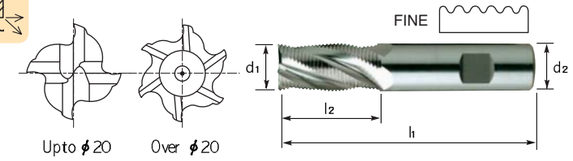
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI. FLUTE, ROUGHING, SHORT LENGTH

HSS Co8 | DIN 844 | HR | 30° | FLUTE 3 - 6 | DIN 1835B | ~ϕ20 | ϕ22~

Series No. 121102



FINE PITCH ROUGHING END MILLS
Short Length, Multi-Flute, Fine Pitch, Round Profile, with Flatted Shank

SCHRUPP-SCHAFTFRÄSER
Kurze Ausführung, Mehrscheidig, Schrupp-Profil, Feine Rillenteilung, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT RAVAGEUSES
Série Courte, à Plusieurs Dents avec Profil Ébauche, à Bout Spherique Coupe au Centre, à Queue Cylindrique avec Plats

FIJNE STEEK VOORDRAAIVINGERFREZEN
Korte lengte, meergroevig, fijne steek, rond profiel, met geplette schacht

FRESE FRONTALE
Serie Corta, a piu Taglienti, per Sgrossare, per Profilo Fine, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	13.0	57.0	3	1211020600	1211210600	1211070600
8.0	10.0	19.0	69.0	3	1211020800	1211210800	1211070800
10.0		22.0	72.0	4	1211021000	1211211000	1211071000
12.0	12.0	26.0	83.0	4	1211021200	1211211200	1211071200
14.0		26.0		4	1211021400	1211211400	1211071400
16.0	16.0	32.0	92.0	4	1211021600	1211211600	1211071600
18.0		32.0		4	1211021800	1211211800	1211071800
20.0	20.0	38.0	104.0	4	1211022000	1211212000	1211072000
25.0	25.0	45.0	121.0	5	1211022500	1211212500	1211072500
30.0		45.0		6	1211023000	1211213000	1211073000
32.0	32.0	53.0	133.0	6	1211023200	1211213200	1211073200

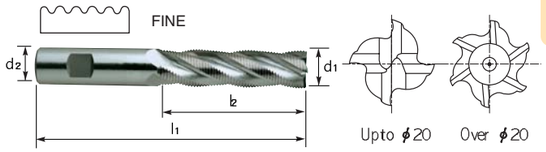
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI. FLUTE, ROUGHING, LONG LENGTH

HSS Co8 | DIN 844 | HR | 30° | FLUTE 3 - 6 | DIN 1835B | ~ϕ20 | ϕ22~

Series No. 122102



FINE PITCH ROUGHING END MILLS
Long Length, Multi-Flute, Fine Pitch, Round Profile, with Flatted Shank

SCHRUPP-SCHAFTFRÄSER
Lange Ausführung, Mehrscheidig, Schrupp-Profil, Feine Rillenteilung, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT RAVAGEUSES
Série Longue, à Plusieurs Dents, avec Profil Ébauche, Profil Fin, à Queue Cylindrique avec Plats

FIJNE STEEK VOORDRAAIVINGERFREZEN
Lange lengte, meergroevig, fijne steek, rond profiel, met geplette schacht

FRESE FRONTALE
Serie Lunga, a piu Taglienti, per Sgrossare, per Profilo Fine, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	24.0	68.0	3	1221020600	1221210600	1221070600
7.0	10.0	30.0	80.0	3	1221020700	1221210700	1221070700
8.0		38.0	88.0	3	1221020800	1221210800	1221070800
9.0		38.0		3	1221020900	1221210900	1221070900
10.0		45.0	95.0	4	1221021000	1221211000	1221071000
11.0	12.0	45.0	102.0	4	1221021100	1221211100	1221071100
12.0		53.0	110.0	4	1221021200	1221211200	1221071200
13.0		53.0		4	1221021300	1221211300	1221071300
14.0		53.0		4	1221021400	1221211400	1221071400
15.0		53.0		4	1221021500	1221211500	1221071500
16.0	16.0	63.0	123.0	4	1221021600	1221211600	1221071600
17.0		63.0		4	1221021700	1221211700	1221071700
18.0		63.0		4	1221021800	1221211800	1221071800
19.0		63.0		4	1221021900	1221211900	1221071900
20.0	20.0	75.0	141.0	4	1221022000	1221212000	1221072000
22.0		75.0		5	1221022200	1221212200	1221072200
24.0	25.0	90.0	166.0	5	1221022400	1221212400	1221072400
25.0		90.0		5	1221022500	1221212500	1221072500
26.0		90.0		6	1221022600	1221212600	1221072600
28.0		90.0		6	1221022800	1221212800	1221072800
30.0		90.0		6	1221023000	1221213000	1221073000
32.0	32.0	106.0	186.0	6	1221023200	1221213200	1221073200
35.0		106.0		6	1221023500	1221213500	1221073500
36.0		106.0		6	1221023600	1221213600	1221073600
38.0		125.0	217.0	6	1221023800	1221213800	1221073800
38.0	40.0	125.0		6	1221029001	1221219001	1221079001
40.0	32.0	125.0		6	1221024000	1221214000	1221074000
40.0	40.0	125.0		6	1221029002	1221219002	1221079002

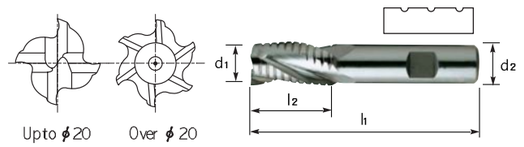
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI. FLUTE, ROUGHING & FINISHING, SHORT LENGTH

HSS Co8 | DIN 844 | NF | 30° | FLUTE 3 - 6 | DIN 1835B | ~ϕ20 | ϕ22~

Series No. 126102



ROUGHING-FINISHING END MILLS
Short Length, Multi-Flute, Rough-Finishing Profile, with Flatted Shank

SCHRUPP-SCHAFTFRÄSER
Kurze Ausführung, Mehrscheidig met Schruppschlicht Profil, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT SEMI-FINITION
Série Courte, à Plusieurs Dents avec Semi-Finition, à Queue Cylindrique avec Plats

VOORDRAAI-NADRAAI VINGERFREZEN
Korte lengte, meergroevig, ruw polijstprofiel, met geplette schacht

FRESE FRONTALE PER SEMI-SGROSSAMENTO
Serie Corta, a piu Taglienti, per Semi-Sgrossamento, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	13.0	57.0	3	1261020600	1261210600	1261070600
7.0	10.0	16.0	66.0	3	1261020700	1261210700	1261070700
8.0		19.0	69.0	4	1261020800	1261210800	1261070800
9.0		19.0		4	1261020900	1261210900	1261070900
10.0		22.0	72.0	4	1261021000	1261211000	1261071000
11.0	12.0	22.0	79.0	4	1261021100	1261211100	1261071100
12.0		26.0	83.0	4	1261021200	1261211200	1261071200
13.0		26.0		4	1261021300	1261211300	1261071300
14.0		26.0		4	1261021400	1261211400	1261071400
16.0	16.0	32.0	92.0	4	1261021600	1261211600	1261071600
18.0		32.0		4	1261021800	1261211800	1261071800
20.0	20.0	38.0	104.0	4	1261022000	1261212000	1261072000
22.0		38.0		5	1261022200	1261212200	1261072200
25.0	25.0	45.0	121.0	5	1261022500	1261212500	1261072500
28.0		45.0		5	1261022800	1261212800	1261072800
30.0		45.0		5	1261023000	1261213000	1261073000
32.0	32.0	53.0	133.0	5	1261023200	1261213200	1261073200
36.0		53.0		6	1261023600	1261213600	1261073600
40.0		63.0	155.0	6	1261024000	1261214000	1261074000

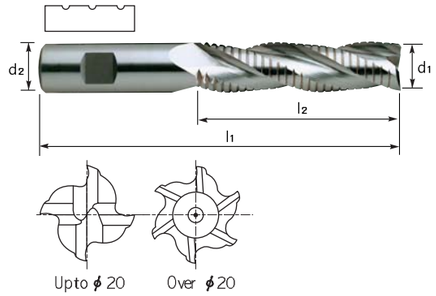
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13	0 / − 16

MULTI. FLUTE, ROUGHING & FINISHING, LONG LENGTH

HSS Co8 | DIN 844 | NF | 30° | FLUTE 3 - 6 | DIN 1835B | ~ϕ20 | ϕ22~

Series No. 137102



ROUGHING-FINISHING END MILLS
Long Length, Multi-Flute, Rough-Finishing Profile, with Flatted Shank

SCHRUPPSCHLICHT-SCHAFTFRÄSER
Lange Ausführung, Mehrscheidig met Schruppschlicht Profil, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT SEMI- FINITION
Série Longue, à Plusieurs Dents avec Profil Semi-Finition, à Queue Cylindrique avec Plats

VOORDRAAI-NADRAAI VINGERFREZEN
Lange lengte, meergroevig, ruw polijstprofiel, met geplette schacht

FRESE FRONTALE PER SEMI-SGROSSAMENTO
Serie Lunga, a piu Taglienti, per Semi-Sgrossamento, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	24.0	68.0	3	1371020600	1371210600	1371070600
8.0	10.0	38.0	88.0	4	1371020800	1371210800	1371070800
10.0		45.0	95.0	4	1371021000	1371211000	1371071000
12.0	12.0	53.0	110.0	4	1371021200	1371211200	1371071200
14.0		53.0		4	1371021400	1371211400	1371071400
16.0	16.0	63.0	123.0	4	1371021600	1371211600	1371071600
18.0		63.0		4	1371021800	1371211800	1371071800
20.0	20.0	75.0	141.0	4	1371022000	1371212000	1371072000
22.0		75.0		5	1371022200	1371212200	1371072200
25.0	25.0	90.0	166.0	5	1371022500	1371212500	1371072500
30.0		90.0		5	1371023000	1371213000	1371073000
32.0	32.0	106.0	186.0	5	1371023200	1371213200	1371073200

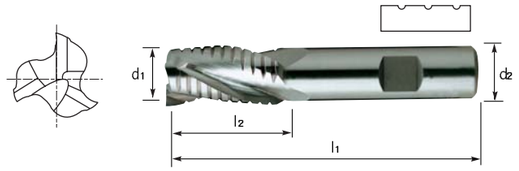
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 / − 6	0 / − 8	0 / − 9	0 / − 11	0 / − 13	0 / − 16

3 FLUTE, ROUGHING & FINISHING SHORT LENGTH

HSS Co8 | DIN 844 | NF | 30° | FLUTE 3 | DIN 1835B

Series No. 138102



ROUGHING-FINISHING END MILLS
Short Length, 3 Flute, Rough-Finishing Profile, with Flatted Shank

SCHRUPPSCHLICHT-SCHAFTFRÄSER
Kurze Ausführung, 3 Schneiden, met Schruppschlicht profil, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT SEMI-FINITION
Série Courte, 3 Dents avec Profil Semi-Finition, à Queue Cylindrique avec Plats

VOORDRAAI-NADRAAI VINGERFREZEN
Korte lengte, 3 groeven, ruw polijstprofiel, met geplette schacht

FRESE FRONTALE PER SEMI-SGROSSAMENTO
Serie Corta, a piu Taglienti, per Semi-Sgrossare, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	13.0	57.0	1381020600	1381210600	1381070600
8.0	10.0	19.0	69.0	1381020800	1381210800	1381070800
10.0		22.0	72.0	1381021000	1381211000	1381071000
12.0	12.0	26.0	83.0	1381021200	1381211200	1381071200
14.0		26.0		1381021400	1381211400	1381071400
16.0	16.0	32.0	92.0	1381021600	1381211600	1381071600
18.0		32.0		1381021800	1381211800	1381071800
20.0	20.0	38.0	104.0	1381022000	1381212000	1381072000
22.0		38.0		1381022200	1381212200	1381072200
25.0	25.0	45.0	121.0	1381022500	1381212500	1381072500
28.0		45.0		1381022800	1381212800	1381072800
30.0		45.0		1381023000	1381213000	1381073000
32.0	32.0	53.0	133.0	1381023200	1381213200	1381073200
36.0		53.0		1381023600	1381213600	1381073600
40.0		63.0	155.0	1381024000	1381214000	1381074000

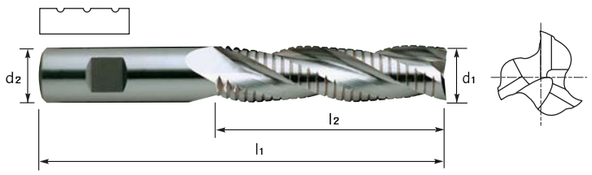
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, ROUGHING & FINISHING LONG LENGTH

HSS Co8 | DIN 844 | NF | 30° | FLUTE 3 | DIN 1835B

Series No. 139102



ROUGHING-FINISHING END MILLS
Long Length, 3 Flute, Rough-Finishing Profile, with Flatted Shank

SCHRUPPSCHLICHT-SCHAFTFRÄSER
Lange Ausführung, 3 Schneiden, met Schruppschlicht profil, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT SEMI-FINITION
Série Longue, 3 Dents avec Profil Semi-Finition, à Queue Cylindrique avec Plats

VOORDRAAI-NADRAAI VINGERFREZEN
Lange lengte, 3 groeven, ruw polijstprofiel, met geplette schacht

FRESE FRONTALE PER SEMI-SGROSSAMENTO
Serie Lunga, a piu Taglienti, per Semi-Sgrossmento, Gambo Cilindrico con Trascinmento Laterale

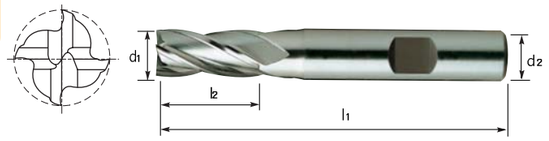
Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8	TiCN HSS Co8
6.0	6.0	24.0	68.0	1391020600	1391210600	1391070600
8.0	10.0	38.0	88.0	1391020800	1391210800	1391070800
10.0		45.0	95.0	1391021000	1391211000	1391071000
12.0	12.0	53.0	110.0	1391021200	1391211200	1391071200
14.0		53.0		1391021400	1391211400	1391071400
16.0	16.0	63.0	123.0	1391021600	1391211600	1391071600
18.0		63.0		1391021800	1391211800	1391071800
20.0	20.0	75.0	141.0	1391022000	1391212000	1391072000
22.0		75.0		1391022200	1391212200	1391072200
25.0	25.0	90.0	166.0	1391022500	1391212500	1391072500
28.0		90.0		1391022800	1391212800	1391072800
30.0		90.0		1391023000	1391213000	1391073000
36.0	32.0	106.0	186.0	1391023600	1391213600	1391073600
40.0		125.0	217.0	1391024000	1391214000	1391074000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

4&6 FLUTE, SHORT LENGTH

PM ASP60 | DIN 844 | N | ≈ 30° | FLUTE 4&6 | DIN 1835B | ~ϕ14 | ϕ16~



Series No. 107113

MULTIPLE FLUTE END MILLS
Short Length, 4 & 6 Flute, Centre Cutting, with Flatted Shank

SCHAFTFRÄSER
Kurze Ausführung, 4 & 6 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES
Série Courte, 4 & 6 Dents, Coupe au Centre, Queue Cylindrique avec Plats

MEERGROEVIG VINGERFREZEN
Korte lengte, 4 & 6 groeven, centerfrees, met geplette schacht

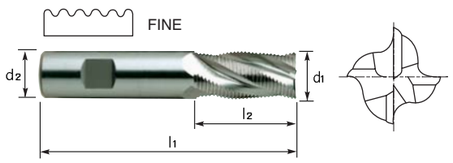
FRESE FRONTALE
Serie Corta, 4 & 6 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinmento Laterale

Mill Dia. k10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	ASP-60	TiAlN ASP-60	TiCN ASP-60
3.0	6.0	8.0	52.0	4	1071130300	1071220300	1071150300
4.0		11.0	55.0	4	1071130400	1071220400	1071150400
5.0		13.0	57.0	4	1071130500	1071220500	1071150500
6.0		13.0		4	1071130600	1071220600	1071150600
8.0	10.0	19.0	69.0	4	1071130800	1071220800	1071150800
10.0		22.0	72.0	4	1071131000	1071221000	1071151000
12.0	12.0	26.0	83.0	4	1071131200	1071221200	1071151200
14.0		26.0		4	1071131400	1071221400	1071151400
16.0	16.0	32.0	92.0	6	1071131600	1071221600	1071151600
18.0		32.0		6	1071131800	1071221800	1071151800
20.0	20.0	38.0	104.0	6	1071132000	1071222000	1071152000
25.0	25.0	45.0	121.0	6	1071132500	1071222500	1071152500

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
k10	+40 0	+48 0	+58 0	+70 0	+84 0	+100 0
h6	0 −6	0 −8	0 −9	0 −11	0 −13	0 −16

MULTI. FLUTE, ROUGHING SHORT LENGTH



PM ASP60 | DIN 844 | HR | 30° | FLUTE 4 - 6 | DIN 1835B | ~ϕ8 | ϕ9~ϕ20 | ϕ22~

Series No. 121113

FINE PITCH ROUGHING END MILLS
Short Length, Multi-Flute, Centre Cutting, 1 Tooth Over Centre, Fine Pitch, Round Profile with Flatted Shank

SCHRUPP-SCHAFTFRÄSER
Kurze Ausführung, Mehrschneidig, Zentrumschneidend, Ein Zahn bis Mitte Schneidend Schrupp-profil, Feine Rillenteilung, Zylinderschaft mit Mitnahmefläche

FRAISES EN BOUT RAVAGEUSES
Série Courte, à Plusieurs Dents, Coupe au Centre, Une Dent Coupante Jusqu'au Centre, avec Profil Ébauche Profil Fin, a Queue Cylindrique avec Plats

FRESE FRONTALE
Serie Corta, a piu Taglienti, Tagliente al Centro, Un Dents Frontale Tagliente Fino al Centro, per Sgrossare per Profilo Fine, Gambo Cilindrico con Trascinmento Laterale

FIJNE STEEK VOORDRAAIVINGERFREZEN
Korte lengte, meergroevig, centerfrees, 1 tand over center, met geplette schacht

Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	ASP-60	TiAlN ASP-60	TiCN ASP-60
6.0	6.0	13.0	57.0	4	1211130600	1211220600	1211150600
7.0	10.0	16.0	66.0	4	1211130700	1211220700	1211150700
8.0		19.0	69.0	4	1211130800	1211220800	1211150800
9.0		19.0		5	1211130900	1211220900	1211150900
10.0		22.0	72.0	5	1211131000	1211221000	1211151000
11.0	12.0	22.0	79.0	5	1211131100	1211221100	1211151100
12.0		26.0	83.0	5	1211131200	1211221200	1211151200
13.0		26.0		5	1211131300	1211221300	1211151300
14.0		26.0		5	1211131400	1211221400	1211151400
15.0		26.0		5	1211131500	1211221500	1211151500
16.0	16.0	32.0	92.0	5	1211131600	1211221600	1211151600
18.0		32.0		5	1211131800	1211221800	1211151800
20.0	20.0	38.0	104.0	5	1211132000	1211222000	1211152000
22.0		38.0		5	1211132200	1211222200	1211152200
25.0	25.0	45.0	121.0	6	1211132500	1211222500	1211152500
30.0		45.0		6	1211133000	1211223000	1211153000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

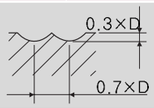
Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 −6	0 −8	0 −9	0 −11	0 −13	0 −16

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2 FLUTE BALL NOSE, SHORT LENGTH

115102,116102,114102,130102,112102,113102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.5 × 3.0	4500	95	3400	70	2000	30	1400	20	11000	230
R 2.0 × 4.0	3200	115	2400	80	1400	35	1000	25	8000	260
R 3.0 × 6.0	2200	135	1700	90	1000	45	700	25	5600	280
R 4.0 × 8.0	1600	160	1200	105	700	50	500	30	4000	350
R 5.0 × 10.0	1300	180	1000	120	560	60	400	35	3200	360
R 6.0 × 12.0	1000	170	800	105	450	55	320	35	2500	340
R 8.0 × 16.0	800	150	600	100	350	55	250	35	2000	300
R 10.0 × 20.0	600	140	500	85	300	50	200	35	1600	280
R 12.5 × 25.0	500	130	400	70	220	40	160	30	1300	250



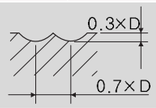
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

2 FLUTE BALL NOSE, SHORT LENGTH,TiCN-COATED

115102,116102,114102,130102,112102,113102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.5 × 3.0	6000	125	4400	90	2600	40	1800	25	14000	300
R 2.0 × 4.0	4000	150	3100	105	1800	45	1300	30	10000	340
R 3.0 × 6.0	3000	175	2200	115	1300	60	900	30	7300	360
R 4.0 × 8.0	2000	210	1600	135	900	65	650	40	5000	450
R 5.0 × 10.0	1700	235	1300	155	730	80	500	45	4000	470
R 6.0 × 12.0	1300	220	1000	135	600	70	400	45	3300	440
R 8.0 × 16.0	1000	200	800	130	450	70	300	45	2600	390
R 10.0 × 20.0	800	180	650	110	400	65	250	45	2000	360
R 12.5 × 25.0	650	170	500	90	300	50	200	40	1700	330



※The FEED, in long & extra long types, should be reduced by around 50%

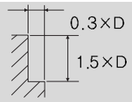
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

MULTI FLUTE, 50° HELIX SHORT LENGTH

132102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40	
STRENGTH	500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
2	5000	35	4500	25	2500	10
3	3500	50	2800	35	1800	20
4	2500	60	2000	40	1200	25
5	2000	75	1800	55	1000	30
6	1800	85	1300	55	900	35
8	1200	95	1000	65	600	40
10	1000	95	900	70	500	40
12	900	110	700	70	450	45
14	800	95	600	70	400	45
16	600	95	500	65	300	40
18	550	95	450	65	280	40
20	500	95	450	65	250	40
22	500	95	400	65	250	40
25	450	85	350	55	200	30
28	400	75	300	50	180	25
30	350	65	280	45	180	25



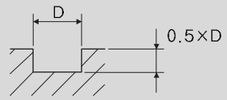
RPM=REVOLUTION PER MIN.
FEED=mm/min.

2FLUTE, SHORT LENGTH, FOR ALUMINIUM

131102

<Slotting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	8000	560
6	7000	700
8	6000	850
10	5000	1200
12	5000	1200
14	3500	1240
16	3500	1240
18	2300	1300
20	2300	1300

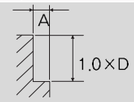


RPM=REVOLUTION PER MIN.
FEED=mm/min.

<Side Cutting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	8000	730
6	7000	900
8	6000	1100
10	5000	1500
12	5000	1500
14	3500	1600
16	3500	1600
18	2300	1700
20	2300	1700

A : ϕ3 ~ ϕ10 =0.25×D
ϕ12 ~ ϕ20 =0.5×D



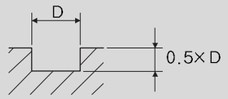
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2FLUTE, EXTRA LONG LENGTH

102102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	40	4500	30	4000	30	2200	15	12000	160
3	3500	55	3200	45	2500	40	1600	20	11000	250
4	2800	70	2200	55	1800	45	1100	30	8000	290
5	2200	90	1800	70	1600	60	900	35	6300	310
6	1800	90	1600	80	1200	60	800	40	5600	310
8	1400	100	1100	90	900	70	560	45	4000	390
10	1100	100	900	90	800	80	450	45	3100	400
12	900	110	800	100	630	80	400	50	2500	380
14	800	110	700	90	560	80	350	50	2200	350
16	700	110	560	90	450	70	280	45	2000	350
18	630	100	500	90	400	70	250	45	1800	350
20	560	100	450	90	400	70	220	45	1600	320
22	500	100	450	90	350	70	220	45	1400	300
25	450	90	400	80	310	60	180	35	1200	280
28	400	80	350	70	280	55	160	30	1100	270
30	350	70	310	60	250	50	160	30	1100	270
32	350	70	280	55	220	45	140	30	1000	240
36	310	60	250	50	200	40	120	25	900	220
40	280	60	220	50	180	40	110	25	800	200



※The FEED, in long & extra long types, should be reduced by around 50%

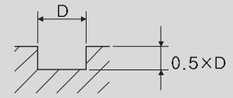
RPM=REVOLUTION PER MIN. FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2FLUTE, EXTRA LONG LENGTH, TiCN-COATED

102102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7300	50	6000	40	5000	40	2900	20	16000	210
3	4500	70	4200	60	3300	50	2100	25	14000	330
4	3600	90	2900	70	2300	60	1400	40	10000	380
5	2900	115	2300	90	2100	80	1200	45	8200	400
6	2300	115	2000	105	1600	80	1000	50	7300	400
8	1800	130	1400	115	1200	90	730	60	5000	510
10	1400	130	1200	115	1000	105	600	60	4000	520
12	1200	145	1000	130	800	105	500	65	3300	500
14	1000	145	900	115	700	105	450	65	2800	450
16	900	145	700	115	600	90	360	60	2600	450
18	800	130	650	115	500	90	320	60	2300	450
20	730	130	600	115	500	90	300	60	2100	420
22	650	130	600	115	450	90	280	60	1800	390
25	600	120	500	105	400	80	230	48	1600	360
28	500	105	450	90	350	70	210	40	1400	350
30	450	90	400	80	320	65	210	40	1400	350
32	450	90	360	70	280	60	180	40	1300	310
36	400	80	320	65	260	50	160	30	1200	280
40	360	80	280	65	230	50	140	30	1000	260



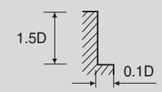
※The FEED, in long & extra long types, should be reduced by around 50%

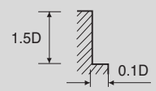
RPM=REVOLUTION PER MIN. FEED=mm/min.

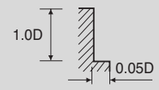
4&6 FLUTE, SHORT LENGTH

107113

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS ~HRc30		CARBON STEELS ALLOY STEELS TOOL STEELS HRc30 ~ HRc45		STAINLESS STEELS TITANIUM ALLOY		INCONEL	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	4400	185	1100	23	2200	110	880	28
4	3600	210	900	31	1800	125	720	37
5	3000	225	750	30	1500	135	600	36
6	2600	235	600	29	1300	140	480	35
8	2000	250	500	28	1000	150	400	34
10	1600	285	410	30	800	170	330	36
12	1320	250	340	29	660	150	270	35
14	1160	235	290	27	580	140	230	32
16	1000	225	250	26	500	135	200	31
18	900	210	225	23	450	125	180	28
20	800	200	200	17	400	120	160	21
25	640	165	165	15	320	100	130	18







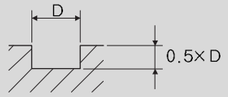
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

3 FLUTE SLOTTING

105102, 128102, 129102, 103102, 104102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	60	4500	45	4000	45	2200	20	12000	240
3	3500	80	3200	65	2500	60	1600	30	11000	380
4	2800	105	2200	80	1800	65	1100	45	8000	440
5	2200	135	1800	105	1600	90	900	50	6300	470
6	1800	135	1600	120	1200	90	800	60	5600	470
8	1400	150	1100	135	900	105	560	65	4000	580
10	1100	150	900	135	800	120	450	65	3100	600
12	900	165	800	150	630	120	400	75	2500	570
14	800	165	700	135	560	120	350	75	2200	530
16	700	165	560	135	450	105	280	65	2000	530
18	630	150	500	135	400	105	250	65	1800	530
20	560	150	450	135	400	105	220	65	1600	480
22	500	150	450	135	350	105	220	65	1400	450
25	450	135	400	120	310	90	180	50	1200	420
28	400	120	350	105	280	80	160	45	1100	400
30	350	105	310	90	250	75	160	45	1100	400



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

3 FLUTE FINISH SIDE CUTTING

105102, 128102, 129102, 103102, 104102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	60	4500	40	4000	35	2200	15	12000	180
3	3500	80	3200	60	2500	45	1600	20	11000	280
4	2800	105	2200	75	1800	50	1100	30	8000	330
5	2200	135	1800	95	1600	65	900	35	6300	350
6	1800	135	1600	110	1200	65	800	45	5600	350
8	1400	150	1100	120	900	80	560	50	4000	440
10	1100	150	900	120	800	90	450	50	3100	450
12	900	165	800	135	630	90	400	55	2500	430
14	800	165	700	120	560	90	350	55	2200	400
16	700	165	560	120	450	80	280	50	2000	400
18	630	150	500	120	400	80	250	50	1800	400
20	560	150	450	120	400	80	220	50	1600	360
22	500	150	450	120	350	80	220	50	1400	340
25	450	135	400	110	310	65	180	35	1200	320
28	400	120	350	95	280	60	160	30	1100	300
30	350	105	310	80	250	55	160	30	1100	300

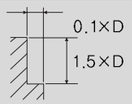
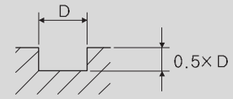


TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

3 FLUTE SLOTTING, TiCN-COATED

105102, 128102, 129102, 103102, 104102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7300	80	6000	60	5000	60	2900	25	16000	310
3	4500	105	4200	85	3300	80	2100	40	14000	500
4	3600	135	2900	105	2300	85	1400	60	10000	570
5	2900	175	2300	135	2100	115	1200	65	8200	610
6	2300	175	2000	155	1600	115	1000	80	7300	610
8	1800	195	1400	175	1200	135	730	85	5000	750
10	1400	195	1200	175	1000	155	600	85	4000	780
12	1200	215	1000	195	800	155	500	95	3300	740
14	1000	215	900	175	700	155	450	95	2800	690
16	900	215	700	175	600	135	360	85	2600	690
18	800	195	650	175	500	135	320	85	2300	690
20	730	195	600	175	500	135	300	85	2100	620
22	650	195	600	175	450	135	280	85	1800	580
25	600	175	500	155	400	115	230	65	1600	550
28	500	155	450	135	350	105	210	60	1400	520
30	450	135	400	115	320	95	210	60	1400	520



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN. FEED=mm/min.

3 FLUTE SIDE CUTTING, TiCN-COATED

105102, 128102, 129102, 103102, 104102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7300	80	6000	50	5000	45	2900	20	16000	230
3	4500	105	4200	80	3300	60	2100	25	14000	360
4	3600	135	2900	95	2300	65	1400	40	10000	430
5	2900	175	2300	125	2100	85	1200	45	8200	450
6	2300	175	2000	145	1600	85	1000	60	7300	450
8	1800	195	1400	155	1200	105	730	65	5000	570
10	1400	195	1200	155	1000	115	600	65	4000	590
12	1200	215	1000	175	800	115	500	70	3300	560
14	1000	215	900	155	700	115	450	70	2800	520
16	900	215	700	155	600	105	360	65	2600	520
18	800	195	650	155	500	105	320	65	2300	520
20	730	195	600	155	500	105	300	65	2100	470
22	650	195	600	155	450	105	280	65	1800	440
25	600	175	500	145	400	85	230	45	1600	420
28	500	155	450	125	350	80	210	40	1400	390
30	450	135	400	105	320	70	210	40	1400	390

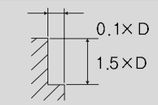
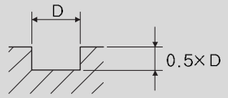


TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2 FLUTE SLOTTING

100102, 101102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	40	4500	30	4000	30	2200	15	12000	160
3	3500	55	3200	45	2500	40	1600	20	11000	250
4	2800	70	2200	55	1800	45	1100	30	8000	290
5	2200	90	1800	70	1600	60	900	35	6300	310
6	1800	90	1600	80	1200	60	800	40	5600	310
8	1400	100	1100	90	900	70	560	45	4000	390
10	1100	100	900	90	800	80	450	45	3100	400
12	900	110	800	100	630	80	400	50	2500	380
14	800	110	700	90	560	80	350	50	2200	350
16	700	110	560	90	450	70	280	45	2000	350
18	630	100	500	90	400	70	250	45	1800	350
20	560	100	450	90	400	70	220	45	1600	320
22	500	100	450	90	350	70	220	45	1400	300
25	450	90	400	80	310	60	180	35	1200	280
28	400	80	350	70	280	55	160	30	1100	270
30	350	70	310	60	250	50	160	30	1100	270
32	350	70	280	55	220	45	140	30	1000	240
36	310	60	250	50	200	40	120	25	900	220
40	280	60	220	50	180	40	110	25	800	200



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN. FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

4&6 FLUTE, FINISH SIDE CUTTING

107102, 108102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	80	4500	55	4000	45	2200	20	12000	240
3	3500	110	3200	80	2500	60	1600	30	11000	380
4	2800	140	2200	100	1800	65	1100	45	8000	440
5	2200	180	1800	125	1600	90	900	50	6300	470
6	1800	180	1600	145	1200	90	800	60	5600	470
8	1400	200	1100	160	900	105	560	65	4000	580
10	1100	200	900	160	800	120	450	65	3100	600
12	900	220	800	180	630	120	400	75	2500	570
14	800	220	700	160	560	120	350	75	2200	530
16	700	220	560	160	450	105	280	65	2000	530
18	630	200	500	160	400	105	250	65	1800	530
20	560	200	450	160	400	105	220	65	1600	480
22	500	200	450	160	350	105	220	65	1400	450
25	450	180	400	145	310	90	180	50	1200	420
28	400	160	350	125	280	80	160	45	1100	400
30	350	140	310	110	250	75	160	45	1100	400
32	350	140	280	100	220	65	140	45	1000	360
36	310	120	250	90	200	60	120	35	900	330
40	280	120	220	90	180	60	110	35	800	300

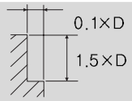
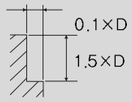


TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2 FLUTE SLOTTING, TiCN-COATED

100102, 101102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	6700	70	5400	50	5000	40	2600	20	14000	220
3	4200	95	3800	70	3000	55	1900	25	13000	340
4	3400	125	2600	90	2200	60	1300	35	9500	400
5	2600	160	2200	115	1900	80	1100	40	7500	420
6	2200	160	1900	130	1400	80	950	55	6700	420
8	1700	180	1300	145	1100	95	670	60	5000	530
10	1300	180	1100	145	950	110	550	60	3700	540
12	1100	200	950	160	750	110	500	65	3000	520
14	950	200	850	145	670	110	400	65	2600	480
16	850	200	670	145	550	95	340	60	2400	480
18	750	180	600	145	500	95	300	60	2200	480
20	670	180	550	145	500	95	260	60	1900	430
22	600	180	550	145	400	95	260	60	1700	410
25	550	160	500	130	370	80	220	40	1400	380
28	500	145	400	115	340	70	190	35	1300	360
30	400	125	370	95	300	65	190	35	1300	360



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN. FEED=mm/min.

MULTI FLUTE, SIDE CUTTING, ROUGHING

118102, 119102, 121102, 124102, 125102, 122102, 133102, 134102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1800	80	1600	60	1200	55	800	30	4500	200
8	1400	105	1100	75	900	65	560	35	3100	230
10	1100	150	900	120	800	110	450	60	2500	350
12	900	180	800	140	630	110	400	70	2000	400
14	800	180	700	140	560	110	350	70	1800	420
16	700	180	560	140	450	110	280	70	1600	450
18	630	180	500	140	400	110	250	70	1400	470
20	560	180	450	140	400	110	220	70	1200	500
22	500	220	450	170	350	140	220	85	1100	470
25	450	220	400	170	310	140	180	85	1000	450
28	400	210	350	160	280	130	160	85	900	510
30	350	210	310	160	250	130	160	85	900	530
32	350	210	280	160	220	130	140	85	800	500
36	310	210	250	160	200	130	120	85	700	470
40	280	200	220	150	180	120	110	80	630	450
50	220	200	180	170	160	140	90	80	500	370

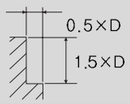
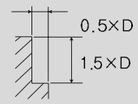


TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

MULTI FLUTE, SIDE CUTTING, ROUGHING, TiCN-COATED

118102, 119102, 121102, 124102, 125102, 122102, 133102, 134102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2300	105	2000	80	1600	70	1000	40	6000	260
8	1800	135	1400	95	1200	85	700	45	4000	300
10	1400	195	1200	155	1000	145	600	80	3200	450
12	1200	235	1000	180	800	145	500	90	2600	520
14	1000	235	900	180	700	145	450	90	2300	550
16	900	235	700	180	600	145	350	90	2100	580
18	800	235	650	180	500	145	320	90	1800	610
20	700	235	600	180	500	145	300	90	1600	650
22	650	285	600	220	450	180	300	110	1400	610
25	600	285	500	220	400	180	230	110	1300	580
28	500	275	450	210	350	170	210	110	1200	660
30	450	275	400	210	320	170	210	110	1200	690
36	450	275	350	210	300	170	180	110	1000	650
39	400	275	320	210	250	170	150	110	900	610
40	350	260	300	195	230	155	140	105	800	280
50	300	260	230	220	200	180	120	105	650	480



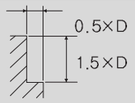
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN. FEED=mm/min.

MULTI FLUTE, ROUGHING SHORT LENGTH

121113

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40		HRc30 ~ HRc40	
STRENGTH	500 ~ 800N/mm²		800 ~ 900N/mm²		900 ~ 1100N/mm²		1100 ~ 1300N/mm²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2300	100	2000	75	1500	70	1000	35
8	1800	130	1400	95	1100	80	700	45
10	1400	190	1100	150	1000	140	560	75
12	1100	230	1000	180	800	140	500	85
14	1000	230	900	180	700	140	450	85
16	900	230	700	180	560	140	350	85
18	800	230	600	180	500	140	300	85
20	700	230	560	180	500	140	300	85
22	600	280	560	210	450	180	300	105
25	560	280	500	210	400	180	230	105
28	500	260	450	200	350	160	200	105
30	450	260	400	200	300	160	200	105



※The FEED, in long & extra long types, should be reduced by around 50%

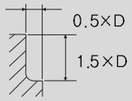
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

3&4 FLUTE, BALL LOSE ROUGHING SHORT LENGTH

127102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 4.0 × 8.0	1400	105	1100	75	900	65	560	35	3100	230
R 5.0 × 10.0	1100	150	900	120	800	110	450	60	2500	250
R 6.0 × 12.0	900	180	800	140	630	110	400	70	2000	400
R 8.0 × 16.0	700	180	560	140	450	110	280	70	1600	450
R 10.0 × 20.0	560	180	450	140	400	110	220	70	1200	500
R 12.5 × 25.0	450	220	400	170	310	140	180	85	1000	450
R 16.0 × 32.0	350	210	280	160	220	130	140	85	800	500
R 20.0 × 40.0	280	200	220	150	180	120	110	80	630	450



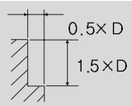
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

MULTI FLUTE SIDE CUTTING, ROUGHING & FINISHING

126102, 138102, 139102,137102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1800	65	1600	50	1200	45	800	25	4500	160
8	1400	85	1100	60	900	50	560	30	3100	185
10	1100	120	900	95	800	90	450	50	2500	280
12	900	145	800	110	630	90	400	55	2000	320
14	800	145	700	110	560	90	350	55	1800	340
16	700	145	560	110	450	90	280	55	1600	360
18	630	145	500	110	400	90	250	55	1400	380
20	560	145	450	110	400	90	220	55	1200	400
22	500	175	450	135	350	110	220	70	1100	380
25	450	175	400	135	310	110	180	70	1000	360
28	400	170	350	130	280	105	160	70	900	410
30	350	170	310	130	250	105	160	70	900	420
32	350	170	280	130	220	105	140	70	800	400
36	310	170	250	130	200	105	120	70	700	380
40	280	160	220	120	180	95	110	65	630	360



※The FEED, in long & extra long types, should be reduced by around 50%

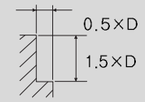
RPM=REVOLUTION PER MIN. FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

MULTI FLUTE SIDE CUTTING, ROUGHING & FINISHING, TiCN-COATED

126102, 138102, 139102,137102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2300	85	2000	65	1600	60	1000	30	6000	210
8	1800	110	1400	80	1200	65	700	40	4000	240
10	1400	155	1200	125	1000	115	600	65	3200	360
12	1200	190	1000	145	800	115	500	70	2600	420
14	1000	190	900	145	700	115	450	70	2300	440
16	900	190	700	145	600	115	350	70	2100	470
18	800	190	650	145	500	115	320	70	1800	500
20	700	190	600	145	500	115	300	70	1600	520
22	650	230	600	175	450	145	300	90	1400	500
25	600	230	500	175	400	145	230	90	1300	470
28	500	220	450	170	350	135	210	90	1200	530
30	450	220	400	170	320	135	210	90	1200	550
32	450	220	350	170	300	135	180	90	1000	520
36	400	220	320	170	250	135	150	90	900	500
40	350	210	300	155	230	125	140	85	800	470



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN. FEED=mm/min.

DRILLING.
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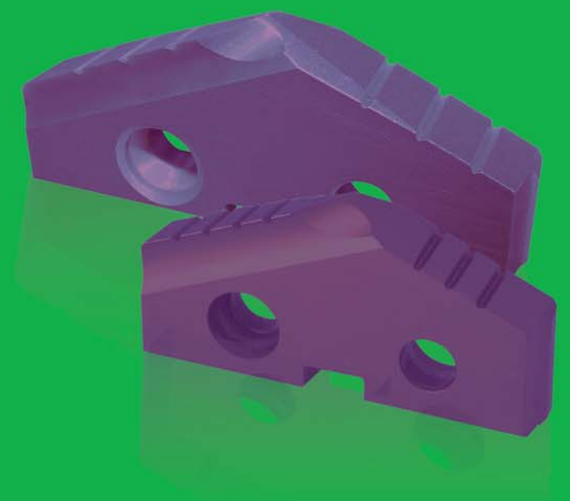
SPADE DRILLS
and Holders

www.europatool.co.uk



Europa Tool 8TH EDITION

NEW PRODUCT-SPADE DRILL

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		807304 807306 807326	TiN TiCN TiAlN	SERIES 4 SPADE THROW-AWAY DRILL INSERTS(M-4)	229
		807394 807396 807386	TiN TiCN TiAlN	SERIES 5, 6 SPADE THROW-AWAY DRILL INSERTS(M-4)	230
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NEW PRODUCT-SPADE DRILL

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SPADE Throw-Away Drill Inserts-HSS M4

- For general use in steels and cast irons.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.40

SERIES 1, 2

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
1 **17.53 (.690″) to 24.38 (.960″)**	45/64″	17.86	.7031"	4.0 (5/32″)	8073041786	8073061786	8073261786
		18.00	.7087"		8073041800	8073061800	8073261800
	23/32″	18.26	.7188"		8073041826	8073061826	8073261826
		18.50	.7283"		8073041850	8073061850	8073261850
	47/64″	18.65	.7344"		8073041865	8073061865	8073261865
		19.00	.7480"		8073041900	8073061900	8073261900
	3/4″	19.05	.7500"		8073041905	8073061905	8073261905
	49/64″	19.45	.7656"		8073041945	8073061945	8073261945
		19.50	.7677"		8073041950	8073061950	8073261950
	25/32″	19.84	.7812"		8073041984	8073061984	8073261984
		20.00	.7874"		8073042000	8073062000	8073262000
	51/64″	20.24	.7969"		8073042024	8073062024	8073262024
		20.50	.8071"		8073042050	8073062050	8073262050
	13/16″	20.64	.8125"		8073042064	8073062064	8073262064
		21.00	.8268"		8073042100	8073062100	8073262100
	27/32″	21.43	.8438"		8073042143	8073062143	8073262143
	55/64″	21.83	.8594"		8073042183	8073062183	8073262183
		22.00	.8661"		8073042200	8073062200	8073262200
	7/8″	22.23	.8750"		8073042223	8073062223	8073262223
	57/64″	22.62	.8906"		8073042262	8073062262	8073262262
		23.00	.9055"		8073042300	8073062300	8073262300
	29/32″	23.02	.9062"		8073042302	8073062302	8073262302
	59/64″	23.42	.9219"		8073042342	8073062342	8073262342
	15/16″	23.81	.9375"		8073042381	8073062381	8073262381
		24.00	.9449"		8073042400	8073062400	8073262400
2 **24.41 (.961″) to 35.05 (1.380″)**	31/32″	24.61	.9688"	4.8 (3/16″)	8073042461	8073062461	8073262461
	63/64″	25.00	.9843"		8073042500	8073062500	8073262500
	1″	25.40	1.0000"		8073042540	8073062540	8073262540
	1-1/64″	25.80	1.0156"		8073042580	8073062580	8073262580
		26.00	1.0236"		8073042600	8073062600	8073262600
	1-1/32″	26.19	1.0312"		8073042619	8073062619	8073262619
	1-3/64″	26.59	1.0469"		8073042659	8073062659	8073262659
	1-1/16″	26.99	1.0625"		8073042699	8073062699	8073262699
		27.00	1.0630"		8073042700	8073062700	8073262700
	1-3/32″	27.78	1.0938"		8073042778	8073062778	8073262778
		28.00	1.1024"		8073042800	8073062800	8073262800
	1-7/64″	28.18	1.1094"		8073042818	8073062818	8073262818
	1-1/8″	28.58	1.1250"		8073042858	8073062858	8073262858
		29.00	1.1417"		8073042900	8073062900	8073262900
	1-5/32″	29.37	1.1562"		8073042937	8073062937	8073262937
		30.00	1.1811"		8073043000	8073063000	8073263000
	1-3/16″	30.16	1.1875"		8073043016	8073063016	8073263016
	1-7/32″	30.96	1.2188"		8073043096	8073063096	8073263096
		31.00	1.2205"		8073043100	8073063100	8073263100
	1-1/4″	31.75	1.2500"		8073043175	8073063175	8073263175
		32.00	1.2598"		8073043200	8073063200	8073263200
	1-9/32″	32.54	1.2812"		8073043254	8073063254	8073263254
		33.00	1.2992"		8073043300	8073063300	8073263300
	1-5/16″	33.34	1.3125"		8073043334	8073063334	8073263334
		34.00	1.3386"		8073043400	8073063400	8073263400
	1-11/32″	34.13	1.3438"		8073043413	8073063413	8073263413
	1-3/8″	34.93	1.3750"		8073043493	8073063493	8073263493
		35.00	1.3780"		8073043500	8073063500	8073263500

SPADE Throw-Away Drill Inserts-HSS M4

- For general use in steels and cast irons.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.40

SERIES 3

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
3 **34.37 (1.353″) to 47.80 (1.882″)**	1-13/32″	35.72	1.4062"	6.4 (1/4″)	8073043572	8073063572	8073263572
		36.00	1.4173"		8073043600	8073063600	8073263600
	1-7/16″	36.51	1.4375"		8073043651	8073063651	8073263651
		37.00	1.4567"		8073043700	8073063700	8073263700
	1-15/32″	37.31	1.4688"		8073043731	8073063731	8073263731
		38.00	1.4961"		8073043800	8073063800	8073263800
	1-1/2″	38.10	1.5000"		8073043810	8073063810	8073263810
	1-17/32″	38.89	1.5312"		8073043889	8073063889	8073263889
		39.00	1.5354"		8073043900	8073063900	8073263900
	1-9/16″	39.69	1.5625"		8073043969	8073063969	8073263969
		40.00	1.5748"		8073044000	8073064000	8073264000
	1-19/32″	40.48	1.5938"		8073044048	8073064048	8073264048
		41.00	1.6142"		8073044100	8073064100	8073264100
	1-5/8″	41.28	1.6250"		8073044128	8073064128	8073264128
		42.00	1.6535"		8073044200	8073064200	8073264200
	1-21/32″	42.07	1.6562"		8073044207	8073064207	8073264207
	1-11/16″	42.86	1.6875"		8073044286	8073064286	8073264286
		43.00	1.6929"		8073044300	8073064300	8073264300
	1-23/32″	43.66	1.7188"		8073044366	8073064366	8073264366
		44.00	1.7323"		8073044400	8073064400	8073264400
	1-3/4″	44.45	1.7500"		8073044445	8073064445	8073264445
		45.00	1.7717"		8073044500	8073064500	8073264500
	1-25/32″	45.24	1.7812"		8073044524	8073064524	8073264524
		46.00	1.8110"		8073044600	8073064600	8073264600
	1-13/16″	46.04	1.8125"		8073044604	8073064604	8073264604
	1-27/32″	46.83	1.8438"		8073044683	8073064683	8073264683
		47.00	1.8504"		8073044700	8073064700	8073264700
	1-7/8″	47.63	1.8750"		8073044763	8073064763	8073264763

SPADE Throw-Away Drill Inserts-HSS M4

- For general use in steels and cast irons.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 4

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
4 **46.99 (1.850″) to 65.28 (2.570″)**		48.00	1.8898"	7.9 (5/16″)	8073044800	8073064800	8073264800
	1-29/32″	48.42	1.9062"		8073044842	8073064842	8073264842
		49.00	1.9291"		8073044900	8073064900	8073264900
	1-15/16″	49.21	1.9375"		8073044921	8073064921	8073264921
		50.00	1.9685"		8073045000	8073065000	8073265000
	1-31/32″	50.01	1.9688"		8073045001	8073065001	8073265001
	2″	50.80	2.0000"		8073045080	8073065080	8073265080
		51.00	2.0079"		8073045100	8073065100	8073265100
	2-1/32″	51.59	2.0312"		8073045159	8073065159	8073265159
	2-3/64″	52.00	2.0472"		8073045200	8073065200	8073265200
	2-1/16″	52.39	2.0625"		8073045239	8073065239	8073265239
		53.00	2.0866"		8073045300	8073065300	8073265300
	2-3/32″	53.18	2.0938"		8073045318	8073065318	8073265318
	2-1/8″	53.98	2.1250"		8073045398	8073065398	8073265398
		54.00	2.1260"		8073045400	8073065400	8073265400
	2-5/32″	54.79	2.1562"		8073045479	8073065479	8073265479
		55.00	2.1654"		8073045500	8073065500	8073265500
	2-3/16″	55.56	2.1875"		8073045556	8073065556	8073265556
		56.00	2.2047"		8073045600	8073065600	8073265600
	2-7/32″	56.36	2.2188"		8073045636	8073065636	8073265636
		57.00	2.2441"		8073045700	8073065700	8073265700
	2-1/4″	57.15	2.2500"		8073045715	8073065715	8073265715
	2-9/32″	57.94	2.2812"		8073045794	8073065794	8073265794
		58.00	2.2835"		8073045800	8073065800	8073265800
	2-5/16″	58.74	2.3125"		8073045874	8073065874	8073265874
		59.00	2.3228"		8073045900	8073065900	8073265900
	2-11/32″	59.53	2.3438"		8073045953	8073065953	8073265953
		60.00	2.3622"		8073046000	8073066000	8073266000
	2-3/8″	60.33	2.3750"		8073046033	8073066033	8073266033
		61.00	2.4016"		8073046100	8073066100	8073266100
	2-13/32″	61.12	2.4062"		8073046112	8073066112	8073266112
	2-7/16″	61.91	2.4375"		8073046191	8073066191	8073266191
		62.00	2.4409"		8073046200	8073066200	8073266200
	2-15/32″	62.71	2.4688"		8073046271	8073066271	8073266271
		63.00	2.4803"		8073046300	8073066300	8073266300
	2-1/2″	63.50	2.5000"		8073046350	8073066350	8073266350
		64.00	2.5197"		8073046400	8073066400	8073266400
	2-17/32″	64.29	2.5312"		8073046429	8073066429	8073266429
		65.00	2.5591"		8073046500	8073066500	8073266500
	2-9/16″	65.09	2.5625"		8073046509	8073066509	8073266509

SPADE Throw-Away Drill Inserts-HSS M4

- For general use in steels and cast irons.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 5, 6

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
5 **62.38 (2.456″) to 76.20 (3.000″)**	2-1/2″	63.50	2.5000"	11.1 (7/16″)	8073946350	8073966350	8073866350
		64.00	2.5197"		8073946400	8073966400	8073866400
	2-17/32″	64.29	2.5312"		8073946429	8073966429	8073866429
	2-9/16″	65.09	2.5625"		8073946509	8073966509	8073866509
	2-19/32″	65.88	2.5938"		8073046588	8073066588	8073266588
		66.00	2.5984"		8073046600	8073066600	8073266600
	2-5/8″	66.68	2.6250"		8073046668	8073066668	8073266668
	2-21/32″	67.47	2.6562"		8073046747	8073066747	8073266747
		68.00	2.6772"		8073046800	8073066800	8073266800
	2-11/16″	68.26	2.6875"		8073046826	8073066826	8073266826
	2-23/32″	69.05	2.7188"		8073046905	8073066905	8073266905
	2-3/4″	69.85	2.7500"		8073046985	8073066985	8073266985
		70.00	2.7559"		8073047000	8073067000	8073267000
	2-25/32″	70.64	2.7812"		8073047064	8073067064	8073267064
	2-13/16″	71.44	2.8125"		8073047144	8073067144	8073267144
		72.00	2.8346"		8073047200	8073067200	8073267200
	2-27/32″	72.23	2.8438"		8073047223	8073067223	8073267223
	2-7/8″	73.03	2.8750"		8073047303	8073067303	8073267303
	2-29/32″	73.82	2.9062"		8073047382	8073067382	8073267382
		74.00	2.9134"		8073047400	8073067400	8073267400
	2-15/16″	74.61	2.9375"		8073047461	8073067461	8073267461
	2-31/32″	75.41	2.9688"		8073047541	8073067541	8073267541
		76.00	2.9921"		8073047600	8073067600	8073267600
	3″	76.20	3.0000"		8073047620	8073067620	8073267620
6 **76.23 (3.001″) to 89.08 (3.507″)**	3-1/32″	76.99	3.0312"	11.1 (7/16″)	8073047699	8073067699	8073267699
	3-1/16″	77.79	3.0625"		8073047779	8073067779	8073267779
		78.00	3.0709"		8073047800	8073067800	8073267800
	3-3/32″	78.58	3.0938"		8073047858	8073067858	8073267858
	3-1/8″	79.38	3.1250"		8073047938	8073067938	8073267938
		80.00	3.1496"		8073048000	8073068000	8073268000
	3-5/32″	80.17	3.1562"		8073048017	8073068017	8073268017
	3-3/16″	80.96	3.1875"		8073048096	8073068096	8073268096
	3-7/32″	81.76	3.2188"		8073048176	8073068176	8073268176
		82.00	3.2283"		8073048200	8073068200	8073268200
	3-1/4″	82.55	3.2500"		8073048255	8073068255	8073268255
	3-9/32″	83.34	3.2812"		8073048334	8073068334	8073268334
		84.00	3.3071"		8073048400	8073068400	8073268400
	3-5/16″	84.14	3.3125"		8073048414	8073068414	8073263200
	3-11/32″	84.93	3.3438"		8073048493	8073068493	8073268493
	3-3/8″	85.73	3.3750"		8073048573	8073068573	8073268573
		86.00	3.3858"		8073048600	8073068600	8073268600
	3-13/32″	86.52	3.4062"		8073048652	8073068652	8073268652
	3-7/16″	87.31	3.4375"		8073048731	8073068731	8073268731
		88.00	3.4646"		8073048800	8073068800	8073268800
	3-15/32″	88.11	3.4688"		8073048811	8073068811	8073268811
	3-1/2″	88.90	3.5000"		8073048890	8073068890	8073268890

SPADE Throw-Away Drill Inserts-HSS M4

- For general use in steels and cast irons.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 7, 8

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
7 87.76 (3.455″) to 101.60 (4.000″)	3-17/32″	89.69	3.5312"	11.1 (7/16″)	8073048969	8073068969	8073268969
		90.00	3.5433"		8073049000	8073069000	8073269000
	3-9/16″	90.49	3.5625"		8073049049	8073069049	8073269049
	3-19/32″	91.28	3.5938"		8073049128	8073069128	8073269128
		92.00	3.6221"		8073049200	8073069200	8073269200
	3-5/8″	92.08	3.6250"		8073049208	8073069208	8073269208
	3-21/32″	92.87	3.6562"		8073049287	8073069287	8073269287
	3-11/16″	93.66	3.6875"		8073049366	8073069366	8073269366
		94.00	3.7008"		8073049400	8073069400	8073269400
	3-23/32″	94.46	3.7188"		8073049446	8073069446	8073269446
	3-3/4″	95.25	3.7500"		8073049525	8073069525	8073269525
		96.00	3.7795"		8073049600	8073069600	8073269600
	3-25/32″	96.04	3.7812"		8073049604	8073069604	8073269604
	3-13/16″	96.84	3.8125"		8073049684	8073069684	8073269684
	3-27/32″	97.63	3.8438"		8073049763	8073069763	8073269763
		98.00	3.8583"		8073049800	8073069800	8073269800
	3-7/8″	98.43	3.8750"		8073049843	8073069843	8073269843
	3-29/32″	99.22	3.9062"		8073049922	8073069922	8073269922
		100.00	3.9370"		80730410000	80730610000	80732610000
	3-15/16″	100.01	3.9375"		80730410001	80730610001	80732610001
	3-31/32″	100.81	3.9688"		80730410081	80730610081	80732610081
	4″	101.60	4.0000"		80730410160	80730610160	80732610160
8 101.63 (4.001″) to 114.48 (4.507″)	4-1/64″	102.00	4.0156"	11.1 (7/16″)	80730410200	80730610200	80732610200
	4-1/16″	103.19	4.0625"		80730410319	80730610319	80732610319
	4-3/32″	104.00	4.0945"		80730410400	80730610400	80732610400
	4-1/8″	104.78	4.1250"		80730410478	80730610478	80732610478
		106.00	4.1732"		80730410600	80730610600	80732610600
	4-3/16″	106.36	4.1875"		80730410636	80730610636	80732610636
	4-1/4″	107.95	4.2500"		80730410795	80730610795	80732610795
		108.00	4.2520"		80730410800	80730610800	80732610800
	4-5/16″	109.54	4.3125"		80730410954	80730610954	80732610954
		110.00	4.3307"		80730411000	80730611000	80732611000
	4-3/8″	111.13	4.3750"		80730411113	80730611113	80732611113
		112.00	4.4094"		80730411200	80730611200	80732611200
	4-7/16″	112.71	4.4375"		80730411271	80730611271	80732611271
		114.00	4.4882"		80730411400	80730611400	80732611400
	4-1/2″	114.30	4.5000"		80730411430	80730611430	80732611430

SPADE Throw-Away Drill Inserts-HSS T15

- For use in high nickel alloys and materials over 280 Brinell.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES Y, Z, O

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
Y 9.50(.374″) to 11.07(.436″)		9.50	.3740"	2.4 (3/32″)	8083170950	8083180950	8083270950
	3/8"	9.53	.3750"		8083170953	8083180953	8083270953
		9.80	.3860"		8083170980	8083180980	8083270980
	25/64"	9.92	.3906"		8083170992	8083180992	8083270992
		10.00	.3937"		8083171000	8083181000	8083271000
		10.20	.4016"		8083171020	8083181020	8083271020
	13/32"	10.32	.4063"		8083171032	8083181032	8083271032
		10.50	.4134"		8083171050	8083181050	8083271050
	27/64"	10.72	.4219"		8083171072	8083181072	8083271072
		10.80	.4252"		8083171080	8083181080	8083271080
		11.00	.4331"		8083171100	8083181100	8083271100
Z 11.11(.437″) to 12.95(.510″)	7/16"	11.11	.4375"	2.4 (3/32″)	8083171111	8083181111	8083271111
		11.50	.4528"		8083171150	8083181150	8083271150
	29/64"	11.51	.4531"		8083171151	8083181151	8083271151
	15/32"	11.91	.4688"		8083171191	8083181191	8083271191
		12.00	.4724"		8083171200	8083181200	8083271200
	31/64"	12.30	.4844"		8083171230	8083181230	8083271230
		12.50	.4921"		8083171250	8083181250	8083271250
	1/2"	12.70	.5000"		8083171270	8083181270	8083271270
0 12.98 (.511″) to 17.65 (.695″)		13.00	.5118"	3.2 (1/8″)	8083171300	8083181300	8083271300
	33/64"	13.10	.5156"		8083171310	8083181310	8083271310
	17/32"	13.49	.5313"		8083171349	8083181349	8083271349
		13.50	.5315"		8083171350	8083181350	8083271350
	35/64"	13.89	.5469"		8083171389	8083181389	8083271389
		14.00	.5512"		8083171400	8083181400	8083271400
	9/16"	14.29	.5625"		8083171429	8083181429	8083271429
		14.50	.5709"		8083171450	8083181450	8083271450
	37/64"	14.68	.5781"		8083171468	8083181468	8083271468
		15.00	.5906"		8083171500	8083181500	8083271500
	19/32"	15.08	.5938"		8083171508	8083181508	8083271508
	39/64"	15.48	.6094"		8083171548	8083181548	8083271548
		15.50	.6102"		8083171550	8083181550	8083271550
	5/8"	15.88	.6250"		8083171588	8083181588	8083271588
		16.00	.6299"		8083171600	8083181600	8083271600
	41/64"	16.27	.6406"		8083171627	8083181627	8083271627
		16.50	.6496"		8083171650	8083181650	8083271650
	21/32"	16.67	.6563"		8083171667	8083181667	8083271667
		17.00	.6693"		8083171700	8083181700	8083271700
	43/64"	17.07	.6719"		8083171707	8083181707	8083271707
	11/16"	17.46	.6875"		8083171746	8083181746	8083271746
		17.50	.6890"		8083171750	8083181750	8083271750

SPADE Throw-Away Drill Inserts-HSS T15

- For use in high nickel alloys and materials over 280 Brinell.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 1, 2

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
1 **17.53 (.690″) to 24.38 (.960″)**	45/64"	17.86	.7031"	4.0 (5/32″)	8083171786	8083181786	8083271786
		18.00	.7087"		8083171800	8083181800	8083271800
	23/32"	18.26	.7188"		8083171826	8083181826	8083271826
		18.50	.7283"		8083171850	8083181850	8083271850
	47/64"	18.65	.7344"		8083171865	8083181865	8083271865
		19.00	.7480"		8083171900	8083181900	8083271900
	3/4"	19.05	.7500"		8083171905	8083181905	8083271905
	49/64"	19.45	.7656"		8083171945	8083181945	8083271945
		19.50	.7677"		8083171950	8083181950	8083271950
	25/32"	19.84	.7813"		8083171984	8083181984	8083271984
		20.00	.7874"		8083172000	8083182000	8083272000
	51/64"	20.24	.7969"		8083172024	8083182024	8083272024
		20.50	.8071"		8083172050	8083182050	8083272050
	13/16"	20.64	.8125"		8083172064	8083182064	8083272064
		21.00	.8268"		8083172100	8083182100	8083272100
	27/32"	21.43	.8438"		8083172143	8083182143	8083272143
	55/64"	21.83	.8594"		8083172183	8083182183	8083272183
		22.00	.8661"		8083172200	8083182200	8083272200
	7/8"	22.23	.8750"		8083172223	8083182223	8083272223
	57/64"	22.62	.8906"		8083172262	8083182262	8083272262
		23.00	.9055"		8083172300	8083182300	8083272300
	29/32"	23.02	.9063"		8083172302	8083182302	8083272302
	59/64"	23.42	.9219"		8083172342	8083182342	8083272342
	15/16"	23.81	.9375"		8083172381	8083182381	8083272381
		24.00	.9449"		8083172400	8083182400	8083272400
2 **24.41 (.961″) to 35.05 (1.380″)**	31/32"	24.61	.9688"	4.8 (3/16″)	8083172461	8083182461	8083272461
	63/64"	25.00	.9843"		8083172500	8083182500	8083272500
	1"	25.40	1.0000"		8083172540	8083182540	8083272540
	1-1/64"	25.80	1.0156"		8083172580	8083182580	8083272580
		26.00	1.0236"		8083172600	8083182600	8083272600
	1-1/32"	26.19	1.0313"		8083172619	8083182619	8083272619
	1-3/64"	26.59	1.0469"		8083172659	8083182659	8083272659
	1-1/16"	26.99	1.0625"		8083172699	8083182699	8083272699
		27.00	1.0630"		8083172700	8083182700	8083272700
	1-3/32"	27.78	1.0938"		8083172778	8083182778	8083272778
		28.00	1.1024"		8083172800	8083182800	8083272800
	1-7/64"	28.18	1.1094"		8083172818	8083182818	8083272818
	1-1/8"	28.58	1.1250"		8083172858	8083182858	8083272858
		29.00	1.1417"		8083172900	8083182900	8083272900
	1-5/32"	29.37	1.1563"		8083172937	8083182937	8083272937
		30.00	1.1811"		8083173000	8083183000	8083273000
	1-3/16"	30.16	1.1875"		8083173016	8083183016	8083273016
	1-7/32"	30.96	1.2188"		8083173096	8083183096	8083273096
		31.00	1.2205"		8083173100	8083183100	8083273100
	1-1/4"	31.75	1.2500"		8083173175	8083183175	8083273175
		32.00	1.2598"		8083173200	8083183200	8083273200
	1-9/32"	32.54	1.2813"		8083173254	8083183254	8083273254
		33.00	1.2992"		8083173300	8083183300	8083273300
	1-5/16"	33.34	1.3125"		8083173334	8083183334	8083273334
		34.00	1.3386"		8083173400	8083183400	8083273400
	1-11/32"	34.13	1.3438"		8083173413	8083183413	8083273413
	1-3/8"	34.93	1.3750"		8083173493	8083183493	8083273493
		35.00	1.3780"		8083173500	8083183500	8083273500

SPADE Throw-Away Drill Inserts-HSS T15

- For use in high nickel alloys and materials over 280 Brinell.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 3

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
3 **34.37 (1.353″) to 47.80 (1.882″)**	1-13/32"	35.72	1.4063"	6.4 (1/4″)	8083173572	8083183572	8083273572
		36.00	1.4173"		8083173600	8083183600	8083273600
	1-7/16"	36.51	1.4375"		8083173651	8083183651	8083273651
		37.00	1.4567"		8083173700	8083183700	8083273700
	1-15/32"	37.31	1.4688"		8083173731	8083183731	8083273731
		38.00	1.4961"		8083173800	8083183800	8083273800
	1-1/2"	38.10	1.5000"		8083173810	8083183810	8083273810
	1-17/32"	38.89	1.5313"		8083173889	8083183889	8083273889
		39.00	1.5354"		8083173900	8083183900	8083273900
	1-9/16"	39.69	1.5625"		8083173969	8083183969	8083273969
		40.00	1.5748"		8083174000	8083184000	8083274000
	1-19/32"	40.48	1.5938"		8083174048	8083184048	8083274048
		41.00	1.6142"		8083174100	8083184100	8083274100
	1-5/8"	41.28	1.6250"		8083174128	8083184128	8083274128
		42.00	1.6535"		8083174200	8083184200	8083274200
	1-21/32"	42.07	1.6563"		8083174207	8083184207	8083274207
	1-11/16"	42.86	1.6875"		8083174286	8083184286	8083274286
		43.00	1.6929"		8083174300	8083184300	8083274300
	1-23/32"	43.66	1.7188"		8083174366	8083184366	8083274366
		44.00	1.7323"		8083174400	8083184400	8083274400
	1-3/4"	44.45	1.7500"		8083174445	8083184445	8083274445
		45.00	1.7717"		8083174500	8083184500	8083274500
	1-25/32"	45.24	1.7813"		8083174524	8083184524	8083274524
		46.00	1.8110"		8083174600	8083184600	8083274600
	1-13/16"	46.04	1.8125"		8083174604	8083184604	8083274604
	1-27/32"	46.83	1.8438"		8083174683	8083184683	8083274683
		47.00	1.8504"		8083174700	8083184700	8083274700
	1-7/8"	47.63	1.8750"		8083174763	8083184763	8083274763

SPADE Throw-Away Drill Inserts-HSS T15

- For use in high nickel alloys and materials over 280 Brinell.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 4

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
4 46.99 (1.850″) to 65.28 (2.570″)		48.00	1.8898"	7.9 (5/16″)	8083174800	8083184800	8083274800
	1-29/32"	48.42	1.9063"		8083174842	8083184842	8083274842
		49.00	1.9291"		8083174900	8083184900	8083274900
	1-15/16"	49.21	1.9375"		8083174921	8083184921	8083274921
		50.00	1.9685"		8083175000	8083185000	8083275000
	1-31/32"	50.01	1.9688"		8083175001	8083185001	8083275001
	2"	50.80	2.0000"		8083175080	8083185080	8083275080
		51.00	2.0079"		8083175100	8083185100	8083275100
	2-1/32"	51.59	2.0313"		8083175159	8083185159	8083275159
	2-3/64"	52.00	2.0472"		8083175200	8083185200	8083275200
	2-1/16"	52.39	2.0625"		8083175239	8083185239	8083275239
		53.00	2.0866"		8083175300	8083185300	8083275300
	2-3/32"	53.18	2.0938"		8083175318	8083185318	8083275318
	2-1/8"	53.98	2.1250"		8083175398	8083185398	8083275398
		54.00	2.1260"		8083175400	8083185400	8083275400
	2-5/32"	54.79	2.1563"		8083175479	8083185479	8083275479
		55.00	2.1654"		8083175500	8083185500	8083275500
	2-3/16"	55.56	2.1875"		8083175556	8083185556	8083275556
		56.00	2.2047"		8083175600	8083185600	8083275600
	2-7/32"	56.36	2.2188"		8083175636	8083185636	8083275636
		57.00	2.2441"		8083175700	8083185700	8083275700
	2-1/4"	57.15	2.2500"		8083175715	8083185715	8083275715
	2-9/32"	57.94	2.2813"		8083175794	8083185794	8083275794
		58.00	2.2835"		8083175800	8083185800	8083275800
	2-5/16"	58.74	2.3125"		8083175874	8083185874	8083275874
		59.00	2.3228"		8083175900	8083185900	8083275900
	2-11/32"	59.53	2.3438"		8083175953	8083185953	8083275953
		60.00	2.3622"		8083176000	8083186000	8083276000
	2-3/8"	60.33	2.3750"		8083176033	8083186033	8083276033
		61.00	2.4016"		8083176100	8083186100	8083276100
	2-13/32"	61.12	2.4063"		8083176112	8083186112	8083276112
	2-7/16"	61.91	2.4375"		8083176191	8083186191	8083276191
		62.00	2.4409"		8083176200	8083186200	8083276200
	2-15/32"	62.71	2.4688"		8083176271	8083186271	8083276271
		63.00	2.4803"		8083176300	8083186300	8083276300
	2-1/2"	63.50	2.5000"		8083176350	8083186350	8083276350
		64.00	2.5197"		8083176400	8083186400	8083276400
	2-17/32"	64.29	2.5313"		8083176429	8083186429	8083276429
		65.00	2.5591"		8083176500	8083186500	8083276500
	2-9/16"	65.09	2.5625"		8083176509	8083186509	8083276509

SPADE Throw-Away Drill Inserts-HSS M48

- For use in high temperature alloys and materials with 350~500 Brinell.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES Y, Z, O

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
Y 9.50(.374″) to 11.07(.436″)		9.50	.3740"	2.4 (3/32″)	8093050950	8093070950	8093210950
	3/8″	9.53	.3750"		8093050953	8093070953	8093210953
		9.80	.3858"		8093050980	8093070980	8093210980
	25/64″	9.92	.3906"		8093050992	8093070992	8093210992
		10.00	.3937"		8093051000	8093071000	8093211000
		10.20	.4016"		8093051020	8093071020	8093211020
	13/32″	10.32	.4062"		8093051032	8093071032	8093211032
		10.50	.4134"		8093051050	8093071050	8093211050
	27/64″	10.72	.4219"		8093051072	8093071072	8093211072
		10.80	.4252"		8093051080	8093071080	8093211080
		11.00	.4331"		8093051100	8093071100	8093211100
Z 11.11(.437″) to 12.95(.510″)	7/16″	11.11	.4375"	2.4 (3/32″)	8093051111	8093071111	8093211111
		11.50	.4528"		8093051150	8093071150	8093211150
	29/64″	11.51	.4531"		8093051151	8093071151	8093211151
	15/32″	11.91	.4688"		8093051191	8093071191	8093211191
		12.00	.4724"		8093051200	8093071200	8093211200
	31/64″	12.30	.4844"		8093051230	8093071230	8093211230
		12.50	.4921"		8093051250	8093071250	8093211250
	1/2″	12.70	.5000"		8093051270	8093071270	8093211270
		13.00	.5118"		8093051300	8093071300	8093211300
0 12.98 (.511″) to 17.65 (.695″)	33/64″	13.10	.5156"	3.2 (1/8″)	8093051310	8093071310	8093211310
	17/32″	13.49	.5312"		8093051349	8093071349	8093211349
		13.50	.5315"		8093051350	8093071350	8093211350
	35/64″	13.89	.5469"		8093051389	8093071389	8093211389
		14.00	.5512"		8093051400	8093071400	8093211400
	9/16″	14.29	.5625"		8093051429	8093071429	8093211429
		14.50	.5709"		8093051450	8093071450	8093211450
	37/64″	14.68	.5781"		8093051468	8093071468	8093211468
		15.00	.5906"		8093051500	8093071500	8093211500
	19/32″	15.08	.5938"		8093051508	8093071508	8093211508
	39/64″	15.48	.6094"		8093051548	8093071548	8093211548
		15.50	.6102"		8093051550	8093071550	8093211550
	5/8″	15.88	.6250"		8093051588	8093071588	8093211588
		16.00	.6299"		8093051600	8093071600	8093211600
	41/64″	16.27	.6406"		8093051627	8093071627	8093211627
		16.50	.6496"		8093051650	8093071650	8093211650
	21/32″	16.67	.6562"		8093051667	8093071667	8093211667
		17.00	.6693"		8093051700	8093071700	8093211700
	43/64″	17.07	.6719"		8093051707	8093071707	8093211707
	11/16″	17.46	.6875"		8093051746	8093071746	8093211746
		17.50	.6890"		8093051750	8093071750	8093211750

SPADE Throw-Away Drill Inserts-HSS M48

- For use in high temperature alloys and materials with 350~500 Brinell.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 1, 2

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
1 **17.53 (.690″) to 24.38 (.960″)**	45/64″	17.86	.7031"	4.0 (5/32″)	8093051786	8093071786	8093211786
		18.00	.7087"		8093051800	8093071800	8093211800
	23/32″	18.26	.7188"		8093051826	8093071826	8093211826
		18.50	.7283"		8093051850	8093071850	8093211850
	47/64″	18.65	.7344"		8093051865	8093071865	8093211865
		19.00	.7480"		8093051900	8093071900	8093211900
	3/4″	19.05	.7500"		8093051905	8093071905	8093211905
	49/64″	19.45	.7656"		8093051945	8093071945	8093211945
		19.50	.7677"		8093051950	8093071950	8093211950
	25/32″	19.84	.7812"		8093051984	8093071984	8093211984
		20.00	.7874"		8093052000	8093072000	8093212000
	51/64″	20.24	.7969"		8093052024	8093072024	8093212024
		20.50	.8071"		8093052050	8093072050	8093212050
	13/16″	20.64	.8125"		8093052064	8093072064	8093212064
		21.00	.8268"		8093052100	8093072100	8093212100
	27/32″	21.43	.8438"		8093052143	8093072143	8093212143
	55/64″	21.83	.8594"		8093052183	8093072183	8093212183
		22.00	.8661"		8093052200	8093072200	8093212200
	7/8″	22.23	.8750"		8093052223	8093072223	8093212223
	57/64″	22.62	.8906"		8093052262	8093072262	8093212262
		23.00	.9055"		8093052300	8093072300	8093212300
	29/32″	23.02	.9062"		8093052302	8093072302	8093212302
	59/64″	23.42	.9219"		8093052342	8093072342	8093212342
	15/16″	23.81	.9375"		8093052381	8093072381	8093212381
		24.00	.9449"		8093052400	8093072400	8093212400
2 **24.41 (.961″) to 35.05 (1.380″)**	31/32″	24.61	.9688"	4.8 (3/16″)	8093052461	8093072461	8093212461
	63/64″	25.00	.9843"		8093052500	8093072500	8093212500
	1″	25.40	1.0000"		8093052540	8093072524	8093212540
	1-1/64″	25.80	1.0156"		8093052580	8093072580	8093212580
		26.00	1.0236"		8093052600	8093072600	8093212600
	1-1/32″	26.19	1.0312"		8093052619	8093072619	8093212619
	1-3/64″	26.59	1.0469"		8093052659	8093072659	8093212659
	1-1/16”	26.99	1.0625"		8093052699	8093072699	8093212699
		27.00	1.0630"		8093052700	8093072700	8093212700
	1-3/32″	27.78	1.0938"		8093052778	8093072778	8093212778
		28.00	1.1024"		8093052800	8093072800	8093212800
	1-7/64″	28.18	1.1094"		8093052818	8093072818	8093212818
	1-1/8″	28.58	1.1250"		8093052858	8093072858	8093212858
		29.00	1.1417"		8093052900	8093072900	8093212900
	1-5/32″	29.37	1.1562"		8093052937	8093072937	8093212937
		30.00	1.1811"		8093053000	8093073000	8093213000
	1-3/16″	30.16	1.1875"		8093053016	8093073016	8093213016
	1-7/32″	30.96	1.2188"		8093053096	8093073096	8093213096
		31.00	1.2205"		8093053100	8093073100	8093213100
	1-1/4″	31.75	1.2500"		8093053175	8093073175	8093213175
		32.00	1.2598"		8093053200	8093073200	8093213200
	1-9/32″	32.54	1.2812"		8093053254	8093073254	8093213254
		33.00	1.2992"		8093053300	8093073300	8093213300
	1-5/16″	33.34	1.3125"		8093053334	8093073334	8093213334
		34.00	1.3386"		8093053400	8093073400	8093213400
	1-11/32″	34.13	1.3438"		8093053413	8093073413	8093213413
	1-3/8″	34.93	1.3750"		8093053493	8093073493	8093213493
		35.00	1.3780"		8093053500	8093073500	8093213500

SPADE Throw-Away Drill Inserts for Cast Iron-Carbide K10

- High performance on Gray cast iron over 220 Brinell, malleable cast iron with short chips, silicon aluminum and copper alloys.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES Y, Z, O

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
Y **9.50(.374″) to 11.07(.436″)**		9.50	.3740"	2.4 (3/32″)	8323080950	8323090950	8323230950
	3/8″	9.53	.3750"		8323080953	8323090953	8323230953
		9.80	.3858"		8323080980	8323090980	8323230980
	25/64″	9.92	.3906"		8323080992	8323090992	8323230992
		10.00	.3937"		8323081000	8323091000	8323231000
		10.20	.4016"		8323081020	8323091020	8323231020
	13/32″	10.32	.4062"		8323081032	8323091032	8323231032
		10.50	.4134"		8323081050	8323091050	8323231050
	27/64″	10.72	.4219"		8323081072	8323091072	8323231072
		10.80	.4252"		8323081080	8323091080	8323231080
		11.00	.4331"		8323081100	8323091100	8323231100
Z **11.11(.437″) to 12.95(.510″)**	7/16″	11.11	.4375"	2.4 (3/32″)	8323081111	8323091111	8323231111
		11.50	.4528"		8323081150	8323091150	8323231150
	29/64″	11.51	.4531"		8323081151	8323091151	8323231151
	15/32″	11.91	.4688"		8323081191	8323091191	8323231191
		12.00	.4724"		8323081200	8323091200	8323231200
	31/64″	12.30	.4844"		8323081230	8323091230	8323231230
		12.50	.4921"		8323081250	8323091250	8323231250
	1/2″	12.70	.5000"		8323081270	8323091270	8323231270
0 **12.98 (.511″) to 17.65 (.695″)**		13.00	.5118"	3.2 (1/8″)	8323081300	8323091300	8323231300
	33/64″	13.10	.5156"		8323081310	8323091310	8323231310
	17/32″	13.49	.5312"		8323081349	8323091349	8323231349
		13.50	.5315"		8323081350	8323091350	8323231350
	35/64″	13.89	.5469"		8323081389	8323091389	8323231389
		14.00	.5512"		8323081400	8323091400	8323231400
	9/16″	14.29	.5625"		8323081429	8323091429	8323231429
		14.50	.5709"		8323081450	8323091450	8323231450
	37/64″	14.68	.5781"		8323081468	8323091468	8323231468
		15.00	.5906"		8323081500	8323091500	8323231500
	19/32″	15.08	.5938"		8323081508	8323091508	8323231508
	39/64″	15.48	.6094"		8323081548	8323091548	8323231548
		15.50	.6102"		8323081550	8323091550	8323231550
	5/8″	15.88	.6250"		8323081588	8323091588	8323231588
		16.00	.6299"		8323081600	8323091600	8323231600
	41/64″	16.27	.6406"		8323081627	8323091627	8323231627
		16.50	.6496"		8323081650	8323091650	8323231650
	21/32″	16.67	.6562"		8323081667	8323091667	8323231667
		17.00	.6693"		8323081700	8323091700	8323231700
	43/64″	17.07	.6719"		8323081707	8323091707	8323231707
	11/16″	17.46	.6875"		8323081746	8323091746	8323231746
		17.50	.6890"		8323081750	8323091750	8323231750

SPADE Throw-Away Drill Inserts for Cast Iron-Carbide K10

- High performance on Gray cast iron over 220 Brinell, malleable cast iron with short chips, silicon aluminum and copper alloys.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 1, 2

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
1 17.53 (.690″) to 24.38 (.960″)	45/64″	17.86	.7031"	4.0 (5/32″)	8323081786	8323091786	8323231786
		18.00	.7087"		8323081800	8323091800	8323231800
	23/32	18.26	.7188"		8323081826	8323091826	8323231826
		18.50	.7283"		8323081850	8323091850	8323231850
	47/64″	18.65	.7344"		8323081865	8323091865	8323231865
		19.00	.7480"		8323081900	8323091900	8323231900
	3/4″	19.05	.7500"		8323081905	8323091905	8323231905
	49/64″	19.45	.7656"		8323081945	8323091945	8323231945
		19.50	.7677"		8323081950	8323091950	8323231950
	25/32″	19.84	.7812"		8323081984	8323091984	8323231984
		20.00	.7874"		8323082000	8323092000	8323232000
	51/64″	20.24	.7969"		8323082024	8323092024	8323232024
		20.50	.8071"		8323082050	8323092050	8323232050
	13/16″	20.64	.8125"		8323082064	8323092064	8323232064
		21.00	.8268"		8323082100	8323092100	8323232100
	27/32″	21.43	.8438"		8323082143	8323092143	8323232143
	55/64″	21.83	.8594"		8323082183	8323092183	8323232183
		22.00	.8661"		8323082200	8323092200	8323232200
	7/8″	22.23	.8750"		8323082223	8323092223	8323232223
	57/64″	22.62	.8906"		8323082262	8323092262	8323232262
		23.00	.9055"		8323082300	8323092300	8323232300
	29/32″	23.02	.9062"		8323082302	8323092302	8323232302
	59/64″	23.42	.9219"		8323082342	8323092342	8323232342
	15/16″	23.81	.9375"		8323082381	8323092381	8323232391
		24.00	.9449"		8323082400	8323092400	8323232400
2 24.41 (.961″) to 35.05 (1.380″)	31/32″	24.61	.9688"	4.8 (3/16″)	8323082461	8323092461	8323232461
	63/64″	25.00	.9843"		8323082500	8323092500	8323232500
	1″	25.40	1.0000"		8323082540	8323092540	8323232540
	1-1/64″	25.80	1.0156"		8323082580	8323092580	8323232580
		26.00	1.0236"		8323082600	8323092600	8323232600
	1-1/32″	26.19	1.0312"		8323082619	8323092619	8323232619
	1-3/64″	26.59	1.0469"		8323082659	8323092659	8323232659
	1-1/16″	26.99	1.0625"		8323082699	8323092699	8323232699
		27.00	1.0630"		8323082700	8323092700	8323232700
	1-3/32″	27.78	1.0938"		8323082778	8323092778	8323232778
		28.00	1.1024"		8323082800	8323092800	8323232800
	1-7/64″	28.18	1.1094"		8323082818	8323092818	8323232818
	1-1/8″	28.58	1.1250"		8323082858	8323092858	8323232858
		29.00	1.1417"		8323082900	8323092900	8323232900
	1-5/32″	29.37	1.1562"		8323082937	8323092937	8323232937
		30.00	1.1811"		8323083000	8323093000	8323233000
	1-3/16″	30.16	1.1875"		8323083016	8323093016	8323233016
	1-7/32″	30.96	1.2188"		8323083096	8323093096	8323233096
		31.00	1.2205"		8323083100	8323093100	8323233100
	1-1/4″	31.75	1.2500"		8323083175	8323093175	8323233175
		32.00	1.2598"		8323083200	8323093200	8323233200
	1-9/32″	32.54	1.2812"		8323083254	8323093254	8323233254
		33.00	1.2992"		8323083300	8323093300	8323233300
	1-5/16″	33.34	1.3125"		8323083334	8323093334	8323233334
		34.00	1.3386"		8323083400	8323093400	8323233400
	1-11/32″	34.13	1.3438"		8323083413	8323093413	8323233413
	1-3/8″	34.93	1.3750"		8323083493	8323093493	8323323493
		35.00	1.3780"		8323083500	8323093500	8323233500

SPADE Throw-Away Drill Inserts -Carbide K20

- For use in Gray cast iron up to 220 Brinell, nonferrous metals, copper, brass and aluminum.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES Y, Z, O

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
Y 9.50(.374″) to 11.07(.436″)		9.50	.3740"	2.4 (3/32″)	8303080950	8303090950	8303230950
	3/8″	9.53	.3750"		8303080953	8303090953	8303230953
		9.80	.3858"		8303080980	8303090980	8303230980
	25/64″	9.92	.3906"		8303080992	8303090992	8303230992
		10.00	.3937"		8303081000	8303091000	8303231000
		10.20	.4016"		8303081020	8303091020	8303231020
	13/32″	10.32	.4062"		8303081032	8303091032	8303231032
		10.50	.4134"		8303081050	8303091050	8303231050
	27/64″	10.72	.4219"		8303081072	8303091072	8303231072
		10.80	.4252"		8303081080	8303091080	8303231080
		11.00	.4331"		8303081100	8303091100	8303231100
Z 11.11(.437″) to 12.95(.510″)	7/16″	11.11	.4375"	2.4 (3/32″)	8303081111	8303091111	8303231111
		11.50	.4528"		8303081150	8303091150	8303231150
	29/64″	11.51	.4531"		8303081151	8303091151	8303231151
	15/32″	11.91	.4688"		8303081191	8303091191	8303231191
		12.00	.4724"		8303081200	8303091200	8303231200
	31/64″	12.30	.4844"		8303081230	8303091230	8303231230
		12.50	.4921"		8303081250	8303091250	8303231250
	1/2″	12.70	.5000"		8303081270	8303091270	8303231270
0 12.98 (.511″) to 17.65 (.695″)		13.00	.5118"	3.2 (1/8″)	8303081300	8303091300	8303231300
	33/64″	13.10	.5156"		8303081310	8303091310	8303231310
	17/32″	13.49	.5312"		8303081349	8303091349	8303231349
		13.50	.5315"		8303081350	8303091350	8303231350
	35/64″	13.89	.5469"		8303081389	8303091389	8303231389
		14.00	.5512"		8303081400	8303091400	8303231400
	9/16″	14.29	.5625"		8303081429	8303091429	8303231429
		14.50	.5709"		8303081450	8303091450	8303231450
	37/64″	14.68	.5781"		8303081468	8303091468	8303231480
		15.00	.5906"		8303081500	8303091500	8303231500
	19/32″	15.08	.5938"		8303081508	8303091508	8303231508
	39/64″	15.48	.6094"		8303081548	8303091548	8303231548
		15.50	.6102"		8303081550	8303091550	8303231550
	5/8″	15.88	.6250"		8303081588	8303091588	8303231588
		16.00	.6299"		8303081600	8303091600	8303231600
	41/64″	16.27	.6406"		8303081627	8303091627	8303231627
		16.50	.6496"		8303081650	8303091650	8303231650
	21/32″	16.67	.6562"		8303081667	8303091667	8303231667
		17.00	.6693"		8303081700	8303091700	8303231700
	43/64″	17.07	.6719"		8303081707	8303091707	8303231707
	11/16″	17.46	.6875"		8303081746	8303091746	8303231746
		17.50	.6890"		8303081750	8303091750	8303231750

SPADE Throw-Away Drill Inserts -Carbide K20

- For use in Gray cast iron up to 220 Brinell, nonferrous metals, copper, brass and aluminum.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 1, 2

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
1 **17.53 (.690″) to 24.38 (.960″)**	45/64″	17.86	.7031"	4.0 (5/32″)	8303081786	8303091786	8303231786
		18.00	.7087"		8303081800	8303091800	8303231800
	23/32″	18.26	.7188"		8303081826	8303091826	8303231826
		18.50	.7283"		8303081850	8303091850	8303231850
	47/64″	18.65	.7344"		8303081865	8303091865	8303231865
		19.00	.7480"		8303081900	8303091900	8303231900
	3/4″	19.05	.7500"		8303081905	8303091905	8303231905
	49/64″	19.45	.7656"		8303081945	8303091945	8303231945
		19.50	.7677"		8303081950	8303091950	8303231950
	25/32″	19.84	.7812"		8303081984	8303091984	8303231984
		20.00	.7874"		8303082000	8303092000	8303232000
	51/64″	20.24	.7969"		8303082024	8303092024	8303232024
		20.50	.8071"		8303082050	8303092050	8303232050
	13/16″	20.64	.8125"		8303082064	8303092064	8303232064
		21.00	.8268"		8303082100	8303092100	8303232100
	27/32″	21.43	.8438"		8303082143	8303092143	8303232143
	55/64″	21.83	.8594"		8303082183	8303092183	8303232183
		22.00	.8661"		8303082200	8303092200	8303232200
	7/8″	22.23	.8750"		8303082223	8303092223	8303232223
	57/64″	22.62	.8906"		8303082262	8303092262	8303232262
		23.00	.9055"		8303082300	8303092300	8303232300
	29/32″	23.02	.9062"		8303082302	8303092302	8303232302
	59/64″	23.42	.9219"		8303082342	8303092342	8303232342
	15/16″	23.81	.9375"		8303082381	8303092381	8303232381
		24.00	.9449"		8303082400	8303092400	8303232400
2 **24.41 (.961″) to 35.05 (1.380″)**	31/32″	24.61	.9688"	4.8 (3/16″)	8303082461	8303092461	8303232461
	63/64″	25.00	.9843"		8303082500	8303092500	8303232500
	1″	25.40	1.0000"		8303082540	8303092540	8303232540
	1-1/64″	25.80	1.0156"		8303082580	8303092580	8303232580
		26.00	1.0236"		8303082600	8303092600	8303232600
	1-1/32″	26.19	1.0312"		8303082619	8303092619	8303232619
	1-3/64″	26.59	1.0469"		8303082659	8303092659	8303232659
	1-1/16″	26.99	1.0625"		8303082699	8303092699	8303232699
		27.00	1.0630"		8303082700	8303092700	8303232700
	1-3/32″	27.78	1.0938"		8303082778	8303092778	8303232778
		28.00	1.1024"		8303082800	8303092800	8303232800
	1-7/64″	28.18	1.1094"		8303082818	8303092818	8303232818
	1-1/8″	28.58	1.1250"		8303082858	8303092858	8303232858
		29.00	1.1417"		8303082900	8303092900	8303232900
	1-5/32″	29.37	1.1562"		8303082937	8303092937	8303232937
		30.00	1.1811"		8303083000	8303093000	8303233000
	1-3/16″	30.16	1.1875"		8303083016	8303093016	8303233016
	1-7/32″	30.96	1.2188"		8303083096	8303093096	8303233096
		31.00	1.2205"		8303083100	8303093100	8303233100
	1-1/4″	31.75	1.2500"		8303083175	8303093175	8303233175
		32.00	1.2598"		8303083200	8303093200	8303233200
	1-9/32″	32.54	1.2812"		8303083254	8303093254	8303233254
		33.00	1.2992"		8303083300	8303093300	8303233300
	1-5/16″	33.34	1.3125"		8303083334	8303093334	8303233334
		34.00	1.3386"		8303083400	8303093400	8303233400
	1-11/32″	34.13	1.3438"		8303083413	8303093413	8303233413
	1-3/8″	34.93	1.3750"		8303083493	8303093493	8303233493
		35.00	1.3780"		8303083500	8303093500	8303233500

SPADE Throw-Away Drill Inserts -Carbide K20

- For use in Gray cast iron up to 220 Brinell, nonferrous metals, copper, brass and aluminum.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 3

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
3 **34.37 (1.353″) to 47.80 (1.882″)**	1-13/32″	35.72	1.4062"	6.4 (1/4″)	8303083572	8303093572	8303233572
		36.00	1.4173"		8303083600	8303093600	8303233600
	1-7/16″	36.51	1.4375"		8303083651	8303093651	8303233651
		37.00	1.4567"		8303083700	8303093700	8303233700
	1-15/32″	37.31	1.4688"		8303083731	8303093731	8303233731
		38.00	1.4961"		8303083800	8303093800	8303233800
	1-1/2″	38.10	1.5000"		8303083810	8303093810	8303233810
	1-17/32″	38.89	1.5312"		8303083889	8303093889	8303233889
		39.00	1.5354"		8303083900	8303093900	8303233900
	1-9/16″	39.69	1.5625"		8303083969	8303093969	8303233969
		40.00	1.5748"		8303084000	8303094000	8303234000
	1-19/32″	40.48	1.5938"		8303084048	8303094048	8303234048
		41.00	1.6142"		8303084100	8303094100	8303234100
	1-5/8″	41.28	1.6250"		8303084128	8303094128	8303234128
		42.00	1.6535"		8303084200	8303094200	8303234200
	1-21/32″	42.07	1.6562"		8303084207	8303094207	8303234207
	1-11/16″	42.86	1.6875"		8303084286	8303094286	8303234286
		43.00	1.6929"		8303084300	8303094300	8303234300
	1-23/32″	43.66	1.7188"		8303084366	8303094366	8303234366
		44.00	1.7323"		8303084400	8303094400	8303234400
	1-3/4″	44.45	1.7500"		8303084445	8303094445	8303234445
		45.00	1.7717"		8303084500	8303094500	8303234500
	1-25/32″	45.24	1.7812"		8303084524	8303094524	8303234524
		46.00	1.8110"		8303084600	8303094600	8303234600
	1-13/16″	46.04	1.8125"		8303084604	8303094604	8303234604
	1-27/32″	46.83	1.8438"		8303084683	8303094683	8303234683
		47.00	1.8504"		8303084700	8303094700	8303234700
	1-7/8″	47.63	1.8750"		8303084763	8303094763	8303234763

SPADE Throw-Away Drill Inserts -Carbide P40

- For general use in carbon steels and alloys steels.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES Y, Z, O

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
Y 9.50 (.374″) to 11.07 (.436″)		9.50	.3740"	2.4 (3/32″)	8313080950	8313090950	8313230950
	3/8″	9.53	.3750"		8313080953	8313090953	8313230953
		9.80	.3858"		8313080980	8313090980	8313230980
	25/64″	9.92	.3906"		8313080992	8313090992	8313230992
		10.00	.3937"		8313081000	8313091000	8313231000
		10.20	.4016"		8313081020	8313091020	8313231020
	13/32″	10.32	.4062"		8313081032	8313091032	8313231032
		10.50	.4134"		8313081050	8313091050	8313231050
	27/64″	10.72	.4219"		8313081072	8313091072	8313231072
		10.80	.4252"		8313081080	8313091080	8313231080
		11.00	.4331"		8313081100	8313091100	8313231100
Z 11.11(.437″) to 12.95(.510″)	7/16″	11.11	.4375"	2.4 (3/32″)	8313081111	8313091111	8313231111
		11.50	.4528"		8313081150	8313091150	8313231150
	29/64″	11.51	.4531"		8313081151	8313091151	8313231151
	15/32″	11.91	.4688"		8313081191	8313091191	8313231191
		12.00	.4724"		8313081200	8313091200	8313231200
	31/64″	12.30	.4844"		8313081230	8313091230	8313231230
		12.50	.4921"		8313081250	8313091250	8313231250
	1/2″	12.70	.5000"		8313081270	8313091270	8313231270
0 12.98 (.511″) to 17.65 (.695″)		13.00	.5118"	3.2 (1/8″)	8313081300	8313091300	8313231300
	33/64″	13.10	.5156"		8313081310	8313091310	8313231310
	17/32″	13.49	.5312"		8313081349	8313091349	8313231349
		13.50	.5315"		8313081350	8313091350	8313231350
	35/64″	13.89	.5469"		8313081389	8313091389	8313231389
		14.00	.5512"		8313081400	8313091400	8313231400
	9/16″	14.29	.5625"		8313081429	8313091429	8313231429
		14.50	.5709"		8313081450	8313091450	8313231450
	37/64″	14.68	.5781"		8313081468	8313091468	8313231468
		15.00	.5906"		8313081500	8313091500	8313231500
	19/32″	15.08	.5938"		8313081508	8313091508	8313231508
	39/64″	15.48	.6094"		8313081548	8313091548	8313231548
		15.50	.6102"		8313081550	8313091550	8313231550
	5/8″	15.88	.6250"		8313081588	8313091588	8313231588
		16.00	.6299"		8313081600	8313091600	8313231600
	41/64″	16.27	.6406"		8313081627	8313091627	8313231627
		16.50	.6496"		8313081650	8313091650	8313231650
	21/32″	16.67	.6562"		8313081667	8313091667	8313231667
		17.00	.6693"		8313081700	8313091700	8313231700
	43/64″	17.07	.6719"		8313081707	8313091707	8313231707
	11/16″	17.46	.6875"		8313081746	8313091746	8313231746
		17.50	.6890"		8313081750	8313091750	8313231750

SPADE Throw-Away Drill Inserts -Carbide P40

- For general use in carbon steels and alloys steels.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 1, 2

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
1 17.53 (.690″) to 24.38 (.960″)	45/64″	17.86	.7031"	4.0 (5/32″)	8313081786	8313091786	8313231786
		18.00	.7087"		8313081800	8313091800	8313231800
	23/32″	18.26	.7188"		8313081826	8313091826	8313231826
		18.50	.7283"		8313081850	8313091850	8313231850
	47/64″	18.65	.7344"		8313081865	8313091865	8313231865
		19.00	.7480"		8313081900	8313091900	8313231900
	3/4″	19.05	.7500"		8313081905	8313091905	8313231905
	49/64″	19.45	.7656"		8313081945	8313091945	8313231945
		19.50	.7677"		8313081950	8313091950	8313231950
	25/32″	19.84	.7812"		8313081984	8313091984	8313231984
		20.00	.7874"		8313082000	8313092000	8313232000
	51/64″	20.24	.7969"		8313082024	8313092024	8313232024
		20.50	.8071"		8313082050	8313092050	8313232050
	13/16″	20.64	.8125"		8313082064	8313092064	8313232064
		21.00	.8268"		8313082100	8313092100	8313232100
	27/32″	21.43	.8438"		8313082143	8313092143	8313232143
	55/64″	21.83	.8594"		8313082183	8313092183	8313232183
		22.00	.8661"		8313082200	8313092200	8313232200
	7/8″	22.23	.8750"		8313082223	8313092223	8313232223
	57/64″	22.62	.8906"		8313082262	8313092262	8313232262
		23.00	.9055"		8313082300	8313092300	8313232300
	29/32″	23.02	.9062"		8313082302	8313092302	8313232302
	59/64″	23.42	.9219"		8313082342	8313092342	8313232342
	15/16″	23.81	.9375"		8313082381	8313092381	8313232381
		24.00	.9449"		8313082400	8313092400	8313232400
2 24.41 (.961″) to 35.05 (1.380″	31/32″	24.61	.9688"	4.8 (3/16″)	8313082461	8313092461	8313232461
	63/64″	25.00	.9843"		8313082500	8313092500	8313232500
	1″	25.40	1.0000"		8313082540	8313092540	8313232540
	1-1/64″	25.80	1.0156"		8313082580	8313092580	8313232580
		26.00	1.0236"		8313082600	8313092600	8313232600
	1-1/32″	26.19	1.0312"		8313082619	8313092619	8313232619
	1-3/64″	26.59	1.0469"		8313082659	8313092659	8313232659
	1-1/16″	26.99	1.0625"		8313082699	8313092699	8313232699
		27.00	1.0630"		8313082700	8313092700	8313232700
	1-3/32″	27.78	1.0938"		8313082778	8313092778	8313232778
		28.00	1.1024"		8313082800	8313092800	8313232800
	1-7/64″	28.18	1.1094"		8313082818	8313092818	8313232818
	1-1/8″	28.58	1.1250"		8313082858	8313092858	8313232858
		29.00	1.1417"		8313082900	8313092900	8313232900
	1-5/32″	29.37	1.1562"		8313082937	8313092937	8313232937
		30.00	1.1811"		8313083000	8313093000	8313233000
	1-3/16″	30.16	1.1875"		8313083016	8313093016	8313233016
	1-7/32″	30.96	1.2188"		8313083096	8313093096	8313233096
		31.00	1.2205"		8313083100	8313093100	8313233100
	1-1/4″	31.75	1.2500"		8313083175	8313093175	8313233175
		32.00	1.2598"		8313083200	8313093200	8313233200
	1-9/32″	32.54	1.2812"		8313083254	8313093254	8313233254
		33.00	1.2992"		8313083300	8313093300	8313233300
	1-5/16″	33.34	1.3125"		8313083334	8313093334	8313233334
		34.00	1.3386"		8313083400	8313093400	8313233400
	1-11/32″	34.13	1.3438"		8313083413	8313093413	8313233413
	1-3/8″	34.93	1.3750"		8313083493	8313093493	8313233493
		35.00	1.3780"		8313083500	8313093500	8313233500

SPADE Throw-Away Drill Inserts -Carbide P40

- For general use in carbon steels and alloys steels.
- Reduce set-up time, it easily can be replaced on the machine.
- Any non-standard size available.

SERIES 3

Series Min. to Max. (mm/inch)	Diameter			Thick	EDP No.		
	Inch (inch)	Metric (mm)	Decimal (inch)	Metric (mm/inch)	TiN	TiCN	TiAlN
3 34.37 (1.353″) to 47.80 (1.882″)	1-13/32″	35.72	1.4062"	6.4 (1/4″)	8313083572	8313093572	8313233572
		36.00	1.4173"		8313083600	8313093600	8313233600
	1-7/16″	36.51	1.4375"		8313083651	8313093651	8313233651
		37.00	1.4567"		8313083700	8313093700	8313233700
	1-15/32″	37.31	1.4688"		8313083731	8313093731	8313233731
		38.00	1.4961"		8313083800	8313093800	8313233800
	1-1/2″	38.10	1.5000"		8313083810	8313093810	8313233810
	1-17/32″	38.89	1.5312"		8313083889	8313093889	8313233889
		39.00	1.5354"		8313083900	8313093900	8313233900
	1-9/16″	39.69	1.5625"		8313083969	8313093969	8313233969
		40.00	1.5748"		8313084000	8313094000	8313234000
	1-19/32″	40.48	1.5938"		8313084048	8313094048	8313234048
		41.00	1.6142"		8313084100	8313094100	8313234100
	1-5/8″	41.28	1.6250"		8313084128	8313094128	8313234128
		42.00	1.6535"		8313084200	8313094200	8313234200
	1-21/32″	42.07	1.6562"		8313084207	8313094207	8313234207
	1-11/16″	42.86	1.6875"		8313084286	8313094286	8313234286
		43.00	1.6929"		8313084300	8313094300	8313234300
	1-23/32″	43.66	1.7188"		8313084366	8313094366	8313234366
		44.00	1.7323"		8313084400	8313094400	8313234400
	1-3/4″	44.45	1.7500"		8313084445	8313094445	8313234445
		45.00	1.7717"		8313084500	8313094500	8313234500
	1-25/32″	45.24	1.7812"		8313084524	8313094524	8313234524
		46.00	1.8110"		8313084600	8313094600	8313234600
	1-13/16″	46.04	1.8125"		8313084604	8313094604	8313234604
	1-27/32″	46.83	1.8438"		8313084683	8313094683	8313234683
		47.00	1.8504"		8313084700	8313094700	8313234700
	1-7/8″	47.63	1.8750"		8313084763	8313094763	8313234763

RECOMMENDED CUTTING CONDITIONS-HSS

Material	Material Hardness (Bhn)	Material Hardness (HRc)	* HSS Grade	Speed (M/min)	Feed (mm/rev) ø9.5 ~12.5	ø13 ~17.5	ø18 ~24	ø25 ~35	ø36 ~47	ø48 ~65	ø66 ~114
Free machining Steel	100 - 150	0	HSS	84	0.16	0.23	0.31	0.40	0.48	0.55	0.67
1213, 12L13, 1215	150 - 200	0 - 13	HSS	81	0.16	0.23	0.31	0.40	0.48	0.55	0.67
12L14, 1118 etc	200 - 250	13 - 24	HSS	72	0.14	0.23	0.31	0.38	0.48	0.57	0.69
Low Carbon Steel	85 - 125	0	HSS	75	0.15	0.22	0.28	0.37	0.46	0.56	0.67
1015, 1020, 1140	125 - 175	0 - 7	HSS	72	0.15	0.22	0.28	0.37	0.46	0.56	0.67
1025 etc	175 - 225	7 - 20	HSS	69	0.13	0.19	0.24	0.34	0.43	0.50	0.57
	225 - 275	20 - 28	HSS	66	0.13	0.19	0.24	0.34	0.43	0.50	0.57
Medium Carbon Steel	125 - 175	0 - 7	HSS	75	0.14	0.22	0.28	0.35	0.45	0.55	0.65
1035, 1050, 1045	175 - 225	7 - 20	HSS	69	0.13	0.19	0.23	0.34	0.43	0.50	0.58
1055, 1140 etc	225 - 275	20 - 28	HSS	63	0.13	0.19	0.23	0.34	0.43	0.50	0.58
	275 - 325	28 - 34	SH, PH	58	0.10	0.17	0.21	0.28	0.38	0.45	0.55
Structural Steel	100 - 150	0	HSS	63	0.14	0.23	0.29	0.35	0.44	0.50	0.63
A36, A516, A182 etc	150 - 250	0 - 24	HSS	55	0.13	0.22	0.24	0.28	0.38	0.46	0.59
	250 - 350	24 - 37	SH, PH	41	0.10	0.20	0.22	0.24	0.34	0.40	0.48
Cast Iron / S,G Iron	120 - 150	0	HSS	75	0.16	0.30	0.40	0.49	0.59	0.69	0.75
A48-76 GR30/GR45	150 - 200	0 - 13	HSS	70	0.14	0.26	0.35	0.45	0.56	0.64	0.68
A536-72 60-40-18	200 - 220	13 - 19	HSS	58	0.14	0.23	0.30	0.41	0.46	0.52	0.60
A220-76 GR40010 etc	220 - 260	19 - 26	SH, PH	52	0.13	0.17	0.23	0.30	0.35	0.43	0.50
	260 - 320	26 - 34	SH, PH	41	0.10	0.15	0.16	0.23	0.28	0.35	0.40
Alloy Steel	125 - 175	0 - 7	HSS	63	0.15	0.20	0.24	0.36	0.43	0.47	0.53
8620, 4130, 4137	175 - 225	7 - 20	HSS	58	0.13	0.20	0.24	0.36	0.42	0.46	0.55
4140, 6150 etc	225 - 275	20 - 28	HSS	56	0.13	0.16	0.23	0.35	0.41	0.44	0.55
	275 - 325	28 - 34	SH, PH	53	0.09	0.15	0.22	0.28	0.38	0.41	0.50
	325 - 375	34 - 40	SH, PH	46	0.08	0.15	0.21	0.27	0.38	0.40	0.51
Tool Steel	150 - 200	0 - 13	SH	34	0.09	0.15	0.19	0.25	0.28	0.36	0.41
H13, H21, A2, S1 etc	200 - 250	13 - 24	SH, PH	26	0.09	0.15	0.19	0.25	0.28	0.36	0.41
High Temp. Alloy	140 - 220	0 - 19	SH, PH	12	0.08	0.17	0.20	0.24	0.30	0.37	-
Hastelloy B,Inconel etc	220 - 310	19 - 33	PH	11	0.08	0.14	0.18	0.19	0.25	0.29	-
High Strength Alloy	225 - 300	0 - 32	SH, PH	35	0.13	0.18	0.23	0.24	0.36	0.43	0.50
9840, 4340, 4330V etc	300 - 350	32 - 37	SH, PH	27	0.10	0.18	0.23	0.24	0.36	0.43	0.50
	350 - 400	37 - 43	PH	21	0.08	0.15	0.20	0.22	0.30	0.48	0.46
Aluminium	30	0	HSS	244	0.19	0.33	0.41	0.50	0.54	0.64	0.62
2014, 6061, 7075 etc	180	0 - 8	HSS	137	0.19	0.33	0.41	0.46	0.54	0.64	0.62
Stainless Steel	135 - 185	0 - 9	HSS	34	0.14	0.20	0.23	0.26	0.36	0.41	0.50
310, 316, 410, 330 etc	185 - 275	9 - 28	HSS	29	0.12	0.18	0.20	0.24	0.30	0.36	0.46

RPM = revolution per minute (rev/min)
M/min = surface meter per minute(M/min)
DIA = diameter of drill (mm)
mm/rev = feed rate(mm/rev)

*** Formulas :**

$$\text{M/min} = \frac{(\text{RPM}) \cdot (\pi) \cdot (\text{DIA.})}{1000}$$

$$\text{mm/min} = (\text{RPM}) \cdot (\text{mm/rev})$$

$$\text{RPM} = \frac{(\text{M/min}) \cdot (1000)}{(\pi) \cdot (\text{DIA.})}$$

* **HSS Grade : HSS** = HSS M4, **SH** = Super HSS T15, **PH** = Premium HSS M48
The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.

RECOMMENDED CUTTING CONDITIONS-CARBIDE

Material	Material Hardness (Bhn)	Material Hardness (HRc)	CARBIDE Grade	Speed (M/min)	Feed (mm/rev) ø 9.5 ~12.5	ø 13 ~17.5	ø 18 ~24	ø 25 ~35	ø 36 ~47
Free machining Steel	100 - 150	0	P40	125	0.13	0.21	0.29	0.36	0.47
1213, 12L13, 1215	150 - 200	0 - 13	P40	110	0.13	0.19	0.27	0.31	0.42
12L14, 1118 etc	200 - 250	13 - 24	P40	101	0.12	0.18	0.24	0.29	0.38
Low Carbon Steel	85 - 125	0	P40	119	0.15	0.19	0.25	0.35	0.45
1015, 1020, 1140	125 - 175	0 - 7	P40	107	0.13	0.19	0.24	0.34	0.44
1025 etc	175 - 225	7 - 20	P40	96	0.10	0.17	0.20	0.30	0.41
	225 - 275	20 - 28	P40	84	0.10	0.17	0.19	0.29	0.37
Medium Carbon Steel	125 - 175	0 - 7	P40	102	0.12	0.19	0.24	0.34	0.42
1035, 1050, 1045	175 - 225	7 - 20	P40	93	0.11	0.17	0.20	0.30	0.40
1055, 1140 etc	225 - 275	20 - 28	P40	84	0.10	0.17	0.19	0.29	0.38
	275 - 325	28 - 34	P40	67	0.10	0.14	0.16	0.25	0.35
Structural Steel	100 - 150	0	P40	91	0.14	0.23	0.27	0.29	0.40
A36, A516, A182 etc	150 - 250	0 - 24	P40	75	0.13	0.19	0.24	0.26	0.38
	250 - 350	24 - 37	P40	73	0.10	0.17	0.20	0.22	0.32
Cast Iron / S,G Iron	120 - 150	0	K20,K10	137	0.13	0.22	0.27	0.37	0.48
A48-76 GR30/GR45	150 - 200	0 - 13	K20,K10	125	0.12	0.20	0.25	0.35	0.46
A536-72 60-40-18	200 - 220	13 - 19	K20,K10	111	0.12	0.18	0.20	0.31	0.35
A220-76 GR40010 etc	220 - 260	19 - 26	K20,K10	93	0.10	0.15	0.17	0.24	0.33
	260 - 320	26 - 34	K20,K10	79	0.10	0.14	0.14	0.20	0.27
Alloy Steel	125 - 175	0 - 7	P40	98	0.13	0.20	0.24	0.31	0.39
8620, 4130, 4137	175 - 225	7 - 20	P40	88	0.13	0.19	0.22	0.30	0.37
4140, 6150 etc	225 - 275	20 - 28	P40	81	0.10	0.18	0.21	0.29	0.36
	275 - 325	28 - 34	P40	78	0.09	0.15	0.20	0.28	0.35
	325 - 375	34 - 40	P40	64	0.08	0.13	0.19	0.24	0.33
Tool Steel	150 - 200	0 - 13	P40	67	0.07	0.12	0.17	0.22	0.27
H13, H21, A2, S1 etc	200 - 250	13 - 24	P40	50	0.07	0.12	0.16	0.21	0.26
High Temp. Alloy	140 - 220	0 - 19	K20	30	0.08	0.32	0.17	0.22	0.26
Hastelloy B,Inconel etc	220 - 310	19 - 33	K20	24	0.08	0.28	0.15	0.19	0.23
High Strength Alloy	225 - 300	0 - 32	P40	62	0.13	0.18	0.19	0.23	0.34
9840, 4340, 4330V etc	300 - 350	32 - 37	P40	55	0.10	0.15	0.18	0.22	0.30
	350 - 400	37 - 43	P40	47	0.08	0.13	0.15	0.19	0.24
Aluminium	30	0	K20	427	0.19	0.32	0.40	0.47	0.52
2014, 6061, 7075 etc	180	0 - 8	K20	291	0.17	0.27	0.34	0.45	0.49
Stainless Steel	135 - 185	0 - 9	K20	62	0.14	0.20	0.22	0.26	0.32
310, 316, 410, 330 etc	185 - 275	9 - 28	K20	46	0.12	0.18	0.19	0.24	0.28

RPM = revolution per minute (rev/min)
M/min = surface meter per minute(M/min)
DIA = diameter of drill (mm)
mm/rev = feed rate(mm/rev)

*** Formulas :**

$$M/min = \frac{(RPM) \cdot (\pi) \cdot (DIA.)}{1000}$$

$$mm/min = (RPM) \cdot (mm/rev)$$

$$RPM = \frac{(M/min) \cdot (1000)}{(\pi) \cdot (DIA.)}$$

The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.

EUROPA TOOL

Drill Insert Holders

Taper Shank Holders

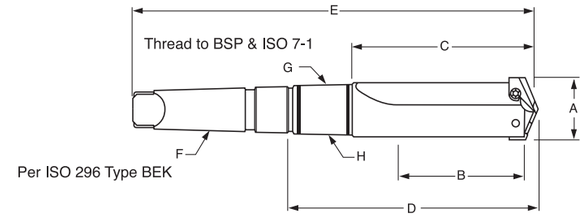
Flanged Straight Shank Holders

Straight Shank Holders

Holder Accessories

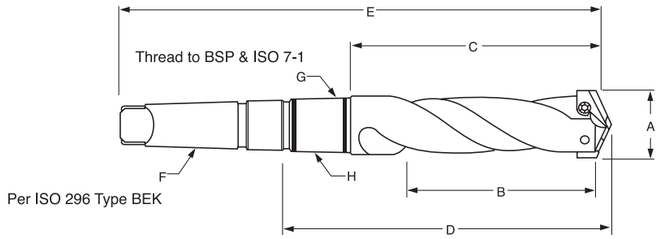
Drill Insert Holders Designation System

TAPER SHANK HOLDER SHORT LENGTH - Straight Flute



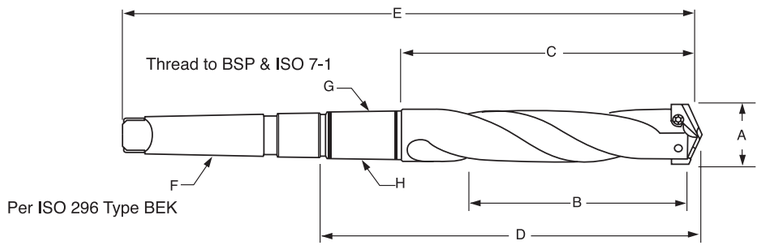
Series	EDP No.	A	B	C	D	E	F	G	H
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	MT	Pipe Tap	RCA
Y	8Y2150002M	9.5 ~ 11.0	31.7	51.5	88.0	160.3	#2	1/16″	PR120190
Z	8Z2150002M	11.5 ~ 12.5	31.7	51.5	88.0	160.3	#2	1/16″	PR120190
0	802150002M	13.0 ~ 17.5	34.9	55.5	92.4	164.3	#2	1/16″	PR120190
0.5	812150002M	15.5 ~ 17.5	34.9	55.5	92.4	164.3	#2	1/16″	PR120190
1	822150003M	18.0 ~ 24.0	69.8	98.4	142.5	232.5	#3	1/8″	PR120254
1.5	832150003M	22.0 ~ 24.0	69.8	98.4	142.5	232.5	#3	1/8″	PR120254
2	842150004M	25.0 ~ 35.0	85.7	114.3	160.4	273.8	#4	1/8″	PR120254
2.5	852150004M	30.0 ~ 35.0	85.7	114.3	167.6	281.0	#4	1/4″	PR120317
3	862150004M	36.0 ~ 47.0	120.6	152.4	206.4	319.1	#4	1/4″	PR120317
4	872150005M	48.0 ~ 65.0	130.1	165.1	219.1	363.5	#5	1/4″	PR120444
5	882150005M	64.0 ~ 88.0	171.1	215.9	287.3	430.2	#5	1/2″	PR120571
7	892150005M	90.0 ~ 114.0	171.1	225.4	296.8	439.7	#5	1/2″	PR120571

TAPER SHANK HOLDER INTERMEDIATE LENGTH - Spiral Flute



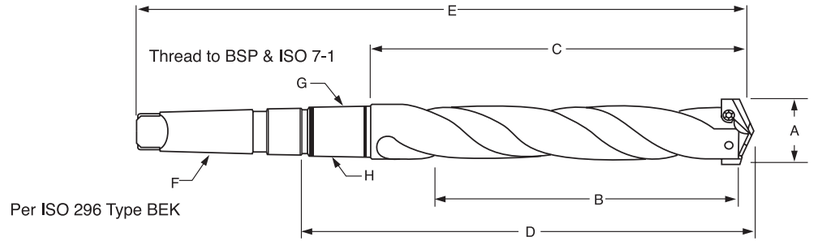
Series	EDP No.	A	B	C	D	E	F	G	H
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	MT	Pipe Tap	RCA
1	823250003M	18.0 ~ 24.0	120.7	149.2	193.3	283.3	#3	1/8″	PR120254
1.5	833250003M	22.0 ~ 24.0	120.7	149.2	193.3	283.3	#3	1/8″	PR120254
2	843250004M	25.0 ~ 35.0	136.5	165.1	211.2	324.6	#4	1/8″	PR120254
2.5	853250004M	30.0 ~ 35.0	136.5	165.1	218.4	331.8	#4	1/4″	PR120317
3	863250004M	36.0 ~ 47.0	165.1	196.9	250.9	363.6	#4	1/4″	PR120317

TAPER SHANK HOLDER STANDARD LENGTH-Spiral Flute



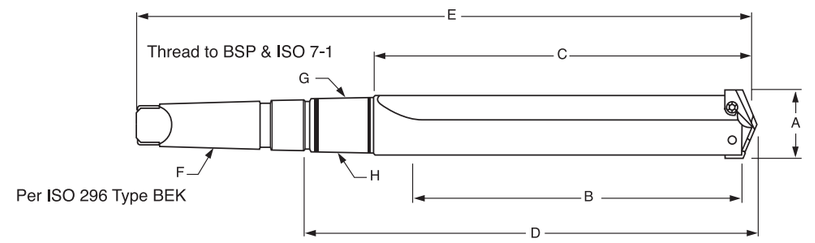
Series	EDP No.	A	B	C	D	E	F	G	H
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	MT	Pipe Tap	RCA
Y	8Y4250002M	9.5 ~ 11.0	60.3	80.2	116.7	188.9	#2	1/16″	PR120190
Z	8Z4250002M	11.5 ~ 12.5	60.3	80.2	116.7	188.9	#2	1/16″	PR120190
0	804250002M	13.0 ~ 17.5	63.5	84.1	121.0	192.9	#2	1/16″	PR120190
0.5	814250002M	15.5 ~ 17.5	63.5	84.1	121.0	192.9	#2	1/16″	PR120190
1	824250003M	18.0 ~ 24.0	171.5	200.0	244.1	334.2	#3	1/8″	PR120254
1.5	834250003M	22.0 ~ 24.0	171.5	200.0	244.1	334.2	#3	1/8″	PR120254
2	844250004M	25.0 ~ 35.0	187.3	215.9	262.0	375.4	#4	1/8″	PR120254
2.5	854250004M	30.0 ~ 35.0	187.3	215.9	269.2	382.6	#4	1/4″	PR120317
3	864250004M	36.0 ~ 47.0	209.5	241.3	295.3	408.0	#4	1/4″	PR120317
4	874250005M	48.0 ~ 65.0	231.8	266.7	320.7	465.1	#5	1/4″	PR120444
5	884250005M	64.0 ~ 88.0	273.1	317.5	388.9	531.8	#5	1/2″	PR120571
7	894250005M	90.0 ~ 114.0	273.1	327.0	398.5	541.3	#5	1/2″	PR120571

TAPER SHANK HOLDER-EXTENDED LENGTH - Spiral Flute



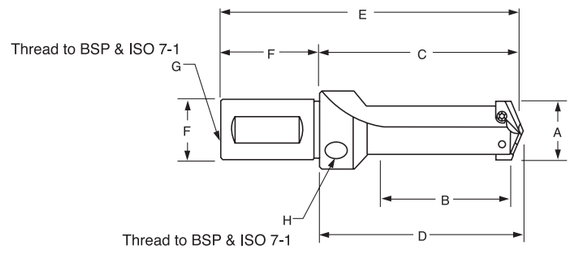
Series	EDP No.	A	B	C	D	E	F	G	H
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	MT	Pipe Tap	RCA
Y	8Y5250002M	9.5 ~ 11.0	111.1	130.9	167.4	239.7	#2	1/16″	PR120190
Z	8Z5250002M	11.5 ~ 12.5	111.1	130.9	167.4	239.7	#2	1/16″	PR120190
0	805250002M	13.0 ~ 17.5	114.3	135.0	171.8	243.7	#2	1/16″	PR120190
0.5	815250002M	15.5 ~ 17.5	114.3	135.0	171.8	243.7	#2	1/16″	PR120190
1	825250003M	18.0 ~ 24.0	273.1	301.6	345.7	435.8	#3	1/8″	PR120254
1.5	835250003M	22.0 ~ 24.0	273.1	301.6	345.7	435.8	#3	1/8″	PR120254
2	845250004M	25.0 ~ 35.0	289.0	317.5	363.6	477.0	#4	1/8″	PR120254
2.5	855250004M	30.0 ~ 35.0	289.0	317.5	370.8	484.2	#4	1/4″	PR120317

TAPER SHANK HOLDER-EXTENDED LENGTH - Straight Flute



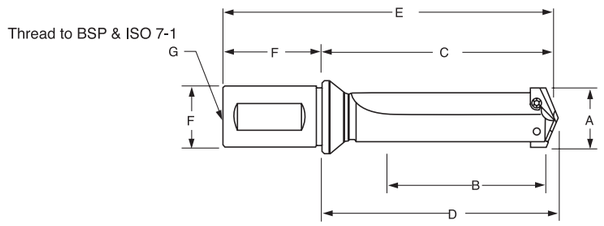
Series	EDP No.	A	B	C	D	E	F	G	H
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	MT	Pipe Tap	RCA
3	865150004M	36.0 ~ 47.0	349.3	381.0	435.0	547.7	#4	1/4″	PR120317
4	875150005M	48.0 ~ 65.0	422.3	457.2	511.2	655.6	#5	1/4″	PR120444
5	885150005M	64.0 ~ 88.0	463.6	508.0	579.4	722.3	#5	1/2″	PR120571
7	895150005M	90.0 ~ 114.0	555.6	609.6	681.1	823.9	#5	1/2″	PR120571

FLANGED STRAIGHT SHANK HOLDERS-STUB LENGTH - Straight Flute



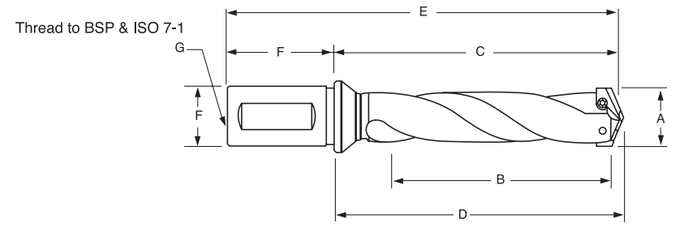
Series	EDP No.	A	B	C	D	E	F		G	H
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	Shank		Pipe Tap	
							Dia.	Length	Rear	Side
Y	8Y115016FM	9.5 ~ 11.0	19.1	47.6	50.0	89.5	16.0	41.9	1/16″	1/8″
Z	8Z115016FM	11.5 ~ 12.5	19.1	47.6	50.0	89.5	16.0	41.9	1/16″	1/8″
0	80115020FM	13.0 ~ 17.5	22.2	47.6	50.4	89.5	20.0	41.9	1/8″	1/8″
0.5	81115020FM	15.5 ~ 17.5	22.2	47.6	50.4	89.5	20.0	41.9	1/8″	1/8″
1	82115025FM	18.0 ~ 24.0	47.6	75.8	79.4	128.9	25.0	53.1	1/8″	1/8″
1.5	83115025FM	22.0 ~ 24.0	57.2	88.5	92.1	141.6	25.0	53.1	1/8″	1/8″
2	84115032FM	25.0 ~ 35.0	57.2	88.5	92.1	146.4	32.0	57.9	1/4″	1/8″

FLANGED STRAIGHT SHANK HOLDERS-SHORT LENGTH - Straight Flute



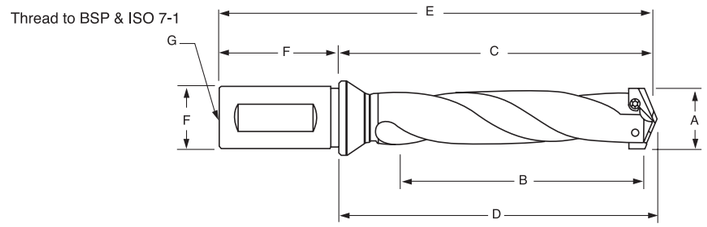
Series	EDP No.	A	B	C	D	E	F		G
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	Shank		Pipe Tap
							Dia.	Length	
Y	8Y215020FM	9.5 ~ 11.0	31.8	61.1	63.5	103.0	20.0	41.9	1/8″
Z	8Z215020FM	11.5 ~ 12.5	31.8	61.1	63.5	103.0	20.0	41.9	1/8″
0	80215020FM	13.0 ~ 17.5	34.9	63.5	66.3	105.4	20.0	41.9	1/8″
0.5	81215020FM	15.5 ~ 17.5	34.9	63.5	66.3	105.4	20.0	41.9	1/8″
1	82215025FM	18.0 ~ 24.0	66.7	107.2	110.7	160.2	25.0	53.1	1/8″
1.5	83215025FM	22.0 ~ 24.0	66.7	107.2	110.7	160.2	25.0	53.1	1/8″
2	84215032FM	25.0 ~ 35.0	85.7	128.6	132.2	186.5	32.0	57.9	1/4″
2.5	85215032FM	30.0 ~ 35.0	85.7	128.6	132.2	186.5	32.0	57.9	1/4″
3	86215040FM	36.0 ~ 47.0	120.7	173.0	177.8	243.1	40.0	70.1	1/4″
4	87215040FM	48.0 ~ 65.0	130.2	179.4	184.2	249.5	40.0	70.1	1/4″

FLANGED STRAIGHT SHANK HOLDER INTERMEDIATE LENGTH - Spiral Flute



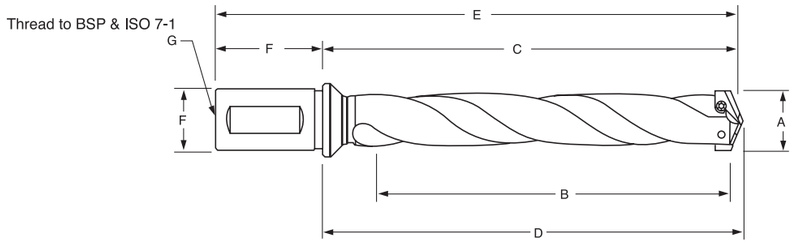
Series	EDP No.	A	B	C	D	E	F		G
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	Shank		Pipe Tap
							Dia.	Length	
1	82325025FM	18.0 ~ 24.0	117.5	154.8	158.4	207.9	25.0	53.1	1/8″
1.5	83325025FM	22.0 ~ 24.0	117.5	154.8	158.4	207.9	25.0	53.1	1/8″
2	84325032FM	25.0 ~ 35.0	136.5	179.4	183.0	237.3	32.0	57.9	1/4″
2.5	85325032FM	30.0 ~ 35.0	136.5	179.4	183.0	237.3	32.0	57.9	1/4″
3	86325040FM	36.0 ~ 47.0	165.1	217.5	222.3	287.6	40.0	70.1	1/4″

FLANGED STRAIGHT SHANK HOLDER-STANDARD LENGTH - Spiral Flute



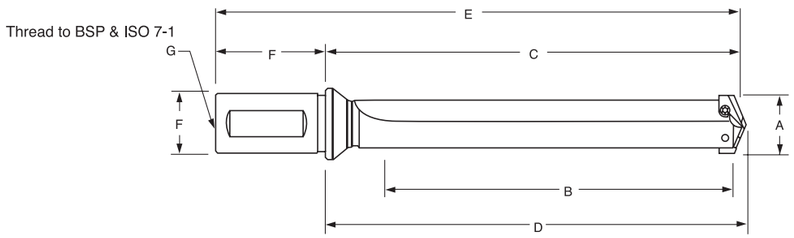
Series	EDP No.	A	B	C	D	E	F		G
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	Shank		Pipe Tap
							Dia.	Length	
Y	8Y325020FM	9.5 ~ 11.0	60.3	89.7	92.1	131.6	20.0	41.9	1/8″
Z	8Z425020FM	11.5 ~ 12.5	60.3	89.7	92.1	131.6	20.0	41.9	1/8″
0	80425020FM	13.0 ~ 17.5	63.5	92.1	94.9	134.0	20.0	41.9	1/8″
0.5	81425020FM	15.5 ~ 17.5	63.5	92.1	94.9	134.0	20.0	41.9	1/8″
1	82425025FM	18.0 ~ 24.0	168.3	205.6	209.2	258.7	25.0	53.1	1/8″
1.5	83425025FM	22.0 ~ 24.0	168.3	205.6	209.2	258.7	25.0	53.1	1/8″
2	84425032FM	25.0 ~ 35.0	187.3	230.2	233.8	288.1	32.0	57.9	1/4″
2.5	85425032FM	30.0 ~ 35.0	187.3	230.2	233.8	288.1	32.0	57.9	1/4″
3	86425040FM	36.0 ~ 47.0	209.6	261.9	266.7	332.0	40.0	70.1	1/4″
4	87425040FM	48.0 ~ 65.0	231.8	281.0	285.8	351.1	40.0	70.1	1/4″

FLANGED STRAIGHT SHANK HOLDER-EXTENDED LENGTH - Spiral Flute



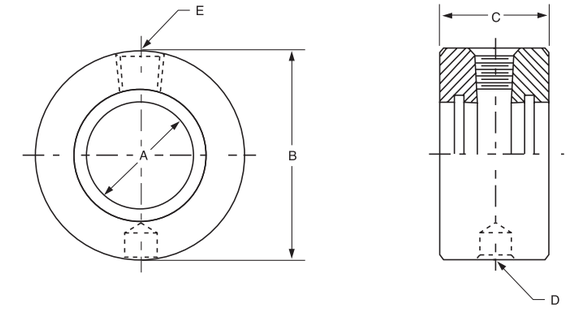
Series	EDP No.	A	B	C	D	E	F		G
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	Shank Dia.	Shank Length	Pipe Tap
Y	8Y425020FM	9.5 ~ 11.0	111.1	140.5	142.9	182.4	20.0	41.9	1/8″
Z	8Z525020FM	11.5 ~ 12.5	111.1	140.5	142.9	182.4	20.0	41.9	1/8″
0	80525020FM	13.0 ~ 17.5	114.3	142.9	145.7	184.8	20.0	41.9	1/8″
0.5	81525020FM	15.5 ~ 17.5	114.3	142.9	145.7	184.8	20.0	41.9	1/8″
1	82525025FM	18.0 ~ 24.0	269.9	307.2	310.8	360.3	25.0	53.1	1/8″
1.5	83525025FM	22.0 ~ 24.0	269.9	307.2	310.8	360.3	25.0	53.1	1/8″
2	84525032FM	25.0 ~ 35.0	288.9	331.8	335.4	389.7	32.0	57.9	1/4″
2.5	85525032FM	30.0 ~ 35.0	288.9	331.8	335.4	389.7	32.0	57.9	1/4″

FLANGED STRAIGHT SHANK HOLDER-EXTENDED LENGTH - Straight Flute



Series	EDP No.	A	B	C	D	E	F		G
		Drill Insert Range	Max. Drill Depth	Flute Length	Ref. Length	Overall Length	Shank Dia.	Shank Length	Pipe Tap
3	86515040FM	36.0 ~ 47.0	349.3	401.6	406.4	471.7	40.0	70.1	1/4″
4	87515040FM	48.0 ~ 65.0	422.3	471.5	476.3	541.6	40.0	70.1	1/4″

COOLANT RINGS & TORX SCREWS / DRIVERS



Metric

Item No.	A	B	C	D	E	RCA Repair Kit Item No.	RCA O-Ring Replacements Item No.
	I.D.	O.D.	Length	Thread for Driving Rod	Pipe Tap		
PR120190	19.05	44.45	22.23	M8 X 1.25	◈1/8″	PR220190	PR320190
PR120254	25.40	53.97	28.57	M8 X 1.25	◈1/8″	PR220254	PR320254
PR120317	31.75	63.50	34.92	M10 X 1.5	◈1/4″	PR220317	PR320317
PR120444	44.45	76.20	34.92	M10 X 1.5	◈1/4″	PR220444	PR320444
PR120571	57.15	95.27	44.45	M12 X 1.75	◈1/2″	PR220571	PR320571

◈ Thread to BSP & ISO 7-1

Torx Screws

Holder Series	Item No.	TORX Hand Driver	Drill Range Used With
Y	J07Y0010	J05Y0070	9.5 mm ~ 11.0 mm
Z	J07Z0110	J05Z0070	11.5 mm ~ 12.5 mm
0	J0800210	J0500080	13.0 mm ~ 17.5 mm
0.5	J0805310	J0505080	15.5 mm ~ 17.5 mm
1	J0910410	J0510090	18.0 mm ~ 24.0 mm
1.5	J0915510	J0515090	22.0 mm ~ 24.0 mm
2	J1520610	J0520150	25.0 mm ~ 35.0 mm
2.5	J1525710	J0525150	30.0 mm ~ 35.0 mm
3,4	J2030810	J0530200	36.0 mm ~ 65.0 mm
5 ~ 8	J2550910	J0550250	64.0 mm ~ 114.0 mm

** Note : Replacement screws sold in packages(10 screws per package)

CARBIDE

DRILL

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DRILLING INTO
STEEL IN GENERAL,
CAST STEEL, CAST IRON,
CHILLED CAST IRON,
MALLEABLE CAST IRON,
NON-FERROUS HEAVY METAL,
NON-FERROUS LIGHT METAL,
ABRASIVE PLASTIC

Europa Tool 8TH EDITION

CARBIDE DRILL CONTENTS

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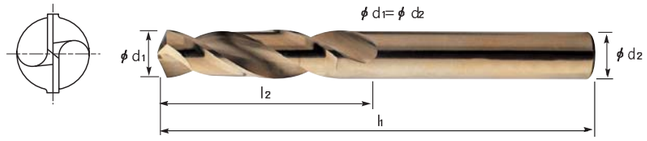
CARBIDE DRILLS STUB SERIES

DIN 6539 | MG | N 30° | h6 | h7 | 118°



Series No. 800303

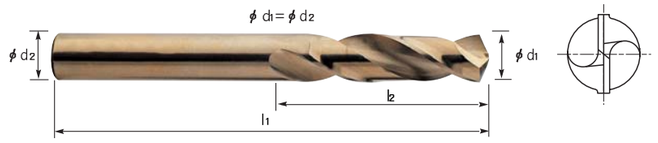
Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8003030200	2.0	12	38
8003030210	2.1		
8003030220	2.2	13	40
8003030230	2.3		
8003030240	2.4	14	43
8003030250	2.5		
8003030260	2.6		
8003030270	2.7	16	46
8003030280	2.8		
8003030290	2.9		
8003030300	3.0		
8003030310	3.1	18	49
8003030320	3.2		
8003030330	3.3		
8003030340	3.4	20	52
8003030350	3.5		
8003030360	3.6		
8003030370	3.7		
8003030380	3.8		
8003030390	3.9	22	55
8003030400	4.0		
8003030410	4.1		
8003030420	4.2		
8003030430	4.3	24	58
8003030440	4.4		
8003030450	4.5		
8003030460	4.6		
8003030470	4.7		

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8003030480	4.8	26	62
8003030490	4.9		
8003030500	5.0		
8003030510	5.1		
8003030520	5.2		
8003030530	5.3		
8003030540	5.4	28	66
8003030550	5.5		
8003030560	5.6		
8003030570	5.7		
8003030580	5.8		
8003030590	5.9		
8003030600	6.0		
8003030610	6.1	31	70
8003030620	6.2		
8003030630	6.3		
8003030640	6.4		
8003030650	6.5		
8003030660	6.6		
8003030670	6.7		
8003030680	6.8	34	74
8003030690	6.9		
8003030700	7.0		
8003030710	7.1		
8003030720	7.2		
8003030730	7.3		
8003030740	7.4		
8003030750	7.5		

CARBIDE DRILL

CARBIDE DRILLS STUB SERIES



DIN 6539 | MG | N 30° | h6 | h7 | 118°

Series No. 800303

Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

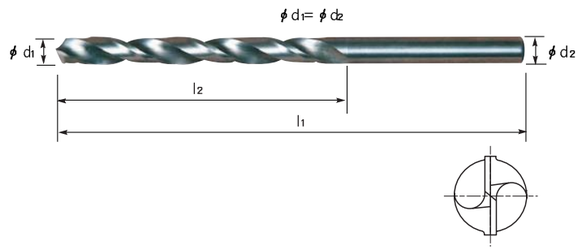
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8003030760	7.6	37	79
8003030770	7.7		
8003030780	7.8		
8003030790	7.9		
8003030800	8.0		
8003030810	8.1		
8003030820	8.2		
8003030830	8.3		
8003030840	8.4		
8003030850	8.5		
8003030860	8.6	40	84
8003030870	8.7		
8003030880	8.8		
8003030890	8.9		
8003030900	9.0		
8003030910	9.1		

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8003030920	9.2	40	84
8003030930	9.3		
8003030940	9.4		
8003030950	9.5		
8003030960	9.6	43	89
8003030970	9.7		
8003030980	9.8		
8003030990	9.9		
8003031000	10.0		
8003031020	10.2		
8003031050	10.5		
8003031100	11.0	47	95
8003031150	11.5		
8003031200	12.0	51	102
8003031300	13.0		

CARBIDE DRILLS JOBBER SERIES

DIN 338 | MG | N 30° | h6 | h7 | 118°

Series No. 801303

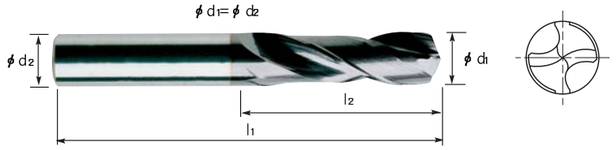


Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8013030200	2.0	24	49
8013030210	2.1		
8013030220	2.2	27	53
8013030230	2.3		
8013030240	2.4	30	57
8013030250	2.5		
8013030260	2.6		
8013030270	2.7	33	61
8013030280	2.8		
8013030290	2.9		
8013030300	3.0		
8013030310	3.1	36	65
8013030320	3.2		
8013030330	3.3		
8013030340	3.4	39	70
8013030350	3.5		
8013030360	3.6		
8013030370	3.7		
8013030380	3.8	43	75
8013030390	3.9		
8013030400	4.0		
8013030410	4.1		
8013030420	4.2		
8013030430	4.3	47	80
8013030440	4.4		
8013030450	4.5		

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8013030460	4.6	47	80
8013030470	4.7		
8013030480	4.8	52	86
8013030490	4.9		
8013030500	5.0		
8013030510	5.1		
8013030520	5.2		
8013030530	5.3		
8013030540	5.4	57	93
8013030550	5.5		
8013030560	5.6		
8013030570	5.7		
8013030580	5.8		
8013030590	5.9		
8013030600	6.0		
8013030610	6.1	63	101
8013030620	6.2		
8013030630	6.3		
8013030640	6.4		
8013030650	6.5		
8013030680	6.8	69	109
8013030700	7.0		
8013030800	8.0	75	117
8013030850	8.5		
8013031000	10.0	87	113
8013031020	10.2		

CARBIDE GOLD DRILLS



DIN 6539 | MG | N 30° | h6 | h7 | 140°

Series No. 802323

TiAlN

Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

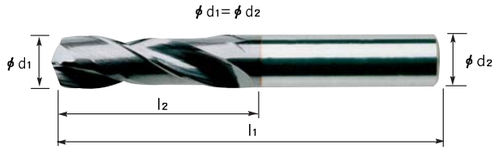
Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8023230300	3.0	16	46
8023230310	3.1	18	49
8023230320	3.2		
8023230330	3.3		
8023230340	3.4	20	52
8023230350	3.5		
8023230360	3.6		
8023230370	3.7		
8023230380	3.8	22	55
8023230390	3.9		
8023230400	4.0		
8023230410	4.1		
8023230420	4.2		
8023230430	4.3	24	58
8023230440	4.4		
8023230450	4.5		
8023230460	4.6		
8023230470	4.7		
8023230480	4.8	26	62
8023230490	4.9		
8023230500	5.0		
8023230510	5.1		
8023230520	5.2		

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8023230530	5.3	26	62
8023230540	5.4	28	66
8023230550	5.5		
8023230560	5.6		
8023230570	5.7		
8023230580	5.8		
8023230590	5.9		
8023230600	6.0		
8023230610	6.1	31	70
8023230620	6.2		
8023230630	6.3		
8023230640	6.4		
8023230650	6.5		
8023230660	6.6		
8023230670	6.7		
8023230680	6.8	34	74
8023230690	6.9		
8023230700	7.0		
8023230710	7.1		
8023230720	7.2		
8023230730	7.3		
8023230740	7.4		
8023230750	7.5		

CARBIDE GOLD DRILLS

DIN 6539 | MG | N 30° | h6 | h7 | 140°



Series No. 802323

TiAlN

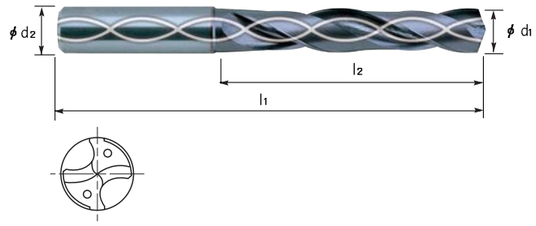
Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8023230760	7.6	37	79
8023230770	7.7		
8023230780	7.8		
8023230790	7.9		
8023230800	8.0		
8023230810	8.1		
8023230820	8.2		
8023230830	8.3		
8023230840	8.4		
8023230850	8.5		
8023230860	8.6	40	84
8023230870	8.7		
8023230880	8.8		
8023230890	8.9		
8023230900	9.0		
8023230910	9.1		
8023230920	9.2		
8023230930	9.3		
8023230940	9.4		
8023230950	9.5		
8023230960	9.6	43	89
8023230970	9.7		
8023230980	9.8		

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8023230990	9.9	43	89
8023231000	10.0		
8023231020	10.2		
8023231050	10.5		
8023231100	11.0	47	95
8023231150	11.5		
8023231200	12.0	51	102
8023231300	13.0		
8023231350	13.5	54	107
8023231400	14.0		
8023231450	14.5	56	111
8023231500	15.0		
8023231550	15.5	58	115
8023231600	16.0		
8023231650	16.5	60	119
8023231700	17.0		
8023231750	17.5	62	123
8023231800	18.0		
8023231850	18.5	64	127
8023231900	19.0		
8023231950	19.5	66	131
8023232000	20.0		

CARBIDE GOLD DRILLS with COOLANT HOLE SHORT



DIN 6537 | DIN 6535-HA | MG | N 30° | h6 | m7 | 140°

Series No. 803323

TiAlN

Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

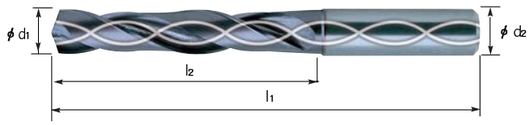
Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8033230300	3.0	6.0	20	62
8033230310	3.1			
8033230320	3.2			
8033230330	3.3			
8033230340	3.4			
8033230350	3.5			
8033230360	3.6			
8033230370	3.7			
8033230380	3.8	6.0	24	66
8033230390	3.9			
8033230400	4.0			
8033230410	4.1			
8033230420	4.2			
8033230430	4.3			
8033230440	4.4			
8033230450	4.5			
8033230460	4.6			
8033230470	4.7			
8033230480	4.8	6.0	28	66
8033230490	4.9			
8033230500	5.0			
8033230510	5.1			
8033230520	5.2			
8033230530	5.3			
8033230540	5.4			
8033230550	5.5			
8033230560	5.6			
8033230570	5.7			
8033230580	5.8			
8033230590	5.9			
8033230600	6.0			
8033230610	6.1	8.0	34	79
8033230620	6.2			

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8033230630	6.3	8.0	34	79
8033230640	6.4			
8033230650	6.5			
8033230660	6.6			
8033230670	6.7			
8033230680	6.8			
8033230690	6.9			
8033230700	7.0			
8033230710	7.1	8.0	41	79
8033230720	7.2			
8033230730	7.3			
8033230740	7.4			
8033230750	7.5			
8033230760	7.6			
8033230770	7.7			
8033230780	7.8			
8033230790	7.9			
8033230800	8.0			
8033230810	8.1	10.0	47	89
8033230820	8.2			
8033230830	8.3			
8033230840	8.4			
8033230850	8.5			
8033230860	8.6			
8033230870	8.7			
8033230880	8.8			
8033230890	8.9			
8033230900	9.0			
8033230910	9.1			
8033230920	9.2			
8033230930	9.3			
8033230940	9.4			
8033230950	9.5			

CARBIDE GOLD DRILLS with COOLANT HOLE SHORT

DIN 6537 | DIN 6535-HA | MG | N 30° | h6 | m7 | 140°



Series No. 803323

TiAIN

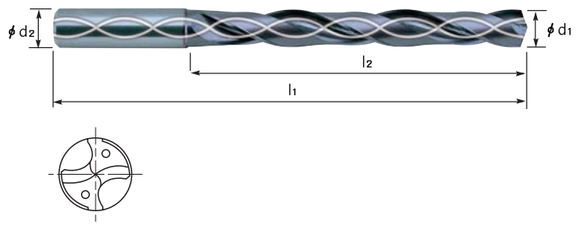
Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D d1	S.D d2	FL l2	OAL l1
8033230960	9.6	10.0	47	89
8033230970	9.7			
8033230980	9.8			
8033230990	9.9			
8033231000	10.0			
8033231010	10.1	12.0	55	102
8033231020	10.2			
8033231030	10.3			
8033231040	10.4			
8033231050	10.5			
8033231060	10.6			
8033231070	10.7			
8033231080	10.8			
8033231090	10.9			
8033231100	11.0			
8033231110	11.1			
8033231120	11.2			
8033231130	11.3			
8033231140	11.4			
8033231150	11.5			
8033231160	11.6			
8033231170	11.7			
8033231180	11.8			
8033231190	11.9			

EDP No.	O.D d1	S.D d2	FL l2	OAL l1
8033231200	12.0	12.0	55	102
8033231250	12.5	14.0	60	107
8033231300	13.0			
8033231350	13.5			
8033231400	14.0			
8033231450	14.5	16.0	65	115
8033231500	15.0			
8033231550	15.5			
8033231600	16.0			
8033231650	16.5	18.0	73	123
8033231700	17.0			
8033231750	17.5			
8033231800	18.0			
8033231850	18.5	20.0	79	131
8033231900	19.0			
8033231950	19.5			
8033232000	20.0			

CARBIDE GOLD DRILLS with COOLANT HOLE LONG



DIN 6537 | DIN 6535-HA | MG | N 30° | h6 | m7 | 140°

Series No. 804323

TiAIN

Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

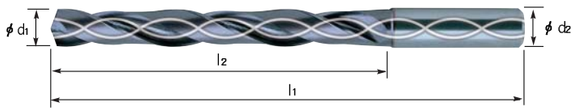
Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D d1	S.D d2	FL l2	OAL l1
8043230300	3.0	6.0	28	66
8043230310	3.1			
8043230320	3.2			
8043230330	3.3			
8043230340	3.4			
8043230350	3.5			
8043230360	3.6			
8043230370	3.7			
8043230380	3.8	6.0	36	74
8043230390	3.9			
8043230400	4.0			
8043230410	4.1			
8043230420	4.2			
8043230430	4.3			
8043230440	4.4			
8043230450	4.5			
8043230460	4.6			
8043230470	4.7			
8043230480	4.8	6.0	44	82
8043230490	4.9			
8043230500	5.0			
8043230510	5.1			
8043230520	5.2			
8043230530	5.3			
8043230540	5.4			
8043230550	5.5			
8043230560	5.6			
8043230570	5.7			
8043230580	5.8			
8043230590	5.9			
8043230600	6.0			
8043230610	6.1	8.0	53	91
8043230620	6.2			

EDP No.	O.D d1	S.D d2	FL l2	OAL l1
8043230630	6.3	8.0	53	91
8043230640	6.4			
8043230650	6.5			
8043230660	6.6			
8043230670	6.7			
8043230680	6.8			
8043230690	6.9			
8043230700	7.0			
8043230710	7.1			
8043230720	7.2			
8043230730	7.3			
8043230740	7.4			
8043230750	7.5			
8043230760	7.6			
8043230770	7.7			
8043230780	7.8			
8043230790	7.9			
8043230800	8.0			
8043230810	8.1	10.0	61	103
8043230820	8.2			
8043230830	8.3			
8043230840	8.4			
8043230850	8.5			
8043230860	8.6			
8043230870	8.7			
8043230880	8.8			
8043230890	8.9			
8043230900	9.0			
8043230910	9.1			
8043230920	9.2			
8043230930	9.3			
8043230940	9.4			
8043230950	9.5			

CARBIDE GOLD DRILLS with COOLANT HOLE LONG

DIN 6537 | DIN 6535-HA | MG | N 30° | h6 | m7 | 140°



Series No. 804323

TiAlN

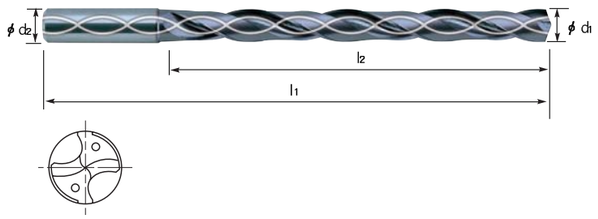
Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8043230960	9.6	10.0	61	103
8043230970	9.7			
8043230980	9.8			
8043230990	9.9			
8043231000	10.0			
8043231010	10.1	12.0	71	118
8043231020	10.2			
8043231030	10.3			
8043231040	10.4			
8043231050	10.5			
8043231060	10.6			
8043231070	10.7			
8043231080	10.8			
8043231090	10.9			
8043231100	11.0			
8043231110	11.1			
8043231120	11.2			
8043231130	11.3			
8043231140	11.4			
8043231150	11.5			
8043231160	11.6			
8043231170	11.7			
8043231180	11.8			
8043231190	11.9			

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8043231200	12.0	12.0	71	118
8043231250	12.5	14.0	77	124
8043231300	13.0			
8043231350	13.5			
8043231400	14.0			
8043231450	14.5	16.0	83	133
8043231500	15.0			
8043231550	15.5			
8043231600	16.0			
8043231650	16.5	18.0	93	143
8043231700	17.0			
8043231750	17.5			
8043231800	18.0			
8043231850	18.5	20.0	101	153
8043231900	19.0			
8043231950	19.5			
8043232000	20.0			

CARBIDE GOLD DRILLS with COOLANT HOLE EXTRA LONG



DIN 6537 | DIN 6535-HA | MG | N 30° | h6 | m7 | 140°

Series No. 805323

TiAlN

Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

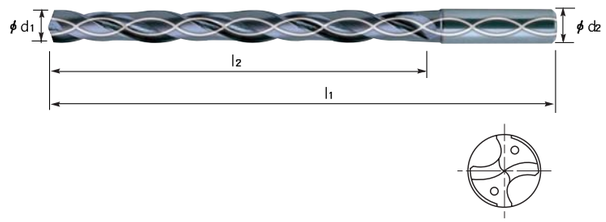
Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8053230300	3.0	6.0	34	72
8053230310	3.1			
8053230320	3.2			
8053230330	3.3			
8053230340	3.4			
8053230350	3.5			
8053230360	3.6			
8053230370	3.7			
8053230380	3.8	6.0	43	81
8053230390	3.9			
8053230400	4.0			
8053230410	4.1			
8053230420	4.2			
8053230430	4.3			
8053230440	4.4			
8053230450	4.5			
8053230460	4.6			
8053230470	4.7			
8053230480	4.8	6.0	57	95
8053230490	4.9			
8053230500	5.0			
8053230510	5.1			
8053230520	5.2			

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8053230530	5.3	6.0	57	95
8053230540	5.4			
8053230550	5.5			
8053230560	5.6			
8053230570	5.7			
8053230580	5.8			
8053230590	5.9			
8053230600	6.0			
8053230610	6.1	8.0	76	114
8053230620	6.2			
8053230630	6.3			
8053230640	6.4			
8053230650	6.5			
8053230660	6.6			
8053230670	6.7			
8053230680	6.8			
8053230690	6.9			
8053230700	7.0			
8053230710	7.1			
8053230720	7.2			
8053230730	7.3			
8053230740	7.4			
8053230750	7.5			

CARBIDE GOLD DRILLS with COOLANT HOLE EXTRA LONG

DIN 6537 | DIN 6535-HA | MG | N 30° | h6 | m7 | 140°



Series No. 805323

TiAlN

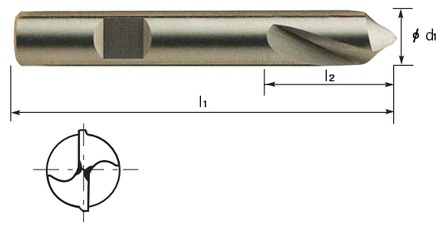
Application :
Drilling into steel in general, cast steel, cast iron, chilled cast iron, malleable cast iron, non-ferrous heavy metal, non-ferrous light metal, abrasive plastic.

Advantage :
Self centering - center drilling is not required
Excellent positioning - bush is not necessary
Special design - reaming is not required, good chip removal, powerful drilling

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8053230760	7.6	8.0	76	114
8053230770	7.7			
8053230780	7.8			
8053230790	7.9			
8053230800	8.0			
8053230810	8.1	10.0	95	142
8053230820	8.2			
8053230830	8.3			
8053230840	8.4			
8053230850	8.5			
8053230860	8.6			
8053230870	8.7			
8053230880	8.8			
8053230890	8.9			
8053230900	9.0			
8053230910	9.1			
8053230920	9.2			
8053230930	9.3			
8053230940	9.4			
8053230950	9.5			
8053230960	9.6			
8053230970	9.7			
8053230980	9.8			

EDP No.	O.D d_1	S.D d_2	FL l_2	OAL l_1
8053230990	9.9	10.0	95	142
8053231000	10.0			
8053231010	10.1	12.0	114	162
8053231020	10.2			
8053231030	10.3			
8053231040	10.4			
8053231050	10.5			
8053231060	10.6			
8053231070	10.7			
8053231080	10.8			
8053231090	10.9			
8053231100	11.0			
8053231110	11.1			
8053231120	11.2			
8053231130	11.3			
8053231140	11.4			
8053231150	11.5			
8053231160	11.6			
8053231170	11.7			
8053231180	11.8			
8053231190	11.9			
8053231200	12.0			

CARBIDE NC SPOTTING DRILLS



MG | DIN6535HB | h6 | 90° | 120°

Series No. 806303, 806403

Application :
For more precise centering work on NC/CNC Machine.
A larger diameter in respect to the subsequent drilling tool permits to obtain the centering and chamfering simultaneously.

NC-Spotting drills 90°

EDP No.	O.D d_1	FL l_2	OAL l_1
8063030600	6.0	13	50
8063030800	8.0	23	60
8063031000	10.0	24	70
8063031200	12.0		
8063031600	16.0	29	75
8063032000	20.0	35	100

NC-Spotting drills 120°

EDP No.	O.D d_1	FL l_2	OAL l_1
8064030600	6.0	13	50
8064030800	8.0	23	60
8064031000	10.0	24	70
8064031200	12.0		
8064031600	16.0	29	75
8064032000	20.0	35	100

CARBIDE DRILL CUTTING CONDITION

800303, 801303

MATERIAL	Tool steels Alloy steels		Aluminum Aluminum alloy		Titan alloy		Brass Bronze		Glass fiber Epoxy resin	
DIA	N	S	N	S	N	S	N	S	N	S
3	4000～7000	0.020	10000～13100	0.028	3000～6000	0.010	7000～10000	0.020	9000～12000	0.075
5	2400～4200	0.028	6000～7800	0.048	1800～3600	0.020	4200～6000	0.038	5400～7200	0.075
8	1500～2600	0.048	3700～4900	0.085	1100～2200	0.038	2600～3700	0.075	3400～4500	0.095
12	1000～1700	0.065	2500～3200	0.125	750～1500	0.065	1700～2500	0.125	2200～3000	0.115

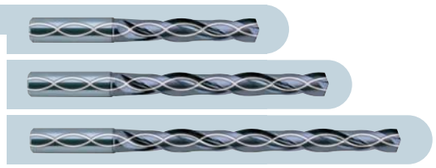
N = R.P.M (rev./min)
S = Feed per revolution (mm/rev.)

802323 (TiAlN Coated)

MATERIAL	NON-ALLOY STEELS		ALLOY STEELS		SOFT GREY CAST IRON		HARD GREY CAST IRON		STAINLESS STEELS		Al-Si ALLOY, Si ＜10%		Al-Si ALLOY, Si ＞10%	
	＜ 700 N/mm²		＜ 1000 N/mm²		＜ HB240, GG25		＜ HB300, GG40		-		-		-	
DIA.	N	S	N	S	N	S	N	S	N	S	N	S	N	S
3～5	8330	0.130	7410	0.130	13890	0.160	9260	0.130	3240	0.060	14310	0.200	11780	0.160
5.1～8	5020	0.160	4460	0.160	8370	0.210	5570	0.160	1950	0.080	8620	0.260	7090	0.210
8.1～10	3490	0.230	3110	0.230	5810	0.290	3880	0.230	1350	0.110	6000	0.360	4940	0.290
10.1～12	2850	0.280	2530	0.280	4750	0.350	3160	0.280	1110	0.140	4900	0.440	4030	0.350
12.1～14	2410	0.310	2140	0.310	4010	0.400	2670	0.310	940	0.160	4130	0.500	3400	0.400
14.1～20	1890	0.350	1680	0.350	3150	0.450	2090	0.350	730	0.180	3240	0.560	2670	0.450

N = R.P.M (rev./min)
S = Feed per revolution (mm/rev.)

803323, 804323, 805323 (TiAlN Coated)



MATERIAL	NON-ALLOY STEELS		ALLOY STEELS		SOFT GREY CAST IRON		HARD GREY CAST IRON		STAINLESS STEELS		Al-Si ALLOY, Si ＜10%		Al-Si ALLOY, Si ＞10%	
	＜ 700 N/mm²		＜ 1000 N/mm²		＜ HB240, GG25		＜ HB300, GG40		-		-		-	
DIA.	N	S	N	S	N	S	N	S	N	S	N	S	N	S
3～5	9260	0.160	8330	0.130	15740	0.160	10190	0.160	3710	0.060	16830	0.200	14310	0.200
5.1～8	5570	0.210	5020	0.160	9480	0.210	6130	0.210	2230	0.080	10130	0.260	8620	0.260
8.1～10	3880	0.290	3490	0.230	6600	0.290	4270	0.290	1550	0.110	7060	0.360	6000	0.360
10.1～12	3160	0.350	2850	0.280	5380	0.350	3480	0.350	1270	0.140	5760	0.440	4900	0.440
12.1～14	2670	0.400	2410	0.310	4550	0.400	2950	0.400	1070	0.160	4870	0.500	4130	0.500
14.1～20	2090	0.450	1890	0.350	3570	0.450	2310	0.450	840	0.180	3820	0.560	3240	0.560

N = R.P.M (rev./min)
S = Feed per revolution (mm/rev.)

EUROPA TOOL

COBALT & HSS TWIST DRILL

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HIGH SPEED STEEL

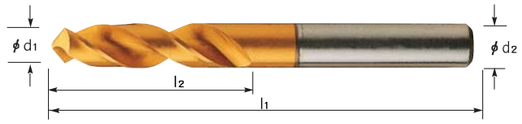
Europa Tool 8TH EDITION

COBALT & HSS TWIST DRILLS

	PRODUCTS	SERIES	DESCRIPTION	PAGE
HPD-SUS TWIST DRILL FOR STAINLESS STEELS				
		820434	HPD-SUS STUB DRILL FOR DRILLING STAINLESS STEEL	275 ~ 277
		810434	HPD-SUS JOBBER DRILL FOR DRILLING STAINLESS STEEL	278 ~ 280
HPD TWIST DRILL				
		810205	JOBBER HSS-Co SUPERIOR TiN COATED	281 ~ 285
HSS STRAIGHT SHANK JOBBER DRILL				
		810504	GOLDEX JOBBER DRILL	286 ~ 288

HPD-SUS TWIST DRILLS STUB

HSS-EX | W 38° | h7 | h8 | 130° up to 4mm | 120° over 4mm



$d_1 = d_2$

four facet

Series No. 820434

for Stainless Steels

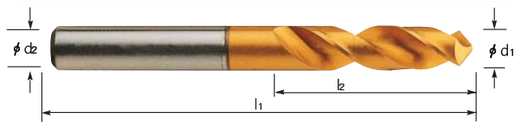
Application
Designed for drilling in stainless steels, mild steels, aluminum, aluminum alloy, aluminum die cast, copper, copper alloy, etc.

Advantage
High helix-sharp cutting edges to avoid built-up and to be suitable for high performance drilling
Wide flute and stub length-increasing chip removal and reducing vibration and deflecton.
High vanadium HSS-EX material with superior TiN coating
- higher speed and feed, longer service life High quality-good surface finishes, high productivity..

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8204340200	2.0	12	44
8204340210	2.1	12	44
8204340220	2.2	13	45
8204340230	2.3	13	45
8204340240	2.4	14	46
8204340250	2.5	14	46
8204340260	2.6	14	46
8204340270	2.7	16	48
8204340280	2.8	16	48
8204340290	2.9	16	48
8204340300	3.0	16	48
8204340310	3.1	18	50
8204340320	3.2	18	50
8204340330	3.3	18	50
8204340340	3.4	20	52
8204340350	3.5	20	52
8204340360	3.6	20	52
8204340370	3.7	20	52
8204340380	3.8	22	54
8204340390	3.9	22	54
8204340400	4.0	22	54
8204340410	4.1	22	66
8204340420	4.2	22	66
8204340430	4.3	24	68

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8204340440	4.4	24	68
8204340450	4.5	24	68
8204340460	4.6	24	68
8204340470	4.7	24	68
8204340480	4.8	26	70
8204340490	4.9	26	70
8204340500	5.0	26	70
8204340510	5.1	26	70
8204340520	5.2	26	70
8204340530	5.3	26	70
8204340540	5.4	28	72
8204340550	5.5	28	72
8204340560	5.6	28	72
8204340570	5.7	28	72
8204340580	5.8	28	72
8204340590	5.9	28	72
8204340600	6.0	28	72
8204340610	6.1	31	75
8204340620	6.2	31	75
8204340630	6.3	31	75
8204340640	6.4	31	75
8204340650	6.5	31	75
8204340660	6.6	31	75
8204340670	6.7	31	75

HPD-SUS TWIST DRILLS STUB



$d_1 = d_2$

four facet

HSS-EX | W 38° | h7 | h8 | 130° up to 4mm | 120° over 4mm

Series No. 820434

for Stainless Steels

Application
Designed for drilling in stainless steels, mild steels, aluminum, aluminum alloy, aluminum die cast, copper, copper alloy, etc.

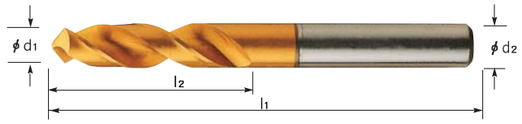
Advantage
High helix-sharp cutting edges to avoid built-up and to be suitable for high performance drilling
Wide flute and stub length-increasing chip removal and reducing vibration and deflecton.
High vanadium HSS-EX material with superior TiN coating
- higher speed and feed, longer service life High quality-good surface finishes, high productivity..

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8204340680	6.8	34	78
8204340690	6.9	34	78
8204340700	7.0	34	78
8204340710	7.1	34	78
8204340720	7.2	34	78
8204340730	7.3	34	78
8204340740	7.4	34	78
8204340750	7.5	34	78
8204340760	7.6	37	81
8204340770	7.7	37	81
8204340780	7.8	37	81
8204340790	7.9	37	81
8204340800	8.0	37	81
8204340810	8.1	37	87
8204340820	8.2	37	87
8204340830	8.3	37	87
8204340840	8.4	37	87
8204340850	8.5	37	87
8204340860	8.6	40	90
8204340870	8.7	40	90
8204340880	8.8	40	90
8204340890	8.9	40	90
8204340900	9.0	40	90
8204340910	9.1	40	90

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8204340920	9.2	40	90
8204340930	9.3	40	90
8204340940	9.4	40	90
8204340950	9.5	40	90
8204340960	9.6	43	93
8204340970	9.7	43	93
8204340980	9.8	43	93
8204340990	9.9	43	93
8204341000	10.0	43	93
8204341010	10.1	43	100
8204341020	10.2	43	100
8204341030	10.3	43	100
8204341040	10.4	43	100
8204341050	10.5	43	100
8204341060	10.6	43	100
8204341070	10.7	47	104
8204341080	10.8	47	104
8204341090	10.9	47	104
8204341100	11.0	47	104
8204341110	11.1	47	104
8204341120	11.2	47	104
8204341130	11.3	47	104
8204341140	11.4	47	104
8204341150	11.5	47	104

HPD-SUS TWIST DRILLS STUB

HSS-EX | W 38° | h7 | h8 | 130° up to 4mm | 120° over 4mm



d1 = d2

four facet

Series No. 820434

for Stainless Steels

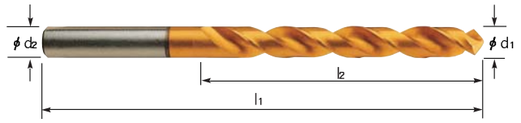
Application
Designed for drilling in stainless steels, mild steels, aluminum, aluminum alloy, aluminum die cast, copper, copper alloy, etc.

Advantage
High helix-sharp cutting edges to avoid built-up and to be suitable for high performance drilling
Wide flute and stub length-increasing chip removal and reducing vibration and deflecton.
High vanadium HSS-EX material with superior TiN coating - higher speed and feed, longer service life High quality-good surface finishes, high productivity..

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8204341160	11.6	47	104
8204341170	11.7	47	104
8204341180	11.8	47	104
8204341190	11.9	51	108
8204341200	12.0	51	108
8204341210	12.1	51	108
8204341220	12.2	51	108
8204341230	12.3	51	108

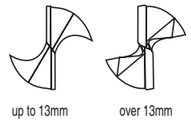
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8204341240	12.4	51	108
8204341250	12.5	51	108
8204341260	12.6	51	108
8204341270	12.7	51	108
8204341280	12.8	51	108
8204341290	12.9	51	108
8204341300	13.0	51	108

HPD-SUS TWIST DRILLS JOBBER



d1 = d2

HSS-EX | W 38° | h7 | h8 | 130° up to 4mm | 120° over 4mm



up to 13mm | over 13mm

Series No. 810434

for Stainless Steels

Application
Designed for 4D ~ 5D drilling in stainless steels, mild steels, aluminium, aluminium alloy, aluminium die cast, copper, copper alloy, etc.

Advantage
High helix-sharp cutting edges to avoid built-up and to be suitable for high performance drilling.
Reinforced web and jobbers length-increasing rigidity and suitable for 4D ~ 5D drilling.
High vanadium HSS-EX material with superior TiN coating - higher speed and feed, longer service life.
High quality-good surface finishes, high productivity and weeding second operation.

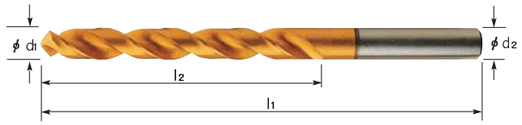
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8104340200	2.0	24	56
8104340210	2.1	24	56
8104340220	2.2	27	59
8104340230	2.3	27	59
8104340240	2.4	30	62
8104340250	2.5	30	62
8104340260	2.6	30	62
8104340270	2.7	33	65
8104340280	2.8	33	65
8104340290	2.9	33	65
8104340300	3.0	33	65
8104340310	3.1	36	68
8104340320	3.2	36	68
8104340330	3.3	36	68
8104340340	3.4	39	71
8104340350	3.5	39	71
8104340360	3.6	39	71
8104340370	3.7	39	71
8104340380	3.8	43	75
8104340390	3.9	43	75
8104340400	4.0	43	75
8104340410	4.1	43	87
8104340420	4.2	43	87
8104340430	4.3	47	91

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8104340440	4.4	47	91
8104340450	4.5	47	91
8104340460	4.6	47	91
8104340470	4.7	47	91
8104340480	4.8	52	96
8104340490	4.9	52	96
8104340500	5.0	52	96
8104340510	5.1	52	96
8104340520	5.2	52	96
8104340530	5.3	52	96
8104340540	5.4	57	101
8104340550	5.5	57	101
8104340560	5.6	57	101
8104340570	5.7	57	101
8104340580	5.8	57	101
8104340590	5.9	57	101
8104340600	6.0	57	101
8104340610	6.1	63	107
8104340620	6.2	63	107
8104340630	6.3	63	107
8104340640	6.4	63	107
8104340650	6.5	63	107
8104340660	6.6	63	107
8104340670	6.7	63	107

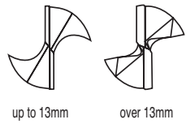
COBALT & HSS TWIST DRILLS

HPD-SUS TWIST DRILLS JOBBER

HSS-EX | W 38° | h7 | h8 | 130° up to 4mm | 120° over 4mm



d1 = d2



Series No. 810434

for Stainless Steels

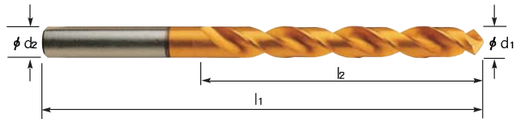
Application
Designed for 4D ~ 5D drilling in stainless steels, mild steels, aluminium, aluminium alloy, aluminium die cast, copper, copper alloy, etc.

Advantage
High helix-sharp cutting edges to avoid built-up and to be suitable for high performance drilling
Reinforced web and jobbers length-increasing rigidity and suitable for 4D ~ 5D drilling.
High vanadium HSS-EX material with superior TiN coating - higher speed and feed, longer service life
High quality-good surface finishes, high productivity and weeding second operation.

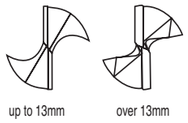
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8104340680	6.8	69	113
8104340690	6.9	69	113
8104340700	7.0	69	113
8104340710	7.1	69	113
8104340720	7.2	69	113
8104340730	7.3	69	113
8104340740	7.4	69	113
8104340750	7.5	69	113
8104340760	7.6	75	119
8104340770	7.7	75	119
8104340780	7.8	75	119
8104340790	7.9	75	119
8104340800	8.0	75	119
8104340810	8.1	75	125
8104340820	8.2	75	125
8104340830	8.3	75	125
8104340840	8.4	75	125
8104340850	8.5	75	125
8104340860	8.6	81	131
8104340870	8.7	81	131
8104340880	8.8	81	131
8104340890	8.9	81	131
8104340900	9.0	81	131
8104340910	9.1	81	131
8104340920	9.2	81	131

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8104340930	9.3	81	131
8104340940	9.4	81	131
8104340950	9.5	81	131
8104340960	9.6	87	137
8104340970	9.7	87	137
8104340980	9.8	87	137
8104340990	9.9	87	137
8104341000	10.0	87	137
8104341010	10.1	87	144
8104341020	10.2	87	144
8104341030	10.3	87	144
8104341040	10.4	87	144
8104341050	10.5	87	144
8104341060	10.6	87	144
8104341070	10.7	94	151
8104341080	10.8	94	151
8104341090	10.9	94	151
8104341100	11.0	94	151
8104341110	11.1	94	151
8104341120	11.2	94	151
8104341130	11.3	94	151
8104341140	11.4	94	151
8104341150	11.5	94	151
8104341160	11.6	94	151
8104341170	11.7	94	151

HPD-SUS TWIST DRILLS JOBBER



d1 = d2



HSS-EX | W 38° | h7 | h8 | 130° up to 4mm | 120° over 4mm

Series No. 810434

for Stainless Steels

Application
Designed for 4D ~ 5D drilling in stainless steels, mild steels, aluminium, aluminium alloy, aluminium die cast, copper, copper alloy, etc.

Advantage
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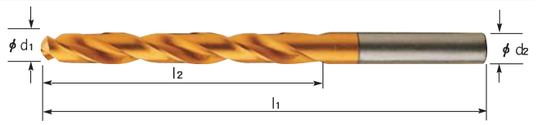
Reinforced web and jobbers length-increasing rigidity and suitable for 4D ~ 5D drilling.
High vanadium HSS-EX material with superior TiN coating - higher speed and feed, longer service life
High quality-good surface finishes, high productivity and weeding second operation.

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8104341180	11.8	94	151
8104341190	11.9	101	158
8104341200	12.0	101	158
8104341210	12.1	101	158
8104341220	12.2	101	158
8104341230	12.3	101	158
8104341240	12.4	101	158
8104341250	12.5	101	158
8104341260	12.6	101	158
8104341270	12.7	101	158
8104341280	12.8	101	158
8104341290	12.9	101	158
8104341300	13.0	101	158
8104341350	13.5	106	166
8104341400	14.0	106	166
8104341410	14.1	109	169

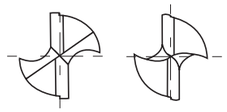
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8104341450	14.5	109	169
8104341500	15.0	109	169
8104341550	15.5	112	172
8104341560	15.6	112	172
8104341600	16.0	112	172
8104341650	16.5	115	181
8104341700	17.0	115	181
8104341750	17.5	118	184
8104341760	17.6	118	184
8104341800	18.0	118	184
8104341850	18.5	122	188
8104341900	19.0	122	188
8104341950	19.5	125	191
8104341960	19.6	125	191
8104342000	20.0	125	191

HPD TWIST DRILLS JOBBER

PREMIUM HSS-Co | N 30° | h7 up to 13mm | h6 over 13mm | h8 | 130° | 



d1 = d2



Series No. 810205

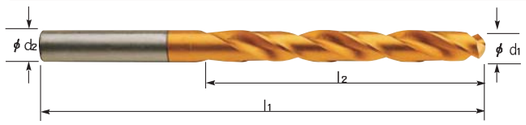
Application
Designed for high speed non-step 4D ~ 5D drilling.
Drilling in mild steel, cast iron, aluminum, alloyed, tool steel, etc.

Advantage
Helical thinning - good chip removal, self-centering, reducing thrust and improving accuracy.
Reinforced web and jobbers length - increasing rigidity and suitable for 4D~5D drilling
Premium Cobalt HSS with superior TiN coating - higher speed and feed, longer service life
High quality-good surface finishes, high productivity and weeding second operation.

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102050200	2.0	24	56
8102050205	2.05	24	56
8102050210	2.1	24	56
8102050215	2.15	27	59
8102050220	2.2	27	59
8102050225	2.25	27	59
8102050230	2.3	27	59
8102050235	2.35	27	59
8102050240	2.4	30	62
8102050245	2.45	30	62
8102050250	2.5	30	62
8102050255	2.55	30	62
8102050260	2.6	30	62
8102050265	2.65	30	62
8102050270	2.7	33	65
8102050275	2.75	33	65
8102050280	2.8	33	65
8102050285	2.85	33	65
8102050290	2.9	33	65
8102050295	2.95	33	65
8102050300	3.0	33	65
8102050305	3.05	36	68
8102050310	3.1	36	68
8102050315	3.15	36	68
8102050320	3.2	36	68

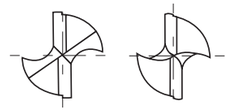
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102050325	3.25	36	68
8102050330	3.3	36	68
8102050335	3.35	36	68
8102050340	3.4	39	71
8102050345	3.45	39	71
8102050350	3.5	39	71
8102050355	3.55	39	71
8102050360	3.6	39	71
8102050365	3.65	39	71
8102050370	3.7	39	71
8102050375	3.75	39	71
8102050380	3.8	43	75
8102050385	3.85	43	75
8102050390	3.9	43	75
8102050395	3.95	43	75
8102050400	4.0	43	75
8102050405	4.05	43	87
8102050410	4.1	43	87
8102050415	4.15	43	87
8102050420	4.2	43	87
8102050425	4.25	43	87
8102050430	4.3	47	91
8102050435	4.35	47	91
8102050440	4.4	47	91
8102050445	4.45	47	91

HPD TWIST DRILLS JOBBER



d1 = d2

PREMIUM HSS-Co | N 30° | h7 up to 13mm | h6 over 13mm | h8 | 130°



Series No. 810205

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Premium Cobalt HSS with superior TiN coating - higher speed and feed, longer service life
High quality-good surface finishes, high productivity and weeding second operation.

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102050450	4.5	47	91
8102050455	4.55	47	91
8102050460	4.6	47	91
8102050465	4.65	47	91
8102050470	4.7	47	91
8102050475	4.75	47	91
8102050480	4.8	52	96
8102050485	4.85	52	96
8102050490	4.9	52	96
8102050495	4.95	52	96
8102050500	5.0	52	96
8102050505	5.05	52	96
8102050510	5.1	52	96
8102050515	5.15	52	96
8102050520	5.2	52	96
8102050525	5.25	52	96
8102050530	5.3	52	96
8102050535	5.35	57	101
8102050540	5.4	57	101
8102050545	5.45	57	101
8102050550	5.5	57	101
8102050555	5.55	57	101
8102050560	5.6	57	101
8102050565	5.65	57	101
8102050570	5.7	57	101

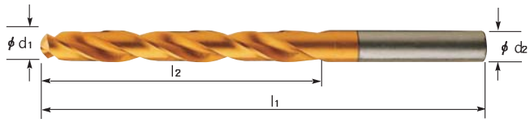
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102050575	5.75	57	101
8102050580	5.8	57	101
8102050585	5.85	57	101
8102050590	5.9	57	101
8102050595	5.95	57	101
8102050600	6.0	57	101
8102050605	6.05	63	107
8102050610	6.1	63	107
8102050615	6.15	63	107
8102050620	6.2	63	107
8102050625	6.25	63	107
8102050630	6.3	63	107
8102050635	6.35	63	107
8102050640	6.4	63	107
8102050645	6.45	63	107
8102050650	6.5	63	107
8102050655	6.55	63	107
8102050660	6.6	63	107
8102050665	6.65	63	107
8102050670	6.7	63	107
8102050675	6.75	69	113
8102050680	6.8	69	113
8102050685	6.85	69	113
8102050690	6.9	69	113
8102050695	6.95	69	113

COBALT & HSS TWIST DRILLS

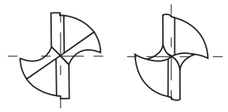
H P D TWIST DRILLS JOBBER

PREMIUM HSS-Co | N 30° | h7 up to 13mm | h6 over 13mm | h8 | 130° | 

Series No. 810205



$d_1 = d_2$



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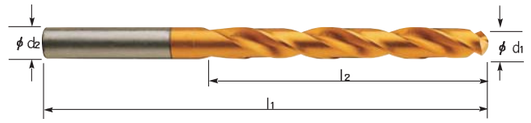
High quality-good surface finishes, high productivity and weeding second operation.

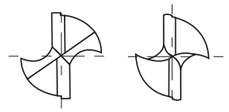
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102050700	7.0	69	113
8102050705	7.05	69	113
8102050710	7.1	69	113
8102050715	7.15	69	113
8102050720	7.2	69	113
8102050725	7.25	69	113
8102050730	7.3	69	113
8102050735	7.35	69	113
8102050740	7.4	69	113
8102050745	7.45	69	113
8102050750	7.5	69	113
8102050755	7.55	75	119
8102050760	7.6	75	119
8102050765	7.65	75	119
8102050770	7.7	75	119
8102050775	7.75	75	119
8102050780	7.8	75	119
8102050785	7.85	75	119
8102050790	7.9	75	119
8102050795	7.95	75	119
8102050800	8.0	75	119
8102050805	8.05	75	125
8102050810	8.1	75	125
8102050815	8.15	75	125
8102050820	8.2	75	125

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102050825	8.25	75	125
8102050830	8.3	75	125
8102050835	8.35	75	125
8102050840	8.4	75	125
8102050845	8.45	75	125
8102050850	8.5	75	125
8102050855	8.55	81	131
8102050860	8.6	81	131
8102050865	8.65	81	131
8102050870	8.7	81	131
8102050875	8.75	81	131
8102050880	8.8	81	131
8102050885	8.85	81	131
8102050890	8.9	81	131
8102050895	8.95	81	131
8102050900	9.0	81	131
8102050905	9.05	81	131
8102050910	9.1	81	131
8102050915	9.15	81	131
8102050920	9.2	81	131
8102050925	9.25	81	131
8102050930	9.3	81	131
8102050935	9.35	81	131
8102050940	9.4	81	131
8102050945	9.45	81	131

H P D TWIST DRILLS JOBBER



PREMIUM HSS-Co | N 30° | h7 up to 13mm | h6 over 13mm | h8 | 130°



Series No. 810205

Application
Designed for high speed non-step 4D ~ 5D drilling.
Drilling in mild steel, cast iron, aluminum, alloyed, tool steel, etc.

Advantage
Helical thinning - good chip removal, self-centering, reducing thrust and improving accuracy.
Reinforced web and jobbers length - increasing rigidity and suitable for 4D~5D drilling
Premium Cobalt HSS with superior TiN coating - higher speed and feed, longer service life
High quality-good surface finishes, high productivity and weeding second operation.

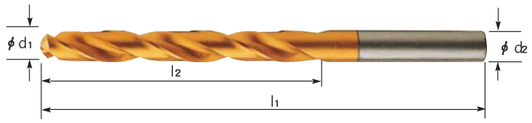
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102050950	9.5	81	131
8102050955	9.55	87	137
8102050960	9.6	87	137
8102050965	9.65	87	137
8102050970	9.7	87	137
8102050975	9.75	87	137
8102050980	9.8	87	137
8102050985	9.85	87	137
8102050990	9.9	87	137
8102050995	9.95	87	137
8102051000	10.0	87	137
8102051005	10.05	87	144
8102051010	10.1	87	144
8102051015	10.15	87	144
8102051020	10.2	87	144
8102051025	10.25	87	144
8102051030	10.3	87	144
8102051035	10.35	87	144
8102051040	10.4	87	144
8102051045	10.45	87	144
8102051050	10.5	87	144
8102051055	10.55	87	144
8102051060	10.6	87	144
8102051065	10.65	94	151
8102051070	10.7	94	151

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102051075	10.75	94	151
8102051080	10.8	94	151
8102051085	10.85	94	151
8102051090	10.9	94	151
8102051095	10.95	94	151
8102051100	11.0	94	151
8102051105	11.05	94	151
8102051110	11.1	94	151
8102051115	11.15	94	151
8102051120	11.2	94	151
8102051125	11.25	94	151
8102051130	11.3	94	151
8102051135	11.35	94	151
8102051140	11.4	94	151
8102051145	11.45	94	151
8102051150	11.5	94	151
8102051155	11.55	94	151
8102051160	11.6	94	151
8102051165	11.65	94	151
8102051170	11.7	94	151
8102051175	11.75	94	151
8102051180	11.8	94	151
8102051185	11.85	101	158
8102051190	11.9	101	158
8102051195	11.95	101	158

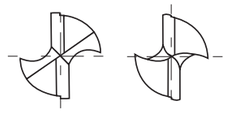
HPD TWIST DRILLS JOBBER

PREMIUM HSS-Co | N 30° | h7 up to 13mm | h6 over 13mm | h8 | 130° |

Series No. 810205



$d_1 = d_2$



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High quality-good surface finishes, high productivity and weeding second operation.

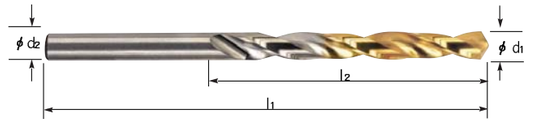
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102051200	12.0	101	158
8102051210	12.1	101	158
8102051220	12.2	101	158
8102051230	12.3	101	158
8102051240	12.4	101	158
8102051250	12.5	101	158
8102051260	12.6	101	158
8102051270	12.7	101	158
8102051280	12.8	101	158
8102051290	12.9	101	158
8102051300	13.0	101	158
8102051350	13.5	90	150
8102051400	14.0	90	150
8102051410	14.1	95	155
8102051450	14.5	95	155
8102051500	15.0	95	161
8102051550	15.5	100	166
8102051560	15.6	100	166
8102051600	16.0	100	166
8102051650	16.5	106	172
8102051700	17.0	106	172
8102051750	17.5	112	178
8102051760	17.6	112	178
8102051800	18.0	112	178
8102051850	18.5	118	184

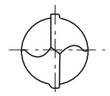
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8102051900	19.0	118	194
8102051950	19.5	125	201
8102051960	19.6	125	201
8102052000	20.0	125	201
8102052050	20.5	128	204
8102052100	21.0	128	204
8102052110	21.1	128	204
8102052150	21.5	132	208
8102052200	22.0	132	208
8102052250	22.5	136	212
8102052300	23.0	136	212
8102052350	23.5	136	212
8102052400	24.0	140	220
8102052450	24.5	140	220
8102052500	25.0	140	220
8102052550	25.5	145	225
8102052600	26.0	145	225
8102052650	26.5	145	225
8102052700	27.0	150	230
8102052800	28.0	150	230
8102052900	29.0	155	235
8102053000	30.0	155	235
8102053100	31.0	160	240
8102053200	32.0	165	245

GOLDEX DRILLS JOBBER

DIN 338 | HSS | N 30° | h8 | 118° |

Series No. 810504





Flute Geometry
Right hand spiral

Point Angle
118?, Split point

Surface treatment
Bright body TiN coating on working part

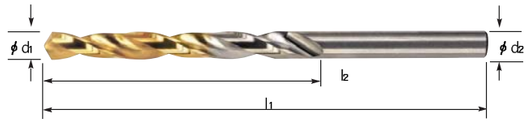
Application
Drilling in steel, cast steel alloyed and Non-alloyed, gray cast iron, graphite, malleable cast iron

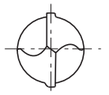
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8105040100	1.0	12	34
8105040110	1.1	14	36
8105040120	1.2	16	38
8105040130	1.3	16	38
8105040140	1.4	18	40
8105040150	1.5	18	40
8105040160	1.6	20	43
8105040170	1.7	20	43
8105040180	1.8	22	46
8105040190	1.9	22	46
8105040200	2.0	24	49
8105040210	2.1	24	49
8105040220	2.2	27	53
8105040230	2.3	27	53
8105040240	2.4	30	57
8105040250	2.5	30	57
8105040260	2.6	30	57
8105040270	2.7	33	61
8105040280	2.8	33	61
8105040290	2.9	33	61
8105040300	3.0	33	61
8105040310	3.1	36	65
8105040320	3.2	36	65
8105040330	3.3	36	65
8105040340	3.4	39	70

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8105040350	3.5	39	70
8105040360	3.6	39	70
8105040370	3.7	39	70
8105040380	3.8	43	75
8105040390	3.9	43	75
8105040400	4.0	43	75
8105040410	4.1	43	75
8105040420	4.2	43	75
8105040430	4.3	47	80
8105040440	4.4	47	80
8105040450	4.5	47	80
8105040460	4.6	47	80
8105040470	4.7	47	80
8105040480	4.8	52	86
8105040490	4.9	52	86
8105040500	5.0	52	86
8105040510	5.1	52	86
8105040520	5.2	52	86
8105040530	5.3	52	86
8105040540	5.4	57	93
8105040550	5.5	57	93
8105040560	5.6	57	93
8105040570	5.7	57	93
8105040580	5.8	57	93
8105040590	5.9	57	93

GOLDEX DRILLS JOBBER

DIN 338 | HSS | N 30° | h8 | 118°





Series No. 810504

Flute Geometry
Right hand spiral

Point Angle
118?, Split point

Surface treatment
Bright body TiN coating on working part

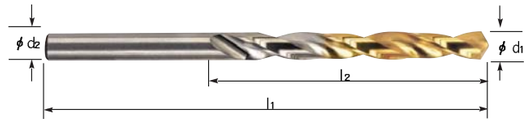
Application
Drilling in steel, cast steel alloyed and Non-alloyed, gray cast iron, graphite, malleable cast iron

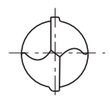
EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8105040600	6.0	57	93
8105040610	6.1	63	101
8105040620	6.2	63	101
8105040630	6.3	63	101
8105040640	6.4	63	101
8105040650	6.5	63	101
8105040660	6.6	63	101
8105040670	6.7	63	101
8105040680	6.8	69	109
8105040690	6.9	69	109
8105040700	7.0	69	109
8105040710	7.1	69	109
8105040720	7.2	69	109
8105040730	7.3	69	109
8105040740	7.4	69	109
8105040750	7.5	69	109
8105040760	7.6	75	117
8105040770	7.7	75	117
8105040780	7.8	75	117
8105040790	7.9	75	117
8105040800	8.0	75	117
8105040810	8.1	75	117
8105040820	8.2	75	117
8105040830	8.3	75	117
8105040840	8.4	75	117

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8105040850	8.5	75	117
8105040860	8.6	81	125
8105040870	8.7	81	125
8105040880	8.8	81	125
8105040890	8.9	81	125
8105040900	9.0	81	125
8105040910	9.1	81	125
8105040920	9.2	81	125
8105040930	9.3	81	125
8105040940	9.4	81	125
8105040950	9.5	81	125
8105040960	9.6	87	133
8105040970	9.7	87	133
8105040980	9.8	87	133
8105040990	9.9	87	133
8105041000	10.0	87	133
8105041010	10.1	87	133
8105041020	10.2	87	133
8105041030	10.3	87	133
8105041040	10.4	87	133
8105041050	10.5	87	133
8105041060	10.6	87	133
8105041070	10.7	94	142
8105041080	10.8	94	142
8105041090	10.9	94	142

GOLDEX DRILLS JOBBER

DIN 338 | HSS | N 30° | h8 | 118°





Series No. 810504

Flute Geometry
Right hand spiral

Point Angle
118?, Split point

Surface treatment
Bright body TiN coating on working part

Application
Drilling in steel, cast steel alloyed and Non-alloyed, gray cast iron, graphite, malleable cast iron

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8105041100	11.0	94	142
8105041110	11.1	94	142
8105041120	11.2	94	142
8105041130	11.3	94	142
8105041140	11.4	94	142
8105041150	11.5	94	142
8105041160	11.6	94	142
8105041170	11.7	94	142
8105041180	11.8	94	142
8105041190	11.9	101	151
8105041200	12.0	101	151

EDP No.	O.D = S.D $d_1 = d_2$	FL l_2	OAL l_1
8105041210	12.1	101	151
8105041220	12.2	101	151
8105041230	12.3	101	151
8105041240	12.4	101	151
8105041250	12.5	101	151
8105041260	12.6	101	151
8105041270	12.7	101	151
8105041280	12.8	101	151
8105041290	12.9	101	151
8105041300	13.0	101	151

COBALT & HSS TWIST DRILLS

THREADING.
INDEX

APPLICATION
MACHINE TAPS

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HIGH PERFORMANCE APPLICATION TAPS

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VA/NW Metric Coarse —  — TM3130 / P.311
VA/NW Metric Fine —  — TM3630 / P.312
VA/NW Unified Coarse —  — TM6430 / P.314
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HIGH PERFORMANCE APPLICATION TAPS

Working Materials

AL	Aluminium & Aluminium Alloys
GS	Steels with good machinability Rm<750N/mm²
VG	Heat treated and heat-resistant steels Rm>750N/mm²
VA	Stainless steels
NW	Carbon steels with low contents of alloy Rm<600N/mm²
GV	Any material with alleast 8-10% elongation
GG	Grey Cast Iron

Surface Treatment and Coating

vap	Steam Tempered
TiN	TiN-Coated (Titanium Nitride)
NI	Nitrided
TiCN	TiCN-Coating(Titanium Carbon Nitride)
TiAlN	TiAlN-Coating(Titanium Aluminium Nitride)

Chamfer Lead acc. To DIN2197

A	Form A (Chamfer Lead 5-6 Threads)
B	Form B (with GUN-Nose and Chamfer Lead 4-5 Threads)
C	Form C (Chamfer Lead 2-3 Threads)
D	Form D (Chamfer Lead 4-5 Threads)
E	Form E (Chamfer Lead 1.5-2 Threads)

SURFACE TREATMENT AND COATING

The High Speed Steels we use grant a good wear resistance and toughness.
Therefore we normally deliver our taps with bright, untreated surface.
In machining certain materials, various surface treatments are of advantage.

STEAM TEMPERED / vap

The Steam Tempered is a Fe_3O_4-oxyd-coating which reduces the friction between tool and workpiece and prevents cold welding.

NITRIDING / NI

We recommend this surface treatment for machining materials which effect a hard wear / abrasion, such as grey cast iron, alu-alloys with high Si-percentage more than 10%.

These are surface finishes of good value and suitable for many application.
We do these surface treatments within our own company.

Further surface finishes are the various coatings.

TiN-COATING / TiN

The TiN-coating has a hardness of approx. **2,300 HV** and is temperature-resistant up to approx. **600** ℃. This is an excellent all-round coating for normal applications.
Colour : **Golden** Coefficient of friction against steel : 0.4

TiCN-COATING / TiCN

TiCN takes place of TiN when the conditions require the coating to have a different hardness and toughness. The TiCN brings advantage in machining very difficult steels or cutting interrupted bores.
The TiCN-coating has a hardness of approx. **3,000 HV**, but is temperature-resistant up to approx. **400** ℃ only. That means TiCN needs an excellent cooling for long service life.
Colour : **Blue-Grey** Coefficient of friction against steel : 0.4

TiAlN-COATING / TiAlN

This is a special coating for machining abrasive materials such as : grey cast iron, alu-alloys with silicon, fiber reinforced plastics, etc., or machining under high temperatures, which means with insufficient cooling, or high speeds ≥ 600m/min. The TiAlN has a hardness of approx. **3,000 HV** and is temperature resistant up to approx. **800** ℃.
Colour : **Violet-Grey** Coefficient of friction against steel : 0.4

Hardslick-COATING / Hardslick

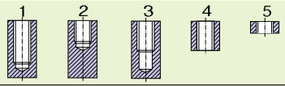
Hardslick combines in a novel way the advantages of an extremely hard, thermally stable TiAlN-coating with the sliding and lubricating properties of an outer WC/C(Tungsten carbide/carbon)-coating. The Hardslick coating has a hardness of approx. **3,000 HV** and is temperature-resistant up to approx. **800** ℃.
Colour : **Violet-Grey** Coefficient of friction against steel : 0.2

MACHINE TAPS
RECOMMENDATION TABLE

USE

● = RECOMMENDED

○ = SUITABLE



COOLANT

A = Cutting Oil
T = Oil Emulsion
X = Cutting Oil/Oil Emulsion
S = Dry
Z = Dry/Oil Emulsion

MATERIAL GROUPS				GS	GS	GS	GS	GS
DIN 371/376	M	Cat.-No.		TM0316	TM0416		TM1316	TM1871
DIN 371/376	EG-M	Cat.-No.						
DIN 352	M	Cat.-No.		TM0116			TM0216	
DIN 374	MF	Cat.-No.		TM3316				
DIN 371/376	UNC	Cat.-No.		TM6416				
DIN 371/376	EG-UNC	Cat.-No.						
DIN 371/374	UNF	Cat.-No.		TM6716				
DIN 371/376	EG-UNF	Cat.-No.						
DIN 2182/2183	W(BSW)	Cat.-No.						
DIN 357/5156	M/G(BSP)	Cat.-No.		TB0116		TM5016		
SURFACE TREATMENT / COATING								Tin
SPIRAL FLUTE ANGLE							R20	R40
CHAMFER LEAD ACC. DIN 2197				B	B	C/Long	C	B
HOLE TYPE				4-5	4-5	1-2-3 4-5	2-3	4-5

MATERIAL GROUPS		LIST OF MATERIALS	HARDNESS HB	TENSILE STRENGTH Rm N/mm²	CHIP	CUTTING SPEED Vc m/min	Coolant					
10. STEELS	11	Magnetic soft steels	< 120	< 400	Extra long	25-20	T			○		
	12	Structure steels, case carburizing steels	< 200	< 700	Medium/long	15-20	T	●	●	○	●	●
	13	Plain carbon steels	< 250	< 850	Long	12-18	T	●	●	○	●	●
	14	Alloy steels	< 250	< 850	Long	10-15	X	●	●	○	●	●
	15	Alloy steels/Hardened & Tempered steels	< 350	< 1,200	Long	6-10	X					
	16	Alloy steels/Hardened & Tempered steels	> 350	> 1,200	Long	3-5	A					
20. STAINLESS STEELS	21	Free maching	< 250	< 850	Medium	7-10	A					
	22	Austenitic	< 250	< 850	Long	5-8	A					
	23	Ferritic, Ferritic+Austenitic,Martensitic	< 300	< 1,000	Long	4-6	A					
30. CAST IRON	31	Grey cast irons	< 150	< 500	Extra short	10-15	X					
	32	Grey cast irons	< 300	< 1,000	Extra short	5-8	T					
	33	Nodular graphite, Melleable cast irons	< 200	< 700	Short	10-15	X	●	●	○	●	●
	34	Nodular graphite, Malleable cast irons	< 300	< 1,000	Short	5-8	X	●	●	○	●	●
40. TITANIUM	41	Titanium, unalloyed	< 200	< 700	Extra long	10-15	T	○	○		○	○
	42	Titanium, alloyed	< 270	< 900	Medium/Short	8-12	A					
	43	Titanium, alloyed	< 350	< 1,250	Medium/Short	4-6	A					
50. NICKEL	51	Nickel, unalloyed	< 150	< 500	Extra long	8-12	A	○	○		○	○
	52	Nickel, alloyed	< 270	< 900	Long	10-15	A					
	53	Nickel, alloyed	< 350	< 1,250	Long	2-4	A					
60. COPPER, BRASS BRONZE	61	Copper, unalloyed	< 100	< 350	Extra long	8-12	T	○	○		○	○
	62	Short chipping Brass, Bronze, Copper	< 200	< 700	Medium/Short	25-35	T			○		
	63	Long chipping Brass, Bronze, Copper	< 200	< 700	Long	15-20	T	●	●	○	●	●
	64	AMPCO (Cu-Al-Fe alloys)	< 470	< 1,500	Short	3-5	A					
70. ALUMINIUM	71	Aluminium, Megnesium, unalloyed	< 100	< 350	Extra long	10-15	T	○	○		○	○
	72	Aluminium, alloyed Si < 0.5%	< 150	< 500	Medium	25-35	T	○	○		○	○
	73	Aluminium, alloyed, Si < 10%	< 120	< 400	Medium/Short	15-20	T	○	○		○	○
	74	Aluminium, alloyed, Si > 10%	< 120	< 400	Short	10-15	T	●	●	○	●	●
80. SINTETIC MATERIALS	81	Thermoplastics			Extra long	20-30	T	○	○		○	○
	82	Thermosseting Plastics			Short	8-12	Z					
	83	Reinforced plastic materials			Extra short	5-7	Z					

With TiN / TiCN / TiAlN / Hardsilck coated taps the cutting Vc speed can be doubled

GS	GS	GS	VG	VG	VG	VG	VG	VG	HR	VA+NW	VA+NW	VA+NW	VA+NW	NW	GV	GV	AI	AI	GG	GG	
TM1716	TM1817	TM1917	TM2716	TM2917	TM6316	TM1530	TM2130	TM2817	TM2330	TM3130	TM8053	TM2530	TM8153	TM1730	TM3817	TM3827	TM0516	TM3716	TM0731	TM0917	
TM3416										TM3630		TM3830									
TM6516										TM6430		TM6530									
TM6816										TM6730		TM6830									
TB0216																					
	Tin	TiN		TiN		vap	vap	TiN	vap	vap	Hardslick	vap	Hardslick	vap	TiN	TiAlN			NI	TiN	
R40	R40	R40			R40	R40	R40	R40	R40			R40	R40	R40				R45/40			
C	C	C	B	B	C	C	C	C	C	B	B	C	C	C	C	C	B	C	C	C	
1-2-3	1-2-3	1-2-3	4-5	4-5	1-2-3	1-2-3	1-2-3	1-2-3	1-2-3	4-5	4-5	1-2-3	1-2-3	1-2-3	1-2-3 4-5	1-2-3 4-5	4-5	1-2-3	1-2-3 4-5	1-2-3 4-5	

										●	●	●	●	●	●	●	○	○			11
●	●	●								●	●	●	●	●	●	●	○	○			12
●	●	●													●	●	○	○			13
●	●	●	○	○	○	○	○	○							●	●					14
			●	●	●	●	●	●	○												15
									●												16
										●	●	●	●		●						21
										●	●	●	●	●	●						22
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●	●	●																			34
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			○	○	○	○	○	○													42
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									○										○	●	62
●	●	●													○	○					63
									●												64
○	○	○												○	●	●	●	●			71
○	○	○															●	●			72
○	○	○													○	○	●	●			73
●	●	●																			74
○	○	○																			81
									○												82
									○										●	●	83

EXAMPLES FOR APPLICATION MATERIAL GROUPS

11 Magnetic Soft Steels < 400 N/mm²

1.1013	RFe 100
1.1014	RFe 80
1.1015	RFe 60
1.0718	9 S MnPb 28

12 Structure/Case Carburizing Steels < 700 N/mm²

1.0037	St 37-2
1.0050	St 50-2
1.0060	St 60-2
1.0070	St 70-2
1.0401	C 15
1.1141	Ck 15

13 Plain Carbon Steels < 850 N/mm²

1.0501	C 35
1.0503	C 45
1.0535	C 55
1.0601	C 60
1.1181	Ck 35
1.1191	Ck 45

14 Alloy Steels < 850 N/mm²

1.2080	X210Cr12
1.2363	X100CrMoV5-1
1.3243	S 6-5-2-5
1.3343	S 6-5-2
1.7218	25CrMo4
1.7220	34CrMo4

15 Alloy, Hardened & Tempered Steels < 1,200 N/mm²

1.2581	X30WCrV9 3
1.2622	X60WCrMoV9
1.2550	60WCrV7
1.6580	30CrNiMo8
1.7361	32CrMo12
1.8515	31CrMo12

16 Alloy, Hardened & Tempered Steels > 1,200 N/mm²

To this group belong most of the materials of group 15, but present a higher tensile strength.

21 Free machining stainless Steels < 850 N/mm²

1.4005	X12CrS13
1.4006	X10Cr13
1.4016	X6Cr17
1.4104	X12CrMoS17
1.4305	X10CrNiS18 9

22 Austenitic stainless Steels < 850 N/mm²

1.4301	X5CrNi18 10
1.4406	X2CrNiMoN17 12 2
1.4435	X2CrNiMo18 14 3
1.4541	X6CrNiTi18 10
1.4571	X6CrNiMoTi17 12 2
1.4828	X15CrNiSi20 12

23 Matensitic/Ferritic/Fer.-Aus. Stainless Steels < 1,000 N/mm²

1.4112	X90CrMoV18
1.4125	X105CrMo17
1.4002	X6CrAl13
1.4512	X6CrTi12
1.4582	X4CrNiMoNb25 7
1.4821	X20CrNiSi25 4

31 Grey graphite cast irons < 500 N/mm²

0.6015	GG-15
0.6020	GG-20
0.6025	GG-25
0.6030	GG-30
0.6035	GG-35
0.6040	GG-40

32 Grey graphite cast irons < 1,000 N/mm²

0.6020	GG-20
0.6025	GG-25
0.6030	GG-30
0.6035	GG-35
0.6040	GG-40

33 Nodular graphite, Malleable cast irons < 700 N/mm²

0.7040	GGG-40
0.7043	GGG-40.3
0.7050	GGG-50
0.7060	GGG-60
0.8040	GTW-40
0.8065	GTW-65

34 Nodular graphite, Malleable cast irons < 1,000 N/mm²

0.7040	GGG-40
0.7043	GGG-40.3
0.7050	GGG-50
0.7060	GGG-60
0.7070	GGG-70
0.7080	GGG-80

41 Titanium unalloys < 700 N/mm²

3.7024	Ti99.5
3.7034	Ti99.7
3.7035	Ti2
3.7055	Ti99.4
3.7064	Ti99.2
3.7065	Ti4

42 Titanium alloys < 900 N/mm²

	TiA14Mn4
3.7114	TiA15Sn2
3.7124	TiCu2
3.7164	TiA16V4
3.7174	TiA16V6Sn2

43 Titanium alloys < 1,300 N/mm²

3.7124	TiCu2
3.7144	TiA16Sn2Zr4Mo2
3.7154	TiAl6Zr5
3.7164	TiA16V4
3.7174	TiA16V6Sn2
3.7184	TiAl4Mo4Sn2

51 Nickel unalloys < 500 N/mm²

2.1504	NiAlBz
2.4042	Ni99CSi
2.4060	Ni99.6
2.4062	Ni99.4Fe

52 Heat resisting Nickel alloys < 900 N/mm²

2.4360	Monel 400
2.4374	Monel 500
2.4665	Hastelloy X
2.4812	Hastelloy C
2.4816	Inconel 600
1.4876	Incoloy 800

53 Heat resisting Nickel alloys < 1,400 N/mm²

2.4631	Nimonic80A
2.4632	Nimonic90
2.4634	Nimonic105
2.4662	Nimonic901
2.4668	Inconel 718
2.4669	Inconel X-750

61 Copper unalloys < 350 N/mm²

2.0060	E-Cu57
2.0070	SE-Cu
2.0090	SF-Cu
2.1356	CuMn3
2.1522	CuSi2Mn

62 Short chip Brass, Bronze copper alloys < 700N/mm²

2.0360	CuZn40 (Ms60)
2.0380	CuZn39Pb2 (Ms58)
2.0410	CuZn44Pb2
2.0580	CuZn40Mn1Pb
2.1086	G-CuSn10Zn
2.1096	G-CuSn5ZnPb

63 Long chip Brass, Bronze copper alloys < 700 N/mm²

2.0250	CuZn20
2.0321	CuZn37
2.1020	CuSn6
2.1080	CuSn6Zn6
2.1245	CuBel.7
2.1293	CuCrZr

64 Cu-Al-Fe alloys < 1,500 N/mm²

Ampco 18
Ampco 20
Ampco 25

71 Aluminium-Magnesium unalloys < 350 N/mm²

3.0250	Al99.5H
3.0280	Al99.8H
3.0305	Al99.9
3.3308	Al99.9Mg0.5

72 Aluminium alloys, Si < 0.5% < 600 N/mm²

3.0515	AlMn1
3.0525	AlMn1Mg0.5
3.1325	AlCuMg1
3.3315	AlMg1
3.3241	G-AlMg3Si
3.3292	GD-AlMg9

73 Aluminium alloys, 0.5-10% Si < 600 N/mm²

3.2134	G-AlSi5Cu1Mg
3.2152	GD-AlSi6Cu4
3.2162	GD-AlSi8Cu3
3.2373	G-AlSi9Mg

74 Aluminium alloys, Si > 10% < 600 N/mm²

3.2381	G-AlSi10Mg
3.2383	G-AlSi10Mg(Cu)
3.2581	G-AlSi12
3.2583	G-AlSi12(Cu)
3.5662	G-MgA16
3.5812	G-MgA18Zn1

81 Thermoplastics

Delrin(POM)
Teflon
Nylon

82 Thermosseting plastics

Bakelit
Novopan

83 Reinforced plastics materials

Glass fiber reinforced
Thermo and Duroplastics

Referance:DIN

NEW TOLERANCE NOTATIONS TO DIN EN 22857

For taps with metric ISO threads

The standard DIN 802 part 1 has been withdrawn and replaced by DIN EN 22857.

The following chart gives a comparison between the new standard DIN EN 22857 and the withdrawn standard DIN 802 part 1. An important change is the re-classification from tap tolerance classes to tap application classes.

Application classes for taps to DIN EN 22857		Tolerance classes to withdrawn standard DIN 802 part 1	Allotment of the tolerance zones of the nut thread to be cut				
Name	Code						
Class 1	ISO 1	4H	4H	5H	-	-	-
Class 2	ISO 2	6H	4G	5G	6H	-	-
Class 3	ISO 3	6G	-	-	6G	7H	8H
-	-	7G	-	-	-	7G	8G

A suitable transition period is to be expected.

Codes for tolerance classes 7G/8G and <X> tolerance zones have not yet been standardised within DIN EN 22857 and the values from DIN 802 part 1 will continue to be valid.

CUTTING SPEED TABLE

Cutting Speeds m/min. into revolutions per minute

Tool Dia.	Cutting Speed m/min. Tool r.p.m.															
	1	2	3	4	5	6	8	10	12	15	20	25	30	40	50	60
1	318	637	955	1274	1592	1910	2548	3185	3822	4777	6396	7962	9554	12739	15924	19108
2	159	318	478	637	796	955	1274	1592	1911	2388	3185	3981	4777	6369	7962	9554
3	106	212	318	425	531	637	849	1062	1274	1592	2123	2654	3185	4246	5308	6369
4	80	159	239	318	398	478	637	796	955	1194	1592	1990	2389	3185	3981	4777
5	64	127	191	255	318	382	510	637	764	955	1274	1592	1911	2548	3185	3822
6	53	106	159	212	265	318	425	531	637	796	1062	1327	1592	2123	2653	3185
8	40	80	119	159	199	239	318	398	478	597	796	955	1194	1592	1990	2388
10	31	64	96	127	159	191	255	318	382	478	637	796	955	1274	1592	1911
12	26	53	80	106	133	159	212	265	318	398	531	663	796	1062	1327	1592
14	23	45	68	91	114	136	182	227	273	341	455	569	682	910	1137	1365
16	20	40	60	80	100	119	159	199	239	299	398	498	597	796	995	1194
18	18	35	53	71	88	106	142	177	212	265	354	442	531	708	885	1062
20	16	32	48	64	80	96	127	159	191	239	318	398	478	637	796	955
25	13	25	38	51	64	76	102	127	153	191	255	318	382	510	637	764
30	11	21	32	42	53	64	85	106	127	159	212	265	318	425	531	637
35	9	18	27	36	45	55	73	91	109	136	182	227	273	364	455	546
40	8	16	24	32	40	48	64	80	96	119	159	199	239	118	398	478

10. STEEL

11. Magnetic soft steels - Hardness < 120 HB 30 - Tensile strength < 400 N/mm²

GERMANY W.Nr	GERMANY DIN	FRANCE AFNOR	GREAT BRITAIN B.S.	EN & OTHER CLASSIFICATIONS	U.S.A. AISI
1.1013	RFe 100		OSOA12	EN2	
1.1014	RFe 80				
1.1015	RFe 60		230Mo7	EN1	
1.0718	9 S MnPb 28				

12. Structural steels - Hardness < 200 HB 30 - Tensile strength < 700 N/mm²

12.1 - Structural steels

1.0034	RSt 34-2	A34-2 EN	1449 34/20 HR		
1.0035	St 33	A33	Fe 310-0		
1.0036	St 37-2		060A35	EN3A,4,5,6,7,8	
1.0037	RSt 37-2				
1.0044	St 44-2				
1.0050	St 50-2		4360-50B	EN 207	
1.0060	St 60-2				
1.0070	St 70-2				
1.0116	St 37-3				
1.0144	St 44-3				

12.2 - Case carburizing steels

1.0301	C 10	AF 34 C 10	040 A 10		M 1010
1.0401	C 15	AF 37 C 12	080 A 15		M 1015
1.1121	Ck 10	XC 10	040 A 10		1010
1.1141	Ck 15	XC 12	040 A 15		1015
1.5732	14 Ni Cr 10	14 NC 11			3415
1.7015	15 Cr 3	12 C 3	523 M 15		5015
1.7131	16 Mn Cr 5	16 MC 4	527 M 17	EN 32	5115
1.7147	20 Mn Cr 5	20 MC 5			5120

12.3 - Free machining steels

1.0710	15 S 10				
1.0715	9 S Mn 28	S 250	230 M 07		1213
1.0718	9 S Mn Pb 28	S 250 Pb			12 L 13
1.0721	10 S 20	10 F1	210 M 15		1108 1109
1.0722	10 S Pb 20	10 Pb F 2			11 L 08
1.0723	15 S 20	.....	210 A 15		
1.0726	35 S 20	35 MF 6	212 M 36		1140
1.0727	45 S 20	45 MF 4			1146
1.0736	9 S Mn 36	S 300			1215
1.0737	9 S Mn Pb 36	S 300 Pb			12 L 14

12.4 - Cast structural steels

1.0416	GS - 38				
1.0446	GS - 45				
1.0552	GS - 52				
1.0553	GS - 60	E 36 - 3			
1.0554	GS - 70				

13. Plain carbon steels - tempered

13.1 - Steels, tempered - Hardness < 250 HB 30 - Tensile strength < 850 N/mm²

1.0402	C 22	1 C 22	070 M 20		M 1023
1.0501	C 35	1 C 35	080 A 32		1035
1.0503	C 45	1 C 45	060 A 47		1045
1.0535	C 55	1 C 55	070 M 55		1055
1.0601	C 60	1 C 60	060 A 62	EN 43	1060
1.1157	40 Mn 4	35 M 5	150 M 36		1035 1041
1.1151	Ck 22	2 C 22	055 M 15		1020 1023
1.1181	Ck 35	2 C 35	080 A 35		1035 1038
1.1191	Ck 45	2 C 45	080 M 46	EN 9, 10	1045
1.1203	Ck 55	2 C 55	060 A 57		1055
1.1221	Ck 60	2 C 60	060 A 62		1060 1064

MATERIAL GROUP

14. Alloy steels - Hardness < 250 HB 30, < 25 HRC - Tensile strength < 850 N/mm²

14.1 - Cold work tool steels

1.2056	90 Cr 3				
1.2067	100 Cr 6	Y 100 C 6	BL 3		L 1 L 3
1.2080	X 210 Cr 12	Z 200 C 12	BD 3		D3
1.2083	X 42 Cr 13	Z 40 C 14			420
1.2363	X 100 CrMoV5 1	Z 100 CDV 5	BA 2		A 2
1.2379	X 155 CrVMo 12 1	Z 160 CDV 12	BD 2		D 2
1.2510	100 MnCrW 4	90 MWCV 5	BO 1		O1
1.2550	60 WCrV 7	55WC 20	BS 1		S1
1.2823	70 Si 7				
1.2826	60 Mn Si Cr 4				
1.2842	90 MnCrV 8	90 MV 8	BO 2		O 2

14.2 - High speed steels

1.3202	S 12-4-4-5	Z 130 WKCV 12-05-04-04	BT 15		T 15
1.3207	S 10-4-3-10	Z130 WKCDV10-10-04-04-03	BT 42		T 42
1.3243	S 6-5-2-5	Z85 WDKCV 06-05-05-04-02	BM 35		M 35
1.3247	S 2-10-1-8	Z110 DKCWV 09-08-04-02-01	BM 42		M 42
1.3343	S 6-5-2	Z 85 WDCV 06-05-04-02	BM 2		M 2
1.3344	S 6-5-3	Z 120 WDCV 06-05-04-03			M 3 / 2
1.3348	S 2-9-2	Z 100 DCWV 09-04-02-02			M 7
ASP 23	(S 6-5-3)				
ASP 30					
ASP 60					

14.3 - Alloy cast irons

1.5919	GS-15Cr Ni 6	16 NC 6			3115
1.7218	GS-25Cr Mo 4	25 C D 4	70 8A 25		4130
1.7220	GS-34Cr Mo 4	35 C D 4	70 8A 37		4135 4137
1.7379	GS-18 Cr Mo 9 10				

14.4 - Tempered steels

1.0503	C 45	1 C 45	060 A 47		1045
1.7220	34 Cr Mo 4	34 Cr Mo 4	708 A 37		4135, 4137
1.7225	42 Cr Mo 4	42 CD 4	708 A 42	EN 16, 17, 19	4140, 4142
1.7228	50 Cr Mo 4	50 Cr Mo 4	708 A 47		4150

14.5 - Nitriding steels

1.7779	20 Cr Mo V 13.5				
1.8504	34 Cr Al 6				
1.8506	34 Cr Al S 5				
1.8507	34 Cr Al Mo 5	30 CAD 6.12			A 355 Cl.D
1.8509	41 Cr Al Mo 7	40 CAD 6.12	905 M 39		A 355 Cl.A
1.8515	31 Cr Mo 12	30 CD 12	722 M 24		

15. Alloy steels / Tempered steels - Hardness 250-350 HB 30, 25-38 HRC - Tensile strength 850-1,200 N/mm²

15.1 - Alloy steels for tools

1.2311	40 Cr Mn Mo 7				
1.2312	40 Cr Mn Mo S 86				
1.2436	X 210 Cr W 12	Z 200 CW 12			
1.2711	54 Ni Cr Mo V 6				
1.2713	55 Ni Cr Mo V 6	55 NCDV 7	826 M 40	S 95, S 97, S 98	L 6
1.2714	56 Ni Cr Mo V 7				
1.2743	60 Ni Cr Mo V 12 4				
1.2766	35 Ni Cr Mo 16				

15.2 - Alloy steels for hot work

1.2343	X 38 Cr Mo V 5 1	Z 38 CDV 5	BH 11		H 11
1.2344	X 40 Cr Mo V 5 1	Z 40 CDV 5	BH 13		H 13
1.2365	X 32 Cr Mo V 3 3	32 DCV 28	BH 10		H 10
1.2367	X 40 Cr Mo V 5 3	Z 38 CDV 5.3			
1.2581	X 30 W Cr V 9 3	Z 30 WCV 9.3	BH 21		H 21
1.2622	X 60 W Cr Mo V 9				
1.2678	X 45 CoCrWV 5 5 5				
1.2550	60 WCr V 7	55 WC 20	BS 1		S 1
1.2567	X 30 W Cr V 5 3	Z 32 WCV 5			

STANDARDS					
GERMANY W.Nr	GERMANY DIN	FRANCE AFNOR	GREAT BRITAIN B.S.	EN & OTHER CLASSIFICATIONS	U.S.A. AISI
15.3 -Hardened tempered steels - Hardness may be different according to pressentation and dimensions of material					
1.5864	35 Ni Cr 18				
1.6580	30 Cr Ni Mo 8	30 Cr Ni Mo 8			
1.7361	32 Cr Mo 12	30 CD 12	722 M 24		
1.7707	30 Cr Mo V 9				
1.8161	58 Cr V 4				
15.4 - Nitriding steels					
1.8515	31 Cr Mo 12	30 CD 12	722 M 24		
1.8519	31 Cr Mo V 9		830 M 31		
1.8523	39 Cr Mo V 13 9		897 M 39		
1.8550	34 Cr Al Ni 7		826 M 40		
16. Alloy steels / Hardened tempered steels - Hardness > 38 HRC - Tensile strength > 1,200 N/mm²					
To this group belong most of the materials of group 15, but pressent a higher tensile strength					
20. STAINLESS STEELS					
21. Free machining stainless steels - Hardness < 250 HB 30 - Tensile strength < 850 N/mm²					
1.4104	X 12 Cr Mo S 17	Z 13 CF 17	416 S 37	EN 56	430 F
1.4305	X 10 Cr Ni S 18 09	Z 8 CNF 18-09	303 S 21	EN 60	303
22. Austenitic stainless steels - Hardness < 250 HB 30 - Tensile strength < 850 N/mm²					
1.4300	X 12 Cr Ni 18 8		320 S 12		
1.4301	X 5 Cr Ni 18 10	Z 6 CN 18-09	304 S 15	EN 80, EN 58 + C	304
1.4311	X 2 CrNiN 18 10	Z 3 CN 18-07 Az	304 S 61		304 LN
1.4406	X 2 CrNiMoN 17 12 2	Z 3 CND 17 11 02	316 S 61		316 LN
1.4433	X 2 CrNiMo 18 15		316 S		
1.4435	X 2 CrNiMo 18 14 3	Z3 CND 17-12-03	316 S 11		316 L
1.4539	X 1 CrNiMoCu 25 20 5	Z 1 NCDU 25-20	321 S 17		UNS N08904
1.4541	X 6 CrNiTi 18 10	Z 6 CNT 18 10	321 S 18	EN 58 J, 316	321
1.4571	X 6 CrNiMoTi 17 12 2	Z 6 CNDT 17 12	320 S 18		316 Ti
1.4573	X 10 CrNiMoTi 18 12		320 S 33		
1.4828	X 15 CrNiSi 20 12	Z 15 CNS 20-12	309 S 24		309
22.1 - Cast austenitic stainless steels					
1.4308	G-X 6 CrNi 18 9	Z 6 CN 18.10 M	304 C 15(LT196)		CF-8
1.4313	G-X 5 CrNi 13 4	Z 8 CD 17-01	425 C 12		CA 6 -NM
1.4408	G-X 6 CrNiMo 18 10		316 C 16(LT196)		CF-8M
1.4581	G-X 5 CrNiMoNb 18 10	Z 4 CNDNb 18.12M	318 C 17		
23. Martensitic stainless steels - Hardness < 320 HB 30 - Tensile strength < 1,100 N/mm²					
1.4021	X 20 Cr 13	Z 20 C 13	420 S 37		420
1.4034	X 46 Cr 13	Z 44 C 14	(420 S 45)		
1.4057	X 20 CrNi 17 2	Z 15 CN 16-02	431 S 29		431
1.4112	X 90 CrMoV 18				
1.4116	X 45 CrMoV 15			EN 58, b.e.j.t	
1.4125	X 105 CrMo 17	Z 100 CD 17		Duplex alloys	440 C
1.4718	X 45 CrSi 9 3	Z 45 CS 9	401 S 45		HNV 3
1.4747	X 80 CrNiSi 20	Z 80 CSN 20-02	443 S 65		HNV 6
1.4086	G-X 120 Cr 29				
1.4106	G-X 10 CrMo 13				
1.4138	G-X 120 CrMo 29 2				
24. Ferritic stainless steels - Hardness < 320 HB 30 - Tensile strength < 1,100 N/mm²					
1.4002	X 6 Cr Al 13	Z 8 CA 12	405 S 17		405
1.4006	X 10 Cr 13	Z 10 C 13	410 C 21		410
1.4016	X 6 Cr 17	Z 8 C 17	430 S 17		430
1.4510	X 6 Cr Ti 17	Z 8 CT 17			430 Ti
1.4512	X 6 Cr Ti 12	Z 6 CT 12	409 S 19		409
25. Ferritic-Austenitic stainless steels - Hardness < 320 HB 30 - Tensile strength < 1,100 N/mm²					
1.4460	X 8 CrNiMo 27 5	Z 5 CND 27-05 Az			329
1.4582	X 4 CrNiMoNb 25 7				
1.4821	X 20 CrNiSi 25 4				
30. CAST IRONS					
31. Grey graphite cast irons - Hardness < 150 HB 30 - Tensile strength < 500 N/mm²					
0.6010	GG-10	Ft 10 D			A 48-20 B
0.6015	GG-15	Ft 20 D	Grade 150	Grey cast iron soft	A 48-25 B
0.6020	GG-20	Ft 25 D	Grade 220		A 48-30 B
0.6025	GG-25	Ft 30 D	Grade 260		A 48-40 B
0.6030	GG-30	Ft 30 D	Grade 300		A 48-45 B
0.6035	GG-35	Ft 35 D	Grade 350		A 48-50 B
0.6040	GG-40	Ft 40 D	Grade 400		A 48-60 B

MATERIAL GROUP

STANDARDS					
GERMANY W.Nr	GERMANY DIN	FRANCE AFNOR	GREAT BRITAIN B.S.	EN & OTHER CLASSIFICATIONS	U.S.A. AISI
31.1 - Meehanite - Hardness < 150 HB 30 - Tensile strength < 500 N/mm²					
.....	GF - 150				
.....	GD - 260				
32. Grey graphite cast irons - Hardness 150 - 300 HB 30 - Tensile strength 500 - 1,000 N/mm²					
0.6020	GG - 20	Ft 25 D	Grade 220	Grey cast iron hard	A 48-30 B
0.6025	GG - 25	Ft 30 D	Grade 260		A 48-40 B
0.6030	GG - 30	Ft 30 D	Grade 300		A 48-45 B
0.6035	GG - 35	Ft 35 D	Grade 350		A 48-50 B
0.6040	GG - 40	Ft 40 D	Grade 400		A 48-60 B
32.1 - Meehanite - Hardness 150-300 HB 30 - Tensile strength 500-1,000 N/mm²					
.....	GF - 150				
.....	GD - 260				
33. Nodular graphite, malleable cast irons - Hardness < 200 HB 30 - Tensile strength < 700 N/mm²					
0.7033	GGG-35.3				
0.7040	GGG-40	FGS 400-12	420 / 12		60-40-18
0.7043	GGG-40.3	FGS 370-17	370 / 17		
0.7050	GGG-50	FGS 500-7	500 / 7		65-45-12
0.7060	GGG-60	FGS 600-3	600 / 3	S.G.iron, Meehanite	80-55-06
0.8035	GTW-35		700/2,30g/72	Black & White Heart	
0.8040	GTW-40				
0.8045	GTW-45				
0.8065	GTW-65				
0.8135	GTS-35				
0.8145	GTS-45				
0.8155	GTS-55				
0.8165	GTS-65				
33.1 - Meehanite - Hardness < 200 HB 30 -Tensile strength < 700 N/mm²					
	SF 400				
	SPF 600				
34. Nodular graphite, tempered malleable cast irons - Hardness 200-300 HB 30 - Tensile strength 700-1,000 N/mm²					
0.7070	GGG-70	FGS 700-2	700 / 2	S.G.iron,Meehanite	100-70-03
0.7080	GGG-80	FGS 800-2	800 / 2	Black & White Heart	120-90-02
And materials from group 33 tempered					
34.1 - Meehanite - Hardness 200-300 HB 30 - Tensile strength 700-1,000 N/mm²					
	SH 800		420/12, P 440/7		
	SH 1000				
40. TITANIUM					
41. Titanium, unalloys - Hardness < 200 HB 30 - Tensile strength < 700 N/mm²					
3.7024.1LN	Ti 99.5				
3.7034.1LN	Ti 99.7				
3.7035	Ti 2				
3.7055	Ti 99.4		TA 1-9	Ti 99.0	
3.7064.1LN	Ti 99.2				
3.7065	Ti 4				
3.7255	Ti 3 Pd				
42. Titanium, alloys - Hardness < 270 HB 30 - Tensile strength < 900 N/mm²					
	Ti Al 4 Mn 4				
3.7144 LN	Ti Al 5 Sn 2				
3.7124 LN	Ti Cu 2		TA 10-14, TA 17	Ti - 2AL	
3.7164 LN	Ti Al 6 V 4		TA 18		
3.7174 LN	Ti Al 6 V 6 Sn 2				
43. Titanium, alloys - Hardness 270-300 HB 30 - Tensile strength 900-1,300 N/mm²					
3.7124 LN	Ti Cu 2				
3.7144 LN	Ti Al 6 Sn 2 Zr4 Mo2			Ti AL	
3.7154 LN	Ti Al 6 Zr 5		TA 10-13, TA 28	3.7174LN, 3.7148LN	
3.7164 LN	Ti Al 6 V 4				
3.7174 LN	Ti Al 6 V Sn 2				
3.7184 LN	Ti Al 4 Mo 4 Sn 2				
50. NICKEL					
51. Nickel, unalloys - Hardness < 150 HB 30 - Tensile strength < 500 N/mm²					
2.1504 LN	Ni Al Bz				
2.4042	Ni 99 CSi		NA 11, NA 12	Nickel 200	
2.4060	Ni 99.6			Nickel 270	
2.4062	Ni 99.4 Fe				

STANDARDS

GERMANY W.Nr	GERMANY DIN	FRANCE AFNOR	GREAT BRITAIN B.S.	EN & OTHER CLASSIFICATIONS	U.S.A. AISI

52. Heat resisting nickel alloys - Hardness < 270 HB 30 - Tensile strength < 900 N/mm²

2.4360 LN	Monel 400				
2.4374 LN	Monel 500				
2.4617	Hastelloy B 2			Nimonic 75	
2.4665	Hastelloy X		HR 203		
2.4812	Hastelloy C		3027-76	Hastelloy C	
2.4816	Inconel 600			Haynes Alloys 263	
1.4876	Incoloy 800				
2.4983	Udimet 500				

53. Heat resisting nickel alloys - Hardness 270-410 HB 30 - Tensile strength 900-1,400 N/mm²

2.4631	Nimonic 80 A			Nimonic 80	
2.4632	Nimonic 90				
2.4634	Nimonic 105				
2.4662	Nimonic 901		HR 8		
2.4668	Inconel 718		HR 401, 601	Rene 41	
2.4669	Inconel X-750				
2.4670 LN	Nimocast 713				
2.4674 LN	Nimocast PK 24				
2.4856	Inconel 625				
2.6554 LN	Waspaloy				

60. COPPER

61. Copper, unalloys - Hardness < 100 HB 30 - Tensile strength < 350 N/mm²

2.0060	E - Cu 57				
2.0070	SE - Cu			Commerially Pure	
2.0090	SF - Cu		C 101		
2.1356	Cu Mn 3				
2.1522	Cu Si 2 Mn				

62. Short chip copper alloys - Hardness < 200 HB 30 - Tensile strength < 700 N/mm²

62.1 - Brass

2.0360	Cu Zn 40(MS 60)				
2.0380	Cu Zn 39 Pb 2 (MS 58)		CZ120, CZ109		
2.0410	Cu Zn 44 Pb 2		PB104		
2.0561	Cu Zn 40 Al 1			2.1030, 2.1080	
2.0580	Cu Zn 40 Mn 1 Pb				
2.0771	Cu Ni 7 Zn 39 Mn 5 Pb3				

62.2 - Bronzes

2.1086	G-Cu Sn 10 Zn				
2.1093	G-Cu Sn 6 Zn Ni				
2.1096	G-Cu Sn 5 Zn Pb				

63. Long chip copper alloys - Hardness < 200 HB 30 - Tensile strength < 700 N/mm²

63.1 - Brass

2.0250	Cu Zn 20				
2.0265	Cu Zn 30				
2.0321	Cu Zn 37		CZ108, CZ106		
2.0335	Cu Zn 36 (Ms 63)				

63.2 - Bronzes

2.1020	Cu Sn 6				
2.1030	Cu Sn 8				
2.1080	Cu Sn 6 Zn 6				

63.3 - Copper alloys tempered by forging

2.1245	Cu Be 1.7				
2.1247	Cu Be 2				
2.1293	Cu Cr Zr				

64. Cu - Al - Fe alloys Hardness < 440 HB 30 - Tensile strength < 1,500 N/mm²

64.1 - Ampco

	Ampco 18			Ampco 18	
	Ampco 20		AB 1 type		
	Ampco 25			Ampco 26	

MATERIAL GROUP

STANDARDS

GERMANY W.Nr	GERMANY DIN	FRANCE AFNOR	GREAT BRITAIN B.S.	EN & OTHER CLASSIFICATIONS	U.S.A. AISI

70. ALUMINIUM - MAGNESIUM

71. Aluminium - Magnesium, unalloys - Hardness < 100 HB 30 - Tensile strength < 350 N/mm²

3.0250	Al 99.5 H				
3.0280	Al 99.8 H				
3.0305	Al 99.9				
3.3308	Al 99.9 Mg 0.5				

72. Aluminium alloys, Si < 0.5% - Hardness < 180 HB 30 - Tensile strength < 600 N/mm²

72.1 - Forging aluminium alloys

3.0515	Al Mn 1				
3.0516	S-Al Mn				
3.0525	Al Mn 1 Mg 0.5				
3.0615	Al Mg Si Pb				
3.1325	Al Cu Mg 1				
3.1355	Al Cu Mg 2				
3.3315	Al Mg 1				
3.3535	Al Mg 3				
3.4365	Al Zn Mg Cu 1.5				

72.2 - Cast aluminium alloys

3.1841	G - Al Cu 4 Ti				
3.3241	G - Al Mg 3 Si				
3.3292	GD - Al Mg 9				

73. Aluminium alloys, 0.5-10% Si - Hardness < 180 HB 30 - Tensile strength < 600 N/mm²

73.1 - Cast aluminium alloys

3.2134	G - Al Si 5 Cu 1 Mg				
3.2152	GD - Al Si 6 Cu 4				
3.2162	GD - Al Si 8 Cu 3				
3.2373	G - Al Si 9 Mg				

74. Aluminium alloys, Si > 10% - Hardnes < 180 HB 30 - Tensile strength < 600 N/mm²

74.1 - Cast aluminium alloys

3.2381	G - Al Si 10 Mg				
3.2383	G - Al Si 10 Mg (Cu)				
3.2581	G - Al Si 12				
3.2583	G - Al Si 12 (Cu)				
3.2982	GD - Al Si 12 (Cu)				

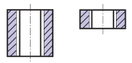
74.2 - Cast aluminium - magnesium alloys

3.5106	G - Mg Ag 3 SE 2 Zr 1				
3.5662	G - Mg Al 6				
3.5812	G - Mg Al 8 Zn 1				
3.5912	G - Mg Al 9 Zn 1				

INTERRUPTED THREAD
ALUMINIUM & ALUMINIUM ALLOYS
SPIRAL POINT

Cat.-No. **TM0516**

Hole type



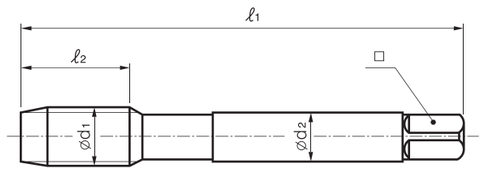
DIN 371

Material groups **AL**

See page : 301~307

61-71-72-73

HSS-E | DIN 371/376 | 6H | 60° | B



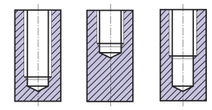
ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM05160200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM05160250
M 3	×	0.5	6	56	3.5	2.7	2.5	TM05160300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM05160400
M 5	×	0.8	8	70	6	4.9	4.2	TM05160500
M 6	×	1.0	10	80	6	4.9	5	TM05160600
M 8	×	1.25	13	90	8	6.2	6.8	TM05160800
M 10	×	1.5	15	100	10	8	8.5	TM05161000
M 12	×	1.75	18	110	9	7	10.2	TM06161200
M 16	×	2.0	20	110	12	9	14	TM06161600

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M16)

ALUMINIUM & ALUMINIUM ALLOYS
SPIRAL FLUTE

Cat.-No. **TM3716**

Hole type



DIN 371

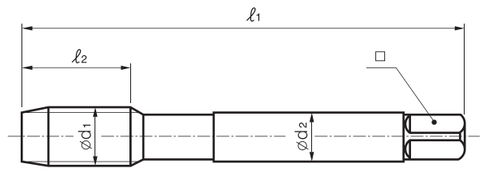
DIN 376

Material groups **AL**

See page : 301~307

71-72-73

HSS-E | DIN 371/376 | 6H | 60° | C



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM37160200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM37160250
M 3	×	0.5	6	56	3.5	2.7	2.5	TM37160300
M 3.5	×	0.6	7	56	4	3	2.9	TM37160350
M 4	×	0.7	7	63	4.5	3.4	3.3	TM37160400
M 5	×	0.8	8	70	6	4.9	4.2	TM37160500
M 6	×	1.0	10	80	6	4.9	5	TM37160600
M 8	×	1.25	13	90	8	6.2	6.8	TM37160800
M 10	×	1.5	15	100	10	8	8.5	TM37161000
M 12	×	1.75	18	110	9	7	10.2	TM37161200
M 14	×	2.0	20	110	11	9	12	TM37161400
M 16	×	2.0	20	110	12	9	14	TM37161600
M 18	×	2.5	25	125	14	11	15.5	TM37161800
M 20	×	2.5	25	140	16	12	17.5	TM37162000

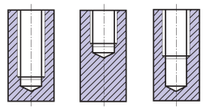
ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M20)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

CARBON STEELS WITH LOW CONTENTS OF ALLOY UP TO 600NM
SPIRAL FLUTE

Cat.-No. **TM1730**

Hole type



DIN 371

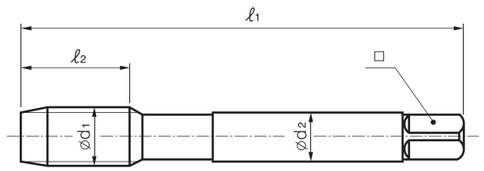
DIN 376

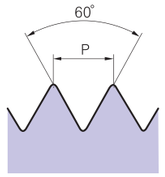
Material groups **NW**

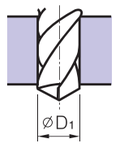
See page : 301~307

11-12-22

HSS-E | DIN 371/376 | 6H | 60° | B | vap







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	6	45	3.5	2.7	2.5	TM17300300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM17300400
M 5	×	0.8	8	70	6	4.9	4.2	TM17300500
M 6	×	1.0	10	80	6	4.9	5	TM17300600
M 8	×	1.25	13	90	8	6.2	6.8	TM17300800
M 10	×	1.5	15	100	10	8	8.5	TM17301000
M 12	×	1.75	18	110	9	7	10.2	TM18301200
M 14	×	2.0	20	110	11	9	12	TM18301400
M 16	×	2.0	20	110	12	9	14	TM18301600
M 18	×	2.5	25	125	14	11	15.5	TM18301800
M 20	×	2.0	25	140	16	12	17.5	TM18302000

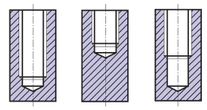
ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M20)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

WITH RECESSED THREADS
FOR STAINLESS STEELS & TOUGH MATERIALS
SPIRAL FLUTE

Cat.-No. **TM2530**

Hole type



DIN 371

DIN 376

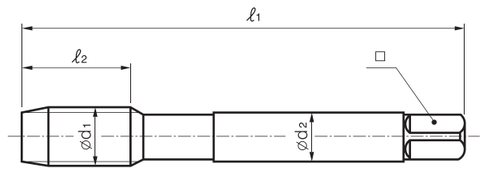
※With recessed threads for maching tapping of deep blind holes.

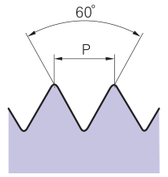
Material groups **VA NW**

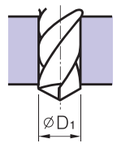
See page : 301~307

11-12-21-22-23

HSS-E | DIN 371/376 | 6H | 60° | C | vap







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 4	×	0.7	7	63	4.5	3.4	3.3	TM25300400
M 5	×	0.8	8	70	6	4.9	4.2	TM25300500
M 6	×	1.0	10	80	6	4.9	5	TM25300600
M 8	×	1.25	13	90	8	6.2	6.8	TM25300800
M 10	×	1.5	15	100	10	8	8.5	TM25301000
M 12	×	1.75	18	110	9	7	10.2	TM26301200

ALL DIMENSIONS ARE IN MM
DIN 371(M4-M10) DIN 376(M12)

M *ISO metric coarse threads DIN 13*
Metrisches ISO-Gewinde DIN 13

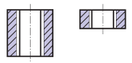
FOR STAINLESS STEELS & TOUGH MATERIALS
SPIRAL POINT

Cat.-No. **TM3130**

DIN 371

DIN 376

Hole type

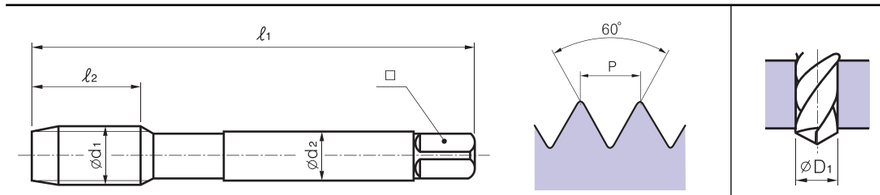


Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | DIN 371/376 | 6HX | 60° | B | vap



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM31300200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM31300250
M 3	×	0.5	11	56	3.5	2.7	2.5	TM31300300
M 4	×	0.7	13	63	4.5	3.4	3.3	TM31300400
M 5	×	0.8	15	70	6	4.9	4.2	TM31300500
M 6	×	1.0	17	80	6	4.9	5	TM31300600
M 8	×	1.25	20	90	8	6.2	6.8	TM31300800
M 10	×	1.5	22	100	10	8	8.5	TM31301000
M 12	×	1.75	24	110	9	7	10.2	TM32301200
M 16	×	2.0	27	110	12	9	14	TM32301600
M 20	×	2.5	32	140	16	12	17.5	TM32302000

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M20)

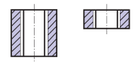
MF *ISO metric fine threads DIN 13*
Metrisches ISO-Feingewinde DIN 13

FOR STAINLESS STEELS & TOUGH MATERIALS
SPIRAL POINT

Cat.-No. **TM3630**

DIN 374

Hole type

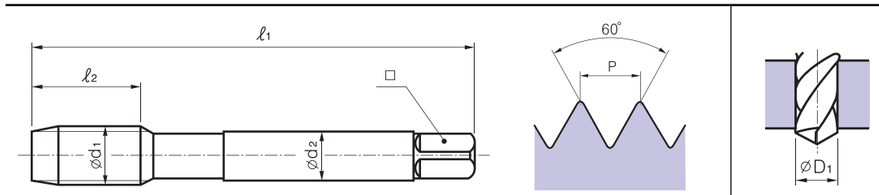


Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | DIN 374 | 6HX | 60° | B | vap



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 4	×	0.5	10	63	2.8	2.1	3.5	TM36300400
M 5	×	0.5	11	70	3.5	2.7	4.5	TM36300500
M 6	×	0.5	13	80	4.5	3.4	5.5	TM36300600
M 6	×	0.75	13	80	4.5	3.4	5.2	TM36300601
M 8	×	0.75	14	80	6	4.9	7.2	TM36300800
M 8	×	1.0	17	90	6	4.9	7	TM36300801
M 10	×	0.75	18	90	7	5.5	9.2	TM36301000
M 10	×	1.0	18	90	7	5.5	9	TM36301001
M 10	×	1.25	22	100	7	5.5	8.8	TM36301002
M 12	×	1.0	18	100	9	7	11	TM36301200
M 12	×	1.25	22	100	9	7	10.8	TM36301201
M 12	×	1.5	22	100	9	7	10.5	TM36301202
M 14	×	1.25	22	100	11	9	12.8	TM36301400
M 14	×	1.5	22	100	11	9	12.5	TM36301401
M 16	×	1.5	22	100	12	9	14.5	TM36301600
M 18	×	1.5	25	110	14	11	16.5	TM36301800
M 20	×	1.5	25	125	16	12	18.5	TM36302000
M 22	×	1.5	25	125	18	14.5	20.5	TM36302200
M 24	×	1.5	27	140	18	14.5	22.5	TM36302400

ALL DIMENSIONS ARE IN MM
DIN 374(M4-M24)

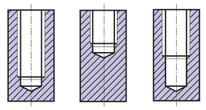
MF *ISO metric fine threads DIN 13*
Metrisches ISO-Feingewinde DIN 13

FOR STAINLESS STEELS & TOUGH MATERIALS
SPIRAL FLUTE

Cat.-No. TM3830

DIN 374

Hole type

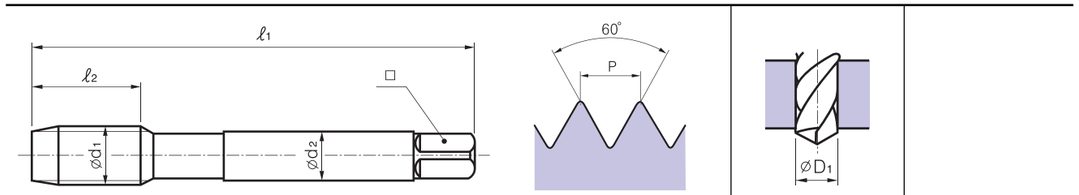


Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | **DIN 374** | **6H** | 60° | **C** | **vap**



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 4	×	0.5	5	63	2.8	2.1	3.5	TM38300400
M 5	×	0.5	5	70	3.5	2.7	4.5	TM38300500
M 6	×	0.5	5	80	4.5	3.4	5.5	TM38300600
M 6	×	0.75	8	80	4.5	3.4	5.2	TM38300601
M 8	×	0.75	8	80	6	4.9	7.2	TM38300800
M 8	×	1.0	10	90	6	4.9	7	TM38300801
M 10	×	0.75	10	90	7	5.5	9.2	TM38301000
M 10	×	1.0	10	90	7	5.5	9	TM38301001
M 10	×	1.25	16	100	7	5.5	8.8	TM38301002
M 12	×	1.0	11	100	9	7	11	TM38301200
M 12	×	1.25	15	100	9	7	10.8	TM38301201
M 12	×	1.5	15	100	9	7	10.5	TM38301202
M 14	×	1.25	15	100	11	9	12.8	TM38301400
M 14	×	1.5	15	100	11	9	12.5	TM38301401
M 16	×	1.5	15	100	12	9	14.5	TM38301600
M 18	×	1.5	17	110	14	11	16.5	TM38301800
M 20	×	1.5	17	125	16	12	18.5	TM38302000
M 22	×	1.5	17	125	18	14.5	20.5	TM38302200
M 24	×	1.5	20	140	18	14.5	22.5	TM38302400

UNC *Unified coarse threads*
Unified Grobgewinde

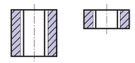
SPIRAL POINT

Cat.-No. TM6430

DIN 371

DIN 376

Hole type

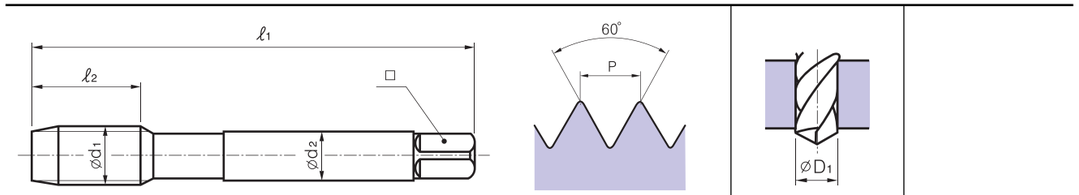


Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | **DIN 371/376** | **2B** | 60° | **B** | **vap**



ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	40	11	56	3.5	2.7	2.3	TM64300400
5	×	40	11	56	3.5	2.7	2.6	TM64300500
6	×	32	12	56	4	3	2.85	TM64300600
8	×	32	13	63	4.5	3.4	3.5	TM64300800
10	×	24	15	70	6	4.9	3.9	TM64301000
12	×	24	16	80	6	4.9	4.5	TM64301200
1/4	×	20	17	80	7	5.5	5.2	TM64309160
5/16	×	18	20	90	8	6.2	6.6	TM64309200
3/8	×	16	22	100	9	7	8	TM64309240
7/16	×	14	22	100	8	6.2	9.4	TM64309280
1/2	×	13	25	110	9	7	10.75	TM64309320
9/16	×	12	26	110	11	9	12.25	TM64309360
5/8	×	11	27	110	12	9	13.5	TM64309400
3/4	×	10	30	125	14	11	16.5	TM64309480
7/8	×	9	32	140	18	14.5	19.5	TM64309560
1”	×	8	36	160	20	16	22.25	TM64309640

DIN 371(NO.4-3/8) DIN 376(7/10-1”)

UNC *Unified coarse threads*
Unified Grobgewinde

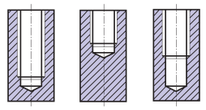
FOR STAINLESS STEELS & TOUGH MATERIALS
SPIRAL FLUTE

Cat.-No. TM6530

DIN 371

DIN 376

Hole type

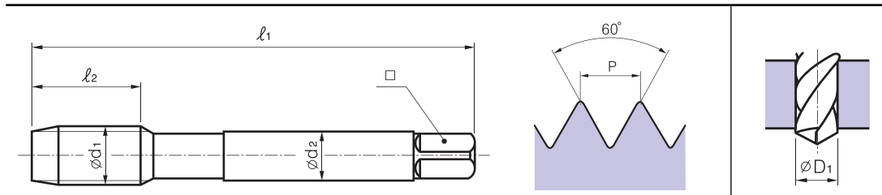


Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | DIN 371/376 | 2B | 60° | C | vap



ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	40	6	56	3.5	2.7	2.3	TM65300400
5	×	40	7	56	3.5	2.7	2.6	TM65300500
6	×	32	7	56	4	3	2.85	TM65300600
8	×	32	8	63	4.5	3.4	3.5	TM65300800
10	×	24	10	70	6	4.9	3.9	TM65301000
12	×	24	10	80	6	4.9	4.5	TM65301200
1/4	×	20	13	80	7	5.5	5.2	TM65309160
5/16	×	18	14	90	8	6.2	6.6	TM65309200
3/8	×	16	16	100	9	7	8	TM65309240
7/16	×	14	17	100	8	6.2	9.4	TM65309280
1/2	×	13	20	110	9	7	10.75	TM65309320
9/16	×	12	20	110	11	9	12.25	TM65309360
5/8	×	11	22	110	12	9	13.5	TM65309400
3/4	×	10	25	125	14	11	16.5	TM65309480
7/8	×	9	27	140	18	14.5	19.5	TM65309560
1”	×	8	30	160	20	16	22.25	TM65309640

DIN 371(NO.4-3/8) DIN 376(7/16-1”)

UNF *Unified fine threads*
Unified Feingewinde

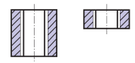
FOR STAINLESS STEELS & TOUGH MATERIALS
SPIRAL POINT

Cat.-No. TM6730

DIN 371

DIN 376

Hole type

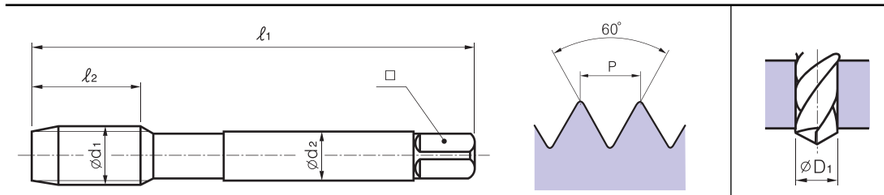


Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | DIN 371/376 | 2B | 60° | B | vap



ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	48	11	56	3.5	2.7	2.4	TM67300400
5	×	44	11	56	3.5	2.7	2.7	TM67300500
6	×	40	12	56	4	3	3	TM67300600
8	×	36	13	63	4.5	3.4	3.5	TM67300800
10	×	32	13	70	6	4.9	4.1	TM67301000
12	×	28	16	80	6	4.9	4.7	TM67301200
1/4	×	28	17	80	7	5.5	5.5	TM67309160
5/16	×	24	17	90	8	6.2	6.9	TM67309200
3/8	×	24	18	100	9	7	5.8	TM67309240
7/16	×	20	22	100	8	6.2	9.9	TM67309280
1/2	×	20	22	100	9	7	11.5	TM67309320
9/16	×	18	22	100	11	9	12.9	TM67309360
5/8	×	18	22	100	12	9	14.5	TM67309400
3/4	×	16	25	110	14	11	17.5	TM67309480
7/8	×	14	26	125	18	14.5	20.5	TM67309560
1”	×	12	28	140	20	16	23.25	TM67309640

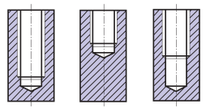
DIN 371(NO.4-3/8) DIN 376(7/16-1”)

UNF *Unified fine threads*
Unified Feingewinde

FOR STAINLESS STEELS & TOUGH MATERIALS
SPIRAL FLUTE

Cat.-No. TM6830

Hole type



DIN 371

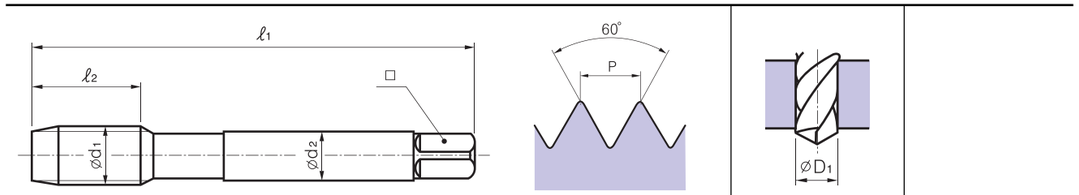
DIN 374

Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | DIN 371/374 | 2B | 60° | C | vap



ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	48	9	56	3.5	2.7	2.4	TM68300400
5	×	44	7	56	3.5	2.7	2.7	TM68300500
6	×	40	7	56	4	3	3	TM68300600
8	×	36	8	63	4.5	3.4	3.5	TM68300800
10	×	32	10	70	6	4.9	4.1	TM68301000
12	×	28	10	80	6	4.9	4.7	TM68301200
1/4	×	28	10	80	7	5.5	5.5	TM68309160
5/16	×	24	10	90	8	6.2	6.9	TM68309200
3/8	×	24	10	100	9	7	8.5	TM68309240
7.16	×	20	13	100	8	6.2	9.9	TM68309280
1/2	×	20	13	100	9	7	11.5	TM68309320
9/16	×	18	15	100	11	9	12.9	TM68309360
5/8	×	18	15	100	12	9	14.5	TM68309400
3/4	×	16	17	110	14	11	17.5	TM68309480
7/8	×	14	17	125	18	14.5	20.5	TM68309560
1”	×	12	20	140	20	16	23.25	TM68309640

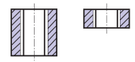
DIN 371(NO.4-3/8) DIN 376(7/16-1”)

M *ISO metric coarse threads DIN 13*
Metrisches ISO-Gewinde DIN 13

HARDSLICK TAPS
SUITABLE FOR STAINLESS STEEL
AUSTENITIC STAINLESS
MAGNETIC SOFT STEELS
STRUCTURAL STEELS
SPIRAL POINT

Cat.-No. TM8053

Hole type



DIN 371

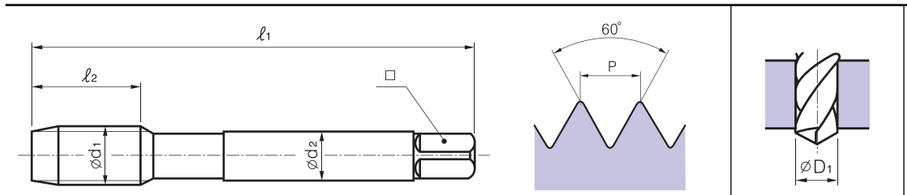
DIN 376

Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | DIN 371/376 | 6HX | 60° | B | Hardslick



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	11	56	3.5	2.7	2.5	TM80530300
M 4	×	0.7	13	63	4.5	3.4	3.3	TM80530400
M 5	×	0.8	15	70	6	4.9	4.2	TM80530500
M 6	×	1.0	17	80	6	4.9	5	TM80530600
M 8	×	1.25	20	90	8	6.2	6.8	TM80530800
M 10	×	1.5	22	100	10	8	8.5	TM80531000
M 12	×	1.75	24	110	9	7	10.2	TM80531200
M 16	×	2.0	27	110	12	9	14	TM80531600
M 18	×	2.5	30	125	14	11	15.5	TM80531800

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M18)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

EUROPA TOOL

HARDSLICK TAPS
WITH RECESSED THREADS
SUITABLE FOR STAINLESS STEEL
AUSTENITIC STAINLESS
MAGNETIC SOFT STEELS
STRUCTURAL STEELS
SPIRAL FLUTE

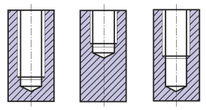
Cat.-No. **TM8153**

DIN 371

DIN 376

※With recessed threads for maching tapping of deep blind holes.

Hole type

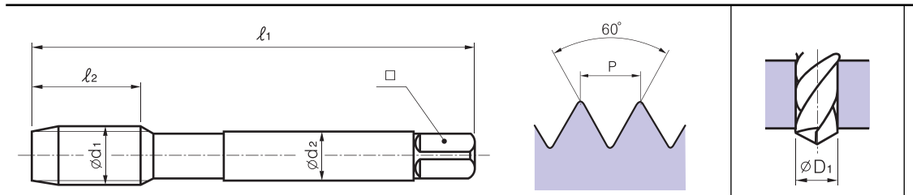


Material groups **VA NW**

See page : 301~307

11-12-21-22-23

HSS-E | DIN 371/376 | 6H | 60° | B | Hardslick



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	11	56	3.5	2.7	2.5	TM81530300
M 4	×	0.7	13	63	4.5	3.4	3.3	TM81530400
M 5	×	0.8	15	70	6	4.9	4.2	TM81530500
M 6	×	1.0	17	80	6	4.9	5	TM81530600
M 8	×	1.25	20	90	8	6.2	6.8	TM81530800
M 10	×	1.5	22	100	10	8	8.5	TM81531000
M 12	×	1.75	24	110	9	7	10.2	TM81531200
M 16	×	2.0	27	110	12	9	14	TM81531600
M 18	×	2.5	30	125	14	11	15.5	TM81531800

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M18)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

EUROPA TOOL

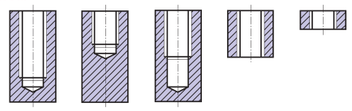
COLD FORMING TAPS
WITH OIL GROOVES
FOR BLIND & THROUGH HOLES IN STEELS UP TO 850NM
STAINLESS STEELS
NICKEL & COPPER UNALLOYS
ALUMINIUM MAGNESIUM
TITAMIUM
COLD FORMING

Cat.-No. **TM3817**

DIN 371

DIN 376

Hole type

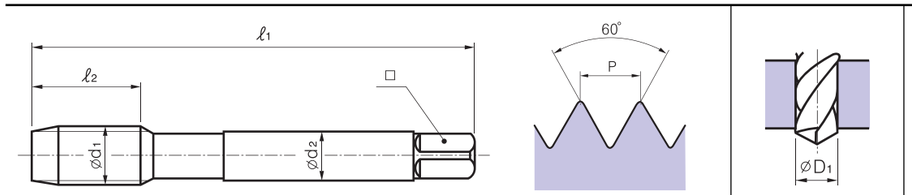


Material groups **GV**

See page : 301~307

11-12-13-14-21-22-41-51-61-71

HSS-E | DIN 371/376 | 6HX | 60° | C | TiN



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.83	TM38170200
M 3	×	0.5	11	56	3.5	2.7	2.8	TM38170300
M 4	×	0.7	13	63	4.5	.4	3.7	TM38170400
M 5	×	0.8	15	70	6	4.9	4.65	TM38170500
M 6	×	1.0	17	80	6	4.9	5.55	TM38170600
M 8	×	1.25	20	90	8	6.2	7.4	TM38170800
M 10	×	1.5	22	100	10	8	9.3	TM38171000
M 12	×	1.75	24	110	9	7	11.2	TM38171200
M 14	×	2.0	26	110	11	9	13	TM38171400
M 16	×	2.0	27	110	12	9	15	TM38171600
M 20	×	2.5	32	140	16	12	18.8	TM38172000

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

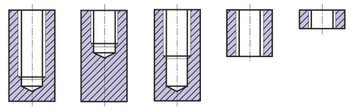
COLD FORMING TAPS
WITH OIL GROOVES
FOR BLIND & THROUGH HOLES IN STEELS UP TO 850NM
STAINLESS STEELS
NICKEL & COPPER
ALUMINIUM MAGNESIUM
TITAMIUM
COLD FORMING

Cat.-No. TM3827

DIN 371

DIN 376

Hole type

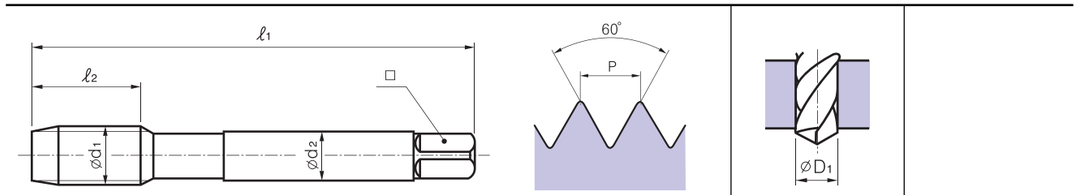


Material groups **GV**

See page : 301~307

11-12-13-14-41-51-61-71

HSS-E | DIN 371/376 | 6HX | 60° | C | TiAlN



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.83	TM38270200
M 2.5	×	0.45	9	50	2.8	2.1	2.3	TM38270250
M 3	×	0.5	11	56	3.5	2.7	2.8	TM38270300
M 4	×	0.7	13	63	4.5	3.4	3.7	TM38270400
M 5	×	0.8	15	70	6	4.9	4.65	TM38270500
M 6	×	1.0	17	80	6	4.9	5.55	TM38270600
M 8	×	1.25	20	90	8	6.2	7.4	TM38270800
M 10	×	1.5	22	100	10	8	9.3	TM38271000
M 12	×	1.75	24	110	9	7	11.2	TM38271200

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

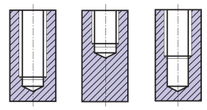
FOR HIGH TENSILE STEELS
HEAT TREATED & HEAT RESISTANT
UP TO 1200NM
SPIRAL FLUTE

Cat.-No. TM1530

DIN 371

DIN 376

Hole type

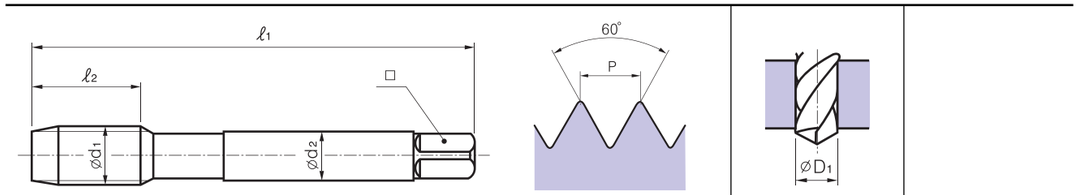


Material groups **VG**

See page : 301~307

15

HSS-E | DIN 371/376 | 6H | 60° | C | vap



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM15300200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM15300250
M 3	×	0.5	6	56	3.5	2.7	2.5	TM15300300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM15300400
M 5	×	0.8	8	70	6	4.9	4.2	TM15300500
M 6	×	1.0	10	80	6	4.9	5	TM15300600
M 8	×	1.25	13	90	8	6.2	6.8	TM15300800
M 10	×	1.5	15	100	10	8	8.5	TM15301000
M 12	×	1.75	18	110	9	7	10.2	TM16301200
M 14	×	2.0	20	110	11	9	12	TM16301400
M 16	×	2.0	20	110	12	9	14	TM16301600
M 18	×	2.5	25	125	14	11	15.5	TM16301800
M 20	×	2.5	25	140	16	12	17.5	TM16302000
M 24	×	3.0	30	160	18	14.5	21	TM16302400

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M24)

WITH RECESSED THREADS FOR DEEP BLIND HOLES IN STEELS UP TO 1200NM & MALLEABLE CAST IRON SPIRAL FLUTE

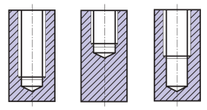
Cat.-No. **TM2130**

DIN 371

DIN 376

※With recessed threads for maching tapping of deep blind holes.

Hole type

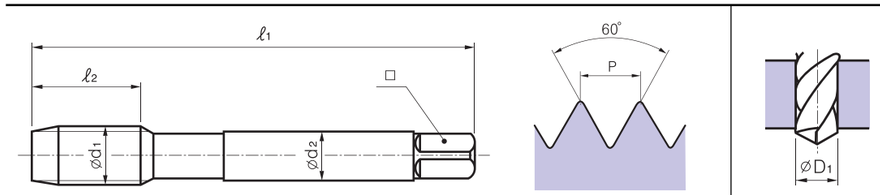


Material groups **VG**

See page : 301~307

15

HSS-E | DIN 371/376 | 6H | 60° | C | vap



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	6	56	3.5	2.7	2.5	TM21300300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM21300400
M 5	×	0.8	8	70	6	4.9	4.2	TM21300500
M 6	×	1.0	10	80	6	4.9	5	TM21300600
M 8	×	1.25	13	90	8	6.2	6.8	TM21300800
M 10	×	1.5	15	100	10	8	8.5	TM21301000
M 12	×	1.75	18	110	9	7	10.2	TM22301200
M 14	×	2.0	20	110	11	9	12	TM22301400
M 16	×	2.0	20	110	12	9	14	TM22301600
M 20	×	2.5	25	140	16	12	17.5	TM22302000

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M20)

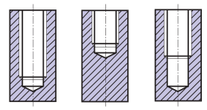
FOR HIGH TENSILE STEELS HEAT TREATED & HEAT RESISTANT UP TO 1200NM SPIRAL FLUTE

Cat.-No. **TM2330**

DIN 371

DIN 376

Hole type

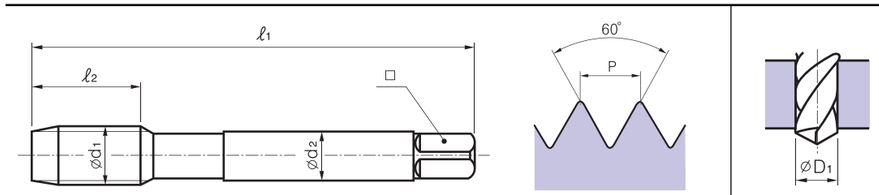


Material groups **HR**

See page : 301~307

16-64

HSS-E | DIN 371/376 | 6H | 60° | C | vap



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM23300200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM23300250
M 3	×	0.5	6	56	3.5	2.7	2.5	TM23300300
M 4	×	0.7	7	663	4.5	3.4	3.3	TM23300400
M 5	×	0.8	8	70	6	4.9	4.2	TM23300500
M 6	×	1.0	10	80	6	4.9	5	TM23300600
M 8	×	1.25	13	90	8	6.2	6.8	TM23300800
M 10	×	1.5	15	100	10	8	8.5	TM23301000
M 12	×	1.75	18	110	9	7	10.2	TM24301200
M 16	×	2.0	20	110	12	9	14	TM24301600

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M16)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

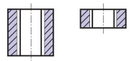
FOR HIGH TENSILE STEELS
HEAT TREATED & HEAT RESISTANT
UP TO 1200NM
SPIRAL POINT

Cat.-No. TM2716

DIN 371

DIN 376

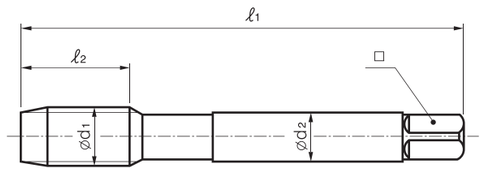
Hole type

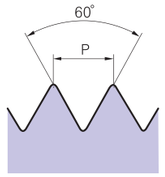


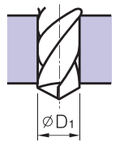
Material groups **VG**

See page : 301~307
15

HSS-E | DIN 371/376 | 6H | 60° | B







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM27160200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM27160250
M 3	×	0.5	11	56	3.5	2.7	2.5	TM27160300
M 3.5	×	0.6	12	56	4	3	2.9	TM27160350
M 4	×	0.7	13	63	4.5	3.4	3.3	TM27160400
M 5	×	0.8	15	70	6	4.9	4.2	TM27160500
M 6	×	1.0	17	80	6	4.9	5	TM27160600
M 8	×	1.25	20	90	8	6.2	6.8	TM27160800
M 10	×	1.5	22	100	10	8	8.5	TM27161000
M 12	×	1.75	24	110	9	7	10.2	TM28161200
M 16	×	2.0	27	110	12	9	14	TM28161600
M 20	×	2.5	32	140	16	12	17.5	TM28162000

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M20)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

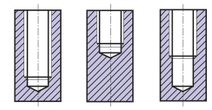
FOR HIGH TENSILE STEELS
HEAT TREATED & HEAT RESISTANT
UP TO 1200NM
SPIRAL FLUTE

Cat.-No. TM2817

DIN 371

DIN376

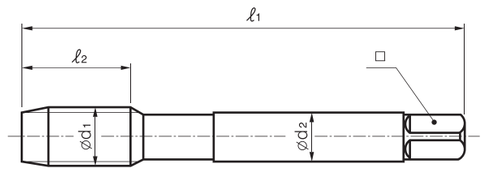
Hole type

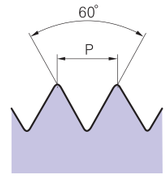


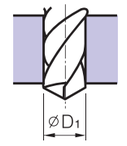
Material groups **VG**

See page : 301~307
15

HSS-E | DIN 371/376 | 6H | 60° | C | TiN







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	6	56	3.5	2.7	2.5	TM28170300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM28170400
M 5	×	0.8	8	70	6	4.9	4.2	TM28170500
M 6	×	1.0	10	80	6	4.9	5	TM28170600
M 8	×	1.25	13	90	8	6.2	6.8	TM28170800
M 10	×	1.5	15	100	10	8	8.5	TM28171000
M 12	×	1.75	18	110	9	7	10.2	TM28171200
M 14	×	2.0	20	110	11	9	12	TM28171400
M 16	×	2.0	20	110	12	9	14	TM28171600
M 20	×	2.5	25	140	16	12	17.5	TM28172000

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M20)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

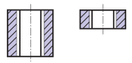
FOR HIGH TENSILE STEELS
HEAT TREATED & HEAT RESISTANT
UP TO 1200NM
SPIRAL POINT

Cat.-No. **TM2917**

DIN 371

DIN 376

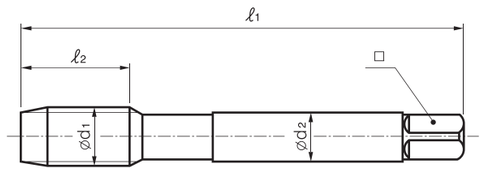
Hole type



Material groups **VG**

See page : 301~307
15

HSS-E | DIN 371/376 | 6H | 60° | B | TiN



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	6	56	3.5	2.7	2.5	TM29170300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM29170400
M 5	×	0.8	8	70	6	4.9	4.2	TM29170500
M 6	×	1.0	10	80	6	4.9	5	TM29170600
M 8	×	1.25	13	90	8	6.2	6.8	TM29170800
M 10	×	1.5	15	100	10	8	8.5	TM29171000
M 12	×	1.75	18	110	9	7	10.2	TM30171200
M 14	×	2.0	20	110	11	9	12	TM30171400
M 16	×	2.0	20	110	12	9	14	TM30171600
M 20	×	2.5	25	140	16	12	17.5	TM30172000

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M20)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

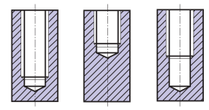
FOR HIGH TENSILE STEELS
HEAT TREATED & HEAT RESISTANT
UP TO 1200NM
SPIRAL FLUTE

Cat.-No. **TM6316**

DIN 371

DIN 376

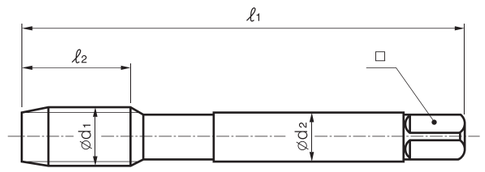
Hole type



Material groups **VG**

See page : 301~307
15

HSS-E | DIN 371/376 | 6H | 60° | C



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM63160200
M 2.2	×	0.45	8	45	2.8	2.1	1.75	TM63160220
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM63160250
M 3	×	0.5	6	56	3.5	2.7	2.5	TM63160300
M 3.5	×	0.6	7	56	4	3	2.9	TM63160350
M 4	×	0.7	7	63	4.5	3.4	3.3	TM63160400
M 5	×	0.8	8	70	6	4.9	4.2	TM63160500
M 6	×	1.0	10	80	6	4.9	5	TM63160600
M 8	×	1.25	13	90	8	6.2	6.8	TM63160800
M 10	×	1.5	15	100	10	8	8.5	TM63161000
M 12	×	1.75	18	110	9	7	10.2	TM63161200
M 16	×	2.0	20	110	12	9	14	TM63161600
M 20	×	2.5	25	140	16	12	17.5	TM63162000

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M20)

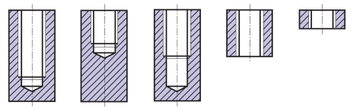
NITRIDED FOR GREY CAST IRON
STRAIGHT FLUTE

Cat.-No. TM0731

DIN 371

DIN 376

Hole type

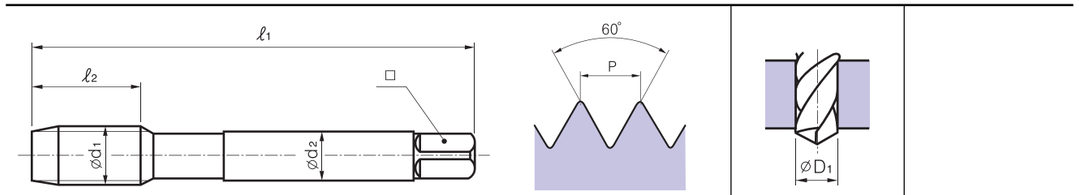


Material groups **GG**

See page : 301~307

31-32-83

HSS-E | DIN 371/376 | 6H | 60° | C | NI



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	11	56	3.5	2.7	2.5	TM07310300
M 4	×	0.7	13	63	4.5	3.4	3.3	TM07310400
M 5	×	0.8	15	70	6	4.9	4.2	TM07310500
M 6	×	1.0	17	80	6	4.9	5	TM07310600
M 8	×	1.25	20	90	8	6.2	6.8	TM07310800
M 10	×	1.5	22	100	10	8	8.5	TM07311000
M 12	×	1.75	24	110	9	7	10.2	TM08311200
M 14	×	2.0	26	110	11	9	12	TM08311400
M 16	×	2.0	27	110	12	9	14	TM08311600

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M16)

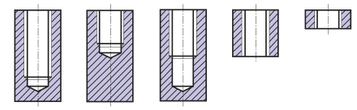
TIN COATED FOR GREY CAST IRON
STRAIGHT FLUTE

Cat.-No. TM0917

DIN 371

DIN 376

Hole type

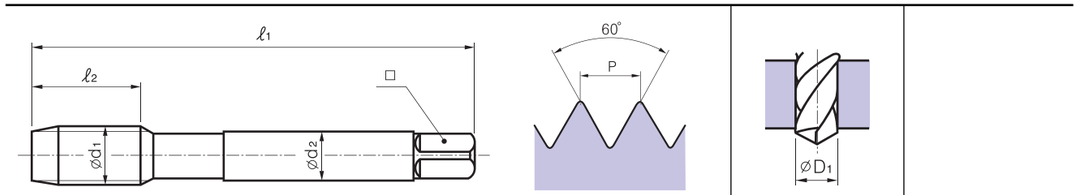


Material groups **GG**

See page : 301~307

31-32-83

HSS-E | DIN 371/376 | 6HX | 60° | C | TiN



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	11	56	3.5	2.7	2.5	TM09170300
M 4	×	0.7	13	63	4.5	3.4	3.3	TM09170400
M 5	×	0.8	15	70	6	4.9	4.2	TM09170500
M 6	×	1.0	17	80	6	4.9	5	TM09170600
M 8	×	1.25	20	90	8	6.2	6.8	TM09170800
M 10	×	1.5	22	100	10	8	8.5	TM09171000
M 12	×	1.75	24	110	9	7	10.2	TM10171200
M 16	×	2.0	27	110	12	9	14	TM10171600

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M16)

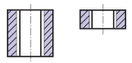
BSP *Whitworth Pipe Threads DIN ISO 228/1*
Whitworth Rohrgewinde DIN ISO 228/1

FOR GENERAL STEELS UP TO 750NM
SPIRAL POINT

Cat.-No. TB0116

DIN 5156

Hole type

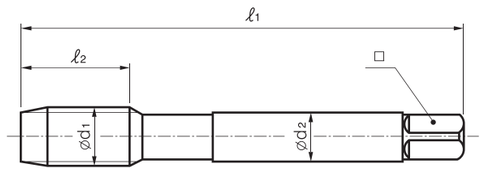


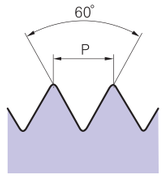
Material groups GS

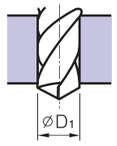
See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 5156 | 55° | B







ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
1/8	×	28	18	90	7	5.5	8.8	TB01160080
1/4	×	19	22	100	11	9	11.8	TB01160160
3/8	×	19	22	100	12	9	15.25	TB01160240
1/2	×	14	25	125	16	12	19	TB01160320
3/4	×	14	28	140	20	16	24.5	TB01160480
1”	×	11	32	160	25	20	30.75	TB01160640

DIN 5156

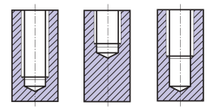
BSP *Whitworth pipe threads DIN ISO 228/1*
Whitworth Rohrgewinde DIN ISO 228/1

FOR GENERAL STEELS UP TO 750NM
SPIRAL FLUTE

Cat.-No. TB0216

DIN 5156

Hole type

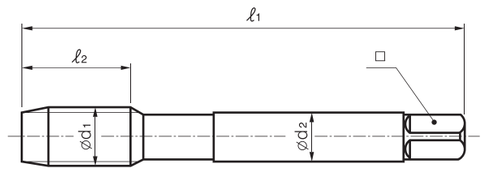


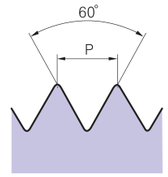
Material groups GS

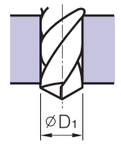
See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 5156 | 55° | C







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
1/8	×	28	10	90	7	5.5	8.8	TB02160080
1/4	×	19	14	100	11	9	11.8	TB02160160
3/8	×	19	15	100	12	9	15.25	TB02160240
1/2	×	14	17	125	16	12	19	TB02160320
3/4	×	14	20	140	20	16	24.5	TB02160480
1”	×	11	24	160	25	20	30.75	TB02160640

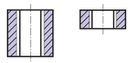
DIN 5156

SHORT MACHINE TAPS
FOR GENERAL STEELS UP TO 750NM
SPIRAL POINT

Cat.-No. TM0116

DIN 352

Hole type

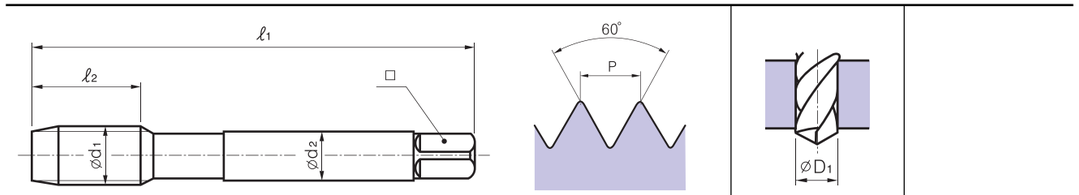


Material groups **GS**

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 352 | 6H | 60° | B



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	36	2.8	2.1	1.6	TM01160200
M 2.5	×	0.45	9	40	2.8	2.1	2.05	TM01160250
M 3	×	0.5	11	40	3.5	2.7	2.5	TM01160300
M 4	×	0.7	13	45	4.5	3.4	3.3	TM01160400
M 5	×	0.8	16	52	6	4.9	4.2	TM01160500
M 6	×	1.0	18	56	6	4.9	5	TM01160600
M 8	×	1.25	20	63	6	4.9	6.8	TM01160800
M 10	×	1.5	22	70	7	5.5	8.5	TM01161000
M 12	×	1.75	24	80	9	7	10.2	TM01161200
M 16	×	2.0	27	80	12	9	14	TM01161600

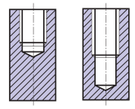
ALL DIMENSIONS ARE IN MM
DIN 352 (M2-M16)

SHORT MACHINE TAPS
FOR AUTOMATIC LATHES
FOR GENERAL STEELS UP TO 750NM
SPIRAL FLUTE

Cat.-No. TM0216

DIN 352

Hole type

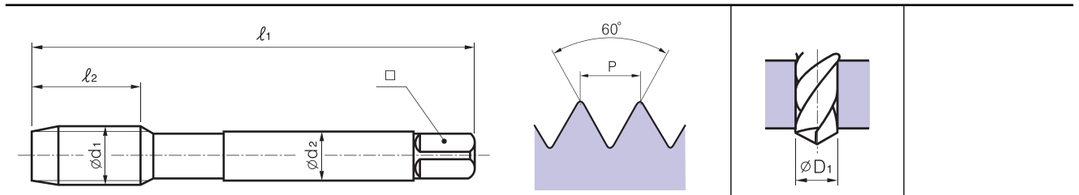


Material groups **GS**

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 352 | 6H | 60° | C



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	11	40	3.5	2.7	2.5	TM02160300
M 4	×	0.7	13	45	4.5	3.4	3.3	TM02160400
M 5	×	0.8	16	52	6	4.9	4.2	TM02160500
M 6	×	1.0	18	56	6	4.9	5	TM02160600
M 8	×	1.25	20	63	6	4.9	6.8	TM02160800
M 10	×	1.5	22	70	7	5.5	8.5	TM02161000
M 12	×	1.75	24	80	9	7	10.2	TM02161200

ALL DIMENSIONS ARE IN MM
DIN 352(M3-M12)

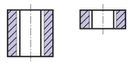
M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

FOR GENERAL STEELS UP TO 750NM
SPIRAL POINT

Cat.-No. TM0316

DIN 371

Hole type

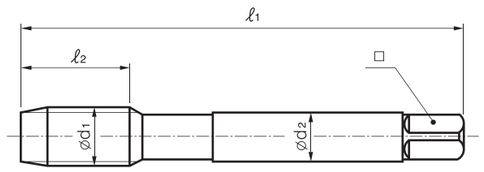


Material groups **GS**

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371 | 6H | 60° | B



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM03160200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM03160250
M 3	×	0.5	11	56	3.5	2.7	2.5	TM03160300
M 3.5	×	0.6	12	56	4	3	2.9	TM03160350
M 4	×	0.7	13	63	4.5	3.4	3.3	TM03160400
M 4.5	×	0.75	14	70	6	4.9	3.7	TM03160450
M 5	×	0.8	15	70	6	4.9	4.2	TM03160500
M 6	×	1.0	17	80	6	4.9	5	TM03160600
M 7	×	1.0	17	80	7	5.5	6	TM03160700
M 8	×	1.25	20	90	8	6.2	6.8	TM03160800
M 10	×	1.5	22	100	10	8	8.5	TM03161000

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10)

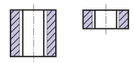
M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

FOR GENERAL STEELS UP TO 750NM
SPIRAL POINT

Cat.-No. TM0416

DIN 376

Hole type

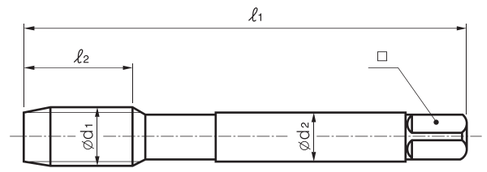


Material groups **GS**

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 376 | 6H | 60° | B



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	11	56	2.2	1.8	2.5	TM04160300
M 4	×	0.7	13	63	2.8	2.1	3.3	TM04160400
M 5	×	0.8	15	70	3.5	2.7	4.2	TM04160500
M 6	×	1.0	17	80	4.5	3.4	5	TM04160600
M 8	×	1.25	20	90	6	4.9	6.8	TM04160800
M 10	×	1.5	22	100	7	5.5	8.5	TM04161000
M 12	×	1.75	24	110	9	7	10.2	TM04161200
M 14	×	2.0	26	110	11	9	12	TM04161400
M 16	×	2.0	27	110	12	9	14	TM04161600
M 18	×	2.5	30	125	14	11	15.5	TM04161800
M 20	×	2.5	32	140	16	12	17.5	TM04162000

ALL DIMENSIONS ARE IN MM
DIN 376(M3-M20)

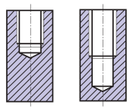
20 DEG SPIRAL FLUTE
FOR GENERAL STEELS UP TO 750NM
SPIRAL FLUTE

Cat.-No. TM1316

DIN 371

DIN 376

Hole type

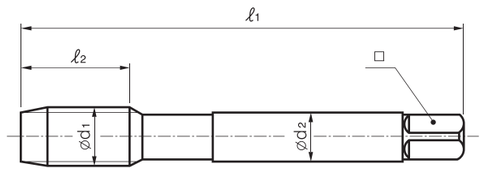


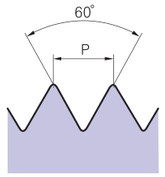
Material groups **GS**

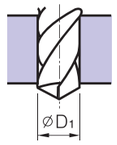
See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371/376 | 6H | 60° | C







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM13160200
M 3	×	0.5	6	56	3.5	2.7	2.5	TM13160300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM13160400
M 5	×	0.8	8	70	6	4.9	4.2	TM13160500
M 6	×	1.0	10	80	6	4.9	5	TM13160600
M 8	×	1.25	13	90	8	6.2	6.8	TM13160800
M 10	×	1.5	15	100	10	8	8.5	TM13161000
M 12	×	1.75	18	110	9	7	10.2	TM14161200
M 16	×	2.0	20	110	12	9	14	TM14161600
M 20	×	2.5	25	140	16	12	17.5	TM14162000

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M20)

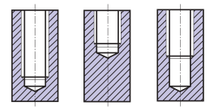
FOR GENERAL STEELS UP TO 750NM
SPIRAL FLUTE

Cat.-No. TM1716

DIN 371

DIN 376

Hole type

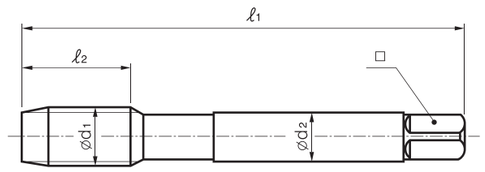


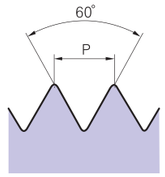
Material groups **GS**

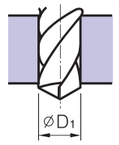
See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371/376 | 6H | 60° | C







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	5	45	2.8	2.1	1.6	TM17160200
M 3	×	0.5	6	56	3.5	2.7	2.5	TM17160300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM17160400
M 5	×	0.8	8	70	6	4.9	4.2	TM17160500
M 6	×	1.0	10	80	6	4.9	5	TM17160600
M 8	×	1.25	13	90	8	6.2	6.8	TM17160800
M 10	×	1.5	15	100	10	8	8.5	TM17161000
M 12	×	1.75	18	110	9	7	10.2	TM17161200
M 14	×	2.0	20	110	11	9	12	TM17161400
M 16	×	2.0	20	110	12	9	14	TM17161600
M 20	×	2.5	25	140	16	12	17.5	TM17162000

ALL DIMENSIONS ARE IN MM
DIN 371(M2-M10) DIN 376(M12-M20)

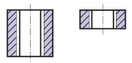
M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

FOR GENERAL STEELS UP TO 900~1000NM
SPIRAL POINT

Cat.-No. TM1817

DIN 371

Hole type

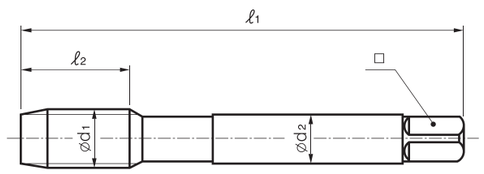


Material groups **GS**

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371 | 6H | 60° | B | TiN



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 3	×	0.5	11	56	3.5	2.7	2.5	TM18170300
M 4	×	0.7	13	63	4.5	3.4	3.3	TM18170400
M 5	×	0.8	15	70	6	4.9	4.2	TM18170500
M 6	×	1.0	17	80	6	4.9	5	TM18170600
M 8	×	1.25	20	90	8	6.2	6.8	TM18170800
M 10	×	1.5	22	100	10	8	8.5	TM18171000
M 12	×	1.75	24	110	9	7	10.2	TM18171200

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M12)

M ISO metric coarse threads DIN 13
Metrisches ISO-Gewinde DIN 13

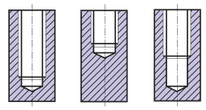
FOR GENERAL STEELS 900-1000NM
SPIRAL FLUTE

Cat.-No. TM1917

DIN 371

DIN 376

Hole type

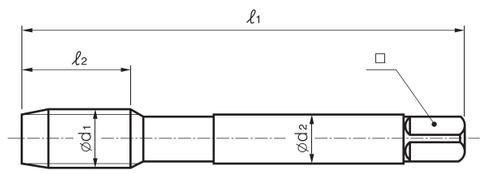


Material groups **GS**

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371/376 | 6H | 60° | C | TiN



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 2	×	0.4	8	45	2.8	2.1	1.6	TM19170200
M 2.5	×	0.45	9	50	2.8	2.1	2.05	TM19170250
M 3	×	0.5	6	56	3.5	2.7	2.5	TM19170300
M 4	×	0.7	7	63	4.5	3.4	3.3	TM19170400
M 5	×	0.8	8	70	6	4.9	4.2	TM19170500
M 6	×	1.0	10	80	6	4.9	5	TM19170600
M 8	×	1.25	13	90	8	6.2	6.8	TM19170800
M 10	×	1.5	15	100	10	8	8.5	TM19171000
M 12	×	1.75	18	110	9	7	10.2	TM19171200
M 14	×	2.0	20	110	11	9	12	TM19171400
M 16	×	2.0	20	110	12	9	14	TM19171600
M 20	×	2.5	25	140	16	12	17.5	TM19172000

ALL DIMENSIONS ARE IN MM
DIN 371(M3-M10) DIN 376(M12-M20)

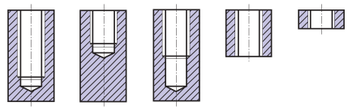
MF *ISO metric fine threads DIN 13*
Metrisches ISO-feingewinde DIN 13

FOR GENERAL STEELS UP TO 750NM
SPIRAL POINT

Cat.-No. TM3316

DIN 371

Hole type

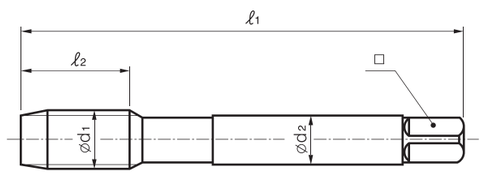


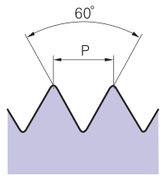
Material groups GS

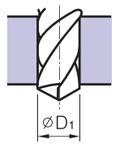
See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 374 | 6H | 60° | B







ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 4	×	0.5	10	63	2.8	2.1	3.5	TM33160400
M 5	×	0.5	11	70	3.5	2.7	4.5	TM33160500
M 6	×	0.5	13	80	4.5	3.4	5.5	TM33160600
M 6	×	0.75	13	80	4.5	3.4	5.2	TM33160601
M 8	×	0.5	14	80	6	4.9	7.5	TM33160800
M 8	×	0.75	14	80	6	4.9	7.2	TM33160801
M 8	×	1.0	17	90	6	4.9	7	TM33160802
M 10	×	1.75	18	90	7	5.5	9.2	TM33161000
M 10	×	1.0	18	90	7	5.5	9	TM33161001
M 10	×	1.25	22	100	7	5.5	8.8	TM33161002
M 12	×	1.0	18	100	9	7	11	TM33161200
M 12	×	1.25	22	100	9	7	10.8	TM33161201
M 12	×	1.5	22	100	9	7	10.5	TM33161202
M 14	×	1.0	18	100	11	9	13	TM33161400
M 14	×	1.25	22	100	11	9	12.8	TM33161401
M 14	×	1.5	22	100	11	9	12.5	TM33161402
M 16	×	1.0	18	100	12	9	15	TM33161600
M 16	×	1.5	22	100	12	9	14.5	TM33161601
M 18	×	1.0	20	110	14	11	17	TM33161800
M 18	×	1.5	25	110	14	11	16.5	TM33161801
M 20	×	1.0	20	125	16	12	19	TM33162000
M 20	×	1.5	25	125	16	12	18.5	TM33162001
M 22	×	1.0	20	125	18	14.5	21	TM33162200
M 22	×	1.5	25	125	18	14.5	20.5	TM33162201
M 24	×	1.5	27	140	18	14.5	22.5	TM33162400
M 24	×	2.0	27	140	18	14.5	22	TM33162401
M 26	×	1.5	28	140	18	14.5	24.5	TM33162600
M 27	×	1.5	28	140	20	16	25.5	TM33162700
M 27	×	2.0	28	140	20	16	25	TM33162701
M 28	×	1.5	28	140	20	16	26.5	TM33162800
M 30	×	1.5	30	150	22	18	28.5	TM33163000
M 30	×	2.0	30	150	22	18	28	TM33163001

ALL DIMENSIONS ARE IN MM
DIN 374(M4-M30)

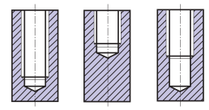
MF *ISO metric fine threads DIN 13*
Metrisches ISO-feingewinde DIN 13

FOR GENERAL STEELS UP TO 750NM
SPIRAL FLUTE

Cat.-No. TM3416

DIN 374

Hole type

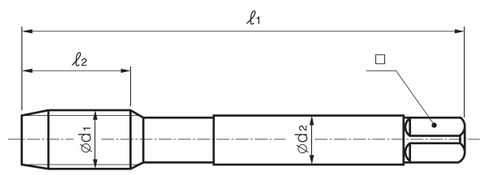


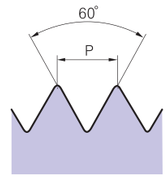
Material groups GS

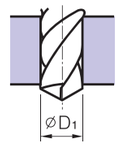
See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 374 | 6H | 60° | C







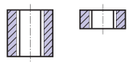
ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 4	×	0.5	5	63	2.8	2.1	3.5	TM34160400
M 5	×	0.5	5	70	3.5	2.7	4.5	TM34160500
M 6	×	0.5	5	80	4.5	3.4	5.5	TM34160600
M 6	×	0.75	8	80	4.5	3.4	5.2	TM34160601
M 8	×	0.5	5	80	6	4.9	7.5	TM34160800
M 8	×	0.75	8	80	6	4.9	7.2	TM34160801
M 8	×	1.0	10	90	6	4.9	7	TM34160802
M 10	×	0.75	10	90	7	5.5	9.2	TM34161000
M 10	×	1.0	10	90	7	5.5	9	TM34161001
M 10	×	1.25	16	100	7	5.5	8.8	TM34161002
M 12	×	1.0	11	100	9	7	11	TM34161200
M 12	×	1.25	15	100	9	7	10.8	TM34161201
M 12	×	1.5	15	100	9	7	10.5	TM34161202
M 14	×	1.0	11	100	11	9	13	TM34161400
M 14	×	1.25	15	100	11	9	12.8	TM34161401
M 14	×	1.5	15	100	11	9	12.5	TM34161402
M 16	×	1.0	12	100	12	9	15	TM34161600
M 16	×	1.5	15	100	12	9	14.5	TM34161601
M 18	×	1.0	13	110	14	11	17	TM34161800
M 18	×	1.5	17	110	14	11	16.5	TM34161801
M 20	×	1.0	14	125	16	12	19	TM34162000
M 20	×	1.5	17	125	16	12	18.5	TM34162001
M 22	×	1.0	14	125	18	14.5	21	TM34162200
M 22	×	1.5	17	125	18	14.5	20.5	TM34162201
M 24	×	1.5	20	140	18	14.5	22.5	TM34162400
M 24	×	2.0	20	140	18	14.5	22	TM34162401
M 26	×	1.5	20	140	18	14.5	24.5	TM34162600
M 27	×	1.5	20	140	20	16	25.5	TM34162700
M 27	×	2.0	20	140	20	16	25	TM34162701
M 28	×	1.5	20	140	20	16	26.5	TM34162800
M 30	×	1.5	22	150	22	18	28.5	TM34163000
M 30	×	2.0	22	150	22	18	28	TM34163001

M *ISO metric coarse threads DIN 13*
Metrisches ISO-Gewinde DIN 13

NUT TAPS
FOR GENERAL STEELS UP TO 750NM
STRAIGHT FLUTE

Cat.-No. **TM5016**

DIN 357

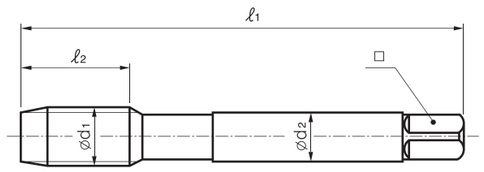
Hole type 

Material groups **GS**

See page : 301~307

12-13-14-33-34-74

HSS-E | DIN 357 | 6H | 60° | LONG



ϕd1 mm	×	P mm	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
M 4	×	0.7	25	90	2.8	2.1	3.3	TM50160400
M 5	×	0.8	28	100	3.5	2.7	4.2	TM50160500
M 6	×	1.0	32	110	4.5	3.4	5	TM50160600
M 7	×	1.0	36	110	5.5	4.3	6	TM50160700
M 8	×	1.25	40	125	6	4.9	6.8	TM50160800
M 10	×	1.5	45	140	7	5.5	8.5	TM50161000
M 12	×	1.75	50	180	9	7	10.2	TM50161200

ALL DIMENSIONS ARE IN MM
DIN 357(M4-M20)

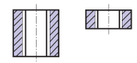
UNC *Unified coarse threads*
Unified Grobgewinde

FOR GENERAL STEELS UP TO 750NM
SPIRAL POINT

Cat.-No. **TM6416**

DIN 371

DIN 376

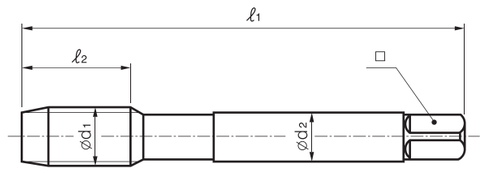
Hole type 

Material groups **GS**

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371/376 | 2B | 60° | B



ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	40	11	56	3.5	2.7	2.3	TM64160400
5	×	40	11	56	3.5	2.7	2.6	TM64160500
6	×	32	12	56	4	3	2.85	TM64160600
8	×	32	13	63	4.5	3.4	3.5	TM64160800
10	×	24	15	70	6	4.9	3.9	TM64161000
12	×	24	16	80	6	4.9	4.5	TM64161200
1/4	×	20	17	80	7	5.5	5.2	TM64169160
5/16	×	18	20	90	8	6.2	6.6	TM64169200
3/8	×	16	22	100	9	7	8	TM64169240
7/16	×	14	22	100	8	6.2	9.4	TM64169280
1/2	×	13	25	110	9	7	10.75	TM64169320
9/16	×	12	26	110	11	9	12.25	TM64169360
5/8	×	11	27	110	12	9	13.5	TM64169400
3/4	×	10	30	125	14	11	16.5	TM64169480
7/8	×	9	32	140	18	14.5	19.5	TM64169560
1”	×	8	36	160	20	16	22.25	TM64169640

DIN 371(NO.4-3/8) DIN 376(7/16-1”)

UNC *Unified coarse threads*
Unified Grobgewinde

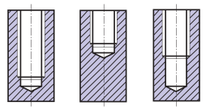
FOR GENERAL STEELS UP TO 750NM
SPIRAL FLUTE

Cat.-No. TM6516

DIN 371

DIN 376

Hole type

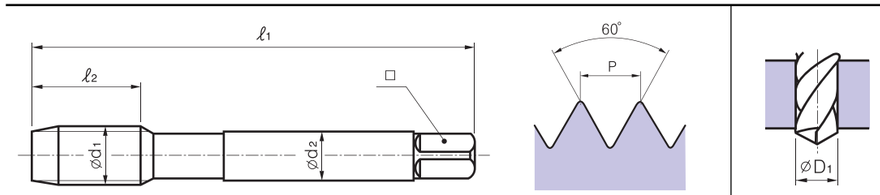


Material groups GS

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371/376 | 2B | 60° | C



ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	40	6	56	3.5	2.7	2.3	TM65160400
5	×	40	7	56	3.5	2.7	2.6	TM65160500
6	×	32	7	56	4	3	2.85	TM65160600
8	×	32	8	63	4.5	3.4	3.5	TM65160800
10	×	24	10	70	6	4.9	3.9	TM65161000
12	×	24	10	80	6	4.9	4.5	TM65161200
1/4	×	20	13	80	7	5.5	5.2	TM65169160
5/16	×	18	14	90	8	6.2	6.6	TM65169200
3/8	×	16	16	100	9	7	8	TM65169240
7/16	×	14	17	100	8	6.2	9.4	TM65169280
1/2	×	13	20	110	9	7	10.75	TM65169320
9/16	×	12	20	110	11	9	12.25	TM65169360
5/8	×	11	22	110	12	9	13.5	TM65169400
3/4	×	10	25	125	14	11	16.5	TM65169480
7/8	×	9	27	140	18	14.5	19.5	TM65169560
1”	×	8	30	160	20	16	22.25	TM65169640

DIN 371(NO.4-3/8) DIN 376(7/16-1”)

UNF *Unified fine threads*
Unified Feingewinde

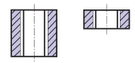
FOR GENERAL STEELS UP TO 750NM
SPIRAL POINT

Cat.-No. TM6716

DIN 371

DIN 374

Hole type

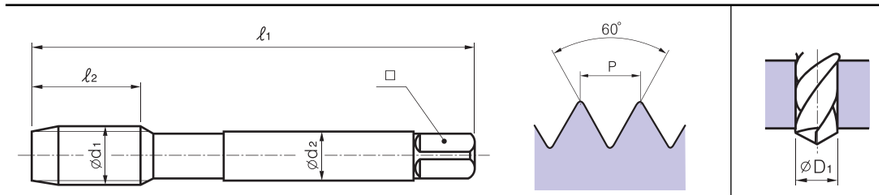


Material groups GS

See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371/374 | 2B | 60° | B



ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	45	11	56	3.5	2.7	2.4	TM67160400
5	×	44	11	56	3.5	2.7	2.7	TM67160500
6	×	40	12	56	4	3	3	TM67160600
8	×	36	13	63	4.5	3.4	3.5	TM67160800
10	×	32	13	70	6	4.9	4.1	TM67161000
12	×	28	16	80	6	4.9	4.7	TM67161200
1/4	×	28	17	80	7	5.5	5.5	TM67169160
5/16	×	24	17	90	8	6.2	6.9	TM67169200
3/8	×	24	18	100	9	7	8.5	TM67169240
7/16	×	20	22	100	8	6.2	9.9	TM67169280
1/2	×	20	22	100	9	7	11.5	TM67169320
9/16	×	18	22	100	11	9	12.9	TM67169360
5/8	×	18	22	100	12	9	14.5	TM67169400
3/4	×	16	25	110	14	11	17.5	TM67169480
7/8	×	14	26	125	18	14.5	20.5	TM67169560
1”	×	12	28	140	20	16	23.25	TM67169640

DIN 371(NO.4-3/8) DIN 374(7/16-1”)

UNF *Unified fine threads*
Unified Feingewinde

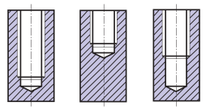
FOR GENERAL STEELS UP TO 750NM
SPIRAL FLUTE

Cat.-No. **TM6816**

DIN 371

DIN 374

Hole type

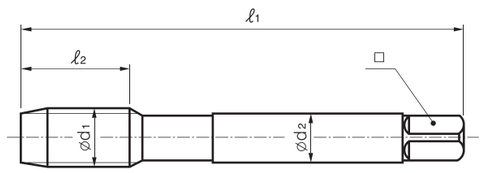


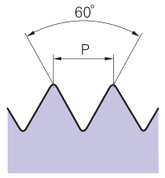
Material groups **GS**

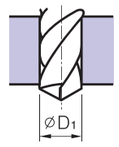
See page : 301~307

12-13-14-33-34-63-74

HSS-E | DIN 371/374 | 2B | 60° | C







ϕd1 inch	×	P inch	l2	l1	d2	sq	Tapping drill diameter	EUROPA CODE
4	×	45	6	56	3.5	2.7	2.4	TM68160400
5	×	44	7	56	3.5	2.7	2.7	TM68160500
6	×	40	7	56	4	3	3	TM68160600
8	×	36	8	63	4.5	3.4	3.5	TM68160800
10	×	32	10	70	6	4.9	4.1	TM68161000
12	×	28	10	80	6	4.9	4.7	TM68161200
1/4	×	28	10	80	7	5.5	5.5	TM68169160
5/16	×	24	10	90	8	6.2	6.9	TM68169200
3/8	×	24	10	100	9	7	8.5	TM68169240
7/16	×	20	13	100	8	6.2	9.9	TM68169280
1/2	×	20	13	100	9	7	11.5	TM68169320
9/16	×	18	15	100	11	9	12.9	TM68169360
5/8	×	18	15	100	12	9	14.5	TM68169400
3/4	×	16	17	110	14	11	17.5	TM68169480
7/8	×	14	17	125	18	14.5	20.5	TM68169560
1”	×	12	20	140	20	16	23.25	TM68169640

DIN 371(NO.4-3/8) DIN 374(7/16-1”)

SUPER CUTTING TAPS

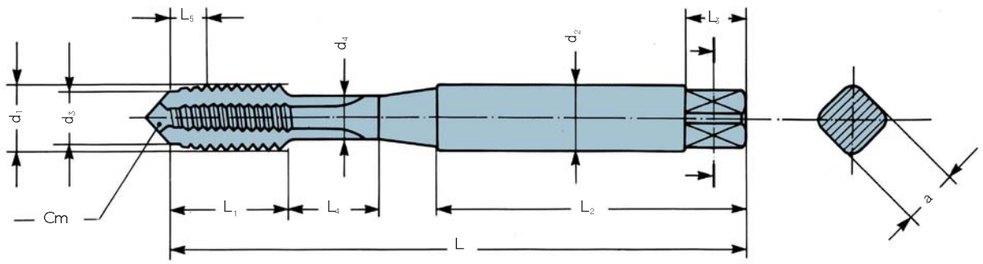
TECHNICAL INFORMATION

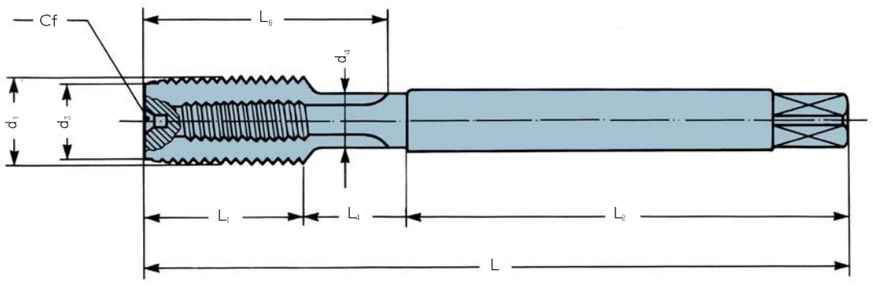
TAPS TERMINOLOGY

DRILL SIZES BEFORE TAPPING

METRIC ISO THREADS

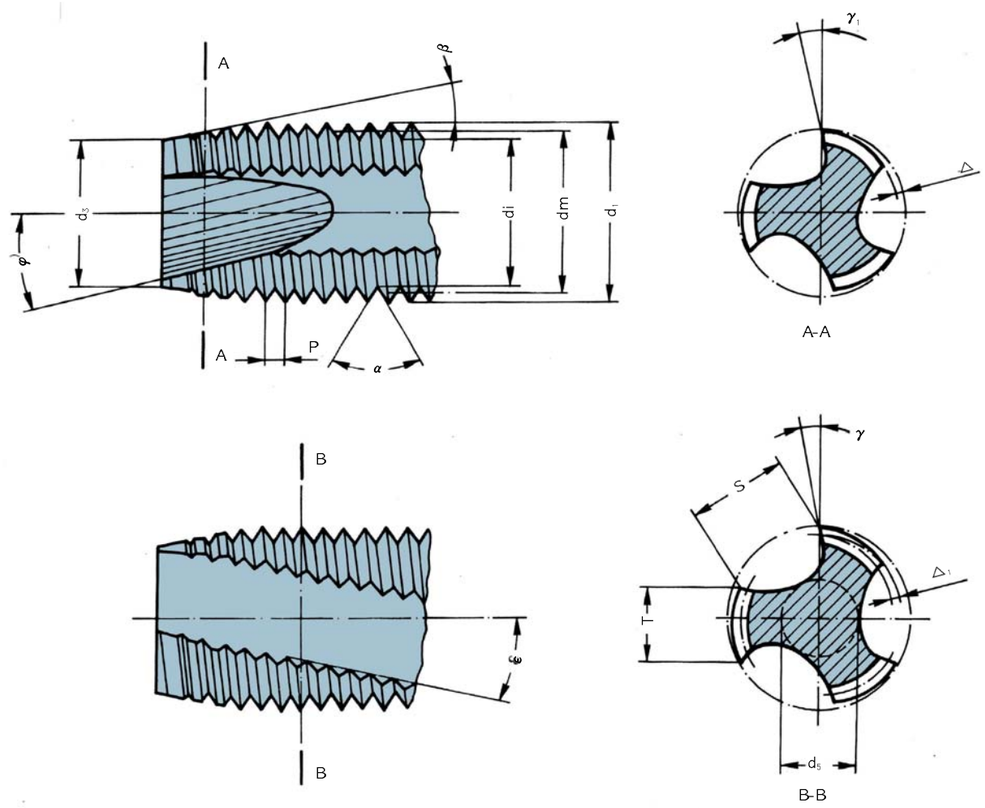
APPLICATION AND USE OF THREADING TAPS





d_1	Major diameter	d_1	Diamètre externe nominal	d_1	Nenn Aussendurchmesser
d_2	Shank diameter	d_2	Diamètre de la queue	d_2	Schaftdurchmesser
d_3	Chamfer diameter	d_3	Diamètre de l'entrée	d_3	Anschnittdurchmesser
d_4	Neck diameter	d_4	Diamètre de la collerette de dégagement	d_4	Bunddurchmesser
L	Total length	L	Longueur totale	L	Gesamtlänge
L_1	Thread length	L_1	Longueur de la patie filetée	L_1	Gewindelänge
L_2	Shank length	L_2	Longueur de la queue	L_2	Schaftlänge
L_3	Square length	L_3	Longueur du carré	L_3	Vierkantlänge
L_4	Neck length	L_4	Longueur de la collerette de dégagement	L_4	Bundlänge
L_5	Chamfer length	L_5	Longueur de l'entrée	L_5	Anschnittlänge
L_6	Flutes length	L_6	Longueur des goujures	L_6	Nutenlänge
a	Square	a	Carré	a	Vierkantmaß
Cm	Center male	Cm	Centre mâle	Cm	Mittelpunkt des Aussengewindes
Cf	Center female	Cf	Centre femelle	Cf	Mittelpunkt des Innengewindes

TAPS TERMINOLOGY
TERMINOLOGIE DES TARAUDS
TECHNISCHE BEGRIFFE BEI GEWINDEBOHRERN



d_1	Major diameter	d_1	Diamètre externe nominal	d_1	Nenn Aussendurchmesser
dm	Flank diameter	dm	Diamètre moyen	dm	Flankendurchmesser
di	Minor diameter	di	Diamètre interne	di	Kerndurchmesser
d_3	Chamfer diameter	d_3	Diamètre de l'entrée	d_3	Anschnittdurchmesser
P	Pitch	P	Pas	P	Steigung
a	Flank angle	α	Angle du filet	a	Flankenwinkel
β	Chamfer angle	β	Demi-angle du cône d'entrée	β	Anschnittwinkel
φ	Gun nose angle	φ	Angle de l'entrée GUN	φ	Schälschnittwinkel
γ	Gun nose rake angle in front	γ_1	Angle de coupe sur l'entrée GUN	γ_1	Schälschnitt-Spanwinkel
Δ	Chamfer relief	Δ	Détalonnage sur l'entrée	Δ	Hinterschliff am Anschnitt
Δ_1	Pitch diameter relief on the land	Δ_1	Détalonnage sur le filet	Δ_1	Flankenhinterschliff auf Zahnbreite
γ	Rake angle	γ	Angle de coupe frontale	γ	Spanwinkel
T	Width of land	T	Largeur des dents	T	Zahnstollenbreite
S	Flute width	S	Largeur des goujoures	S	Nutenbreite
d_5	Web tickness	d_5	Diamètre de l'âme	d_5	Seelendicke
ε	Angle of spiral flute	ε	Angle d'hélice des goujures	ε	Spiralwinkel

DRILL SIZES BEFORE TAPPING

Metric-ISO threads coarse pitch			
M	Pitch mm.	Maximun core dia. mm.	Drill size mm.
1	0,25	0,785	0,75
1,1	0,25	0,885	0,85
1,2	0,25	0,985	0,95
1,4	0,30	1,160	1,10
1,6	0,35	1,321	1,25
1,7	0,35	1,346	1,30
1,8	0,35	1,521	1,45
2	0,40	1,679	1,60
2,2	0,45	1,838	1,75
2,3	0,40	1,920	1,90
2,5	0,45	2,138	2,05
2,6	0,45	2,176	2,10
3	0,50	2,599	2,50
3,5	0,60	3,010	2,90
4	0,70	3,422	3,30
4,5	0,75	3,878	3,70
5	0,80	4,334	4,20
6	1,00	5,153	5,00
7	1,00	6,153	6,00
8	1,25	6,912	6,80
9	1,25	7,912	7,80
10	1,50	8,676	8,50
11	1,50	9,676	9,50
12	1,75	10,441	10,20
14	2,00	12,210	12,00
16	2,00	14,210	14,00
18	2,50	15,744	15,50
20	2,50	17,744	17,50
22	2,50	19,744	19,50
24	3,00	21,252	21,00
27	3,00	24,252	24,00
30	3,50	26,771	26,50
33	3,50	29,771	29,50
36	4,00	32,270	32,00
39	4,00	35,270	35,00
42	4,50	37,799	37,50
45	4,50	40,799	40,50
48	5,00	43,297	43,00
52	5,00	47,297	47,00
56	5,50	50,796	50,50
60	5,50	54,796	54,50
64	6,00	58,305	58,00
68	6,00	62,305	62,00

Metric-ISO threads fine pitch			
MF	Pitch mm.	Maximun core dia. mm.	Drill size mm.
2,5	0,35	2,221	2,15
3	0,35	2,271	2,65
3,5	0,35	3,221	3,15
4	0,50	3,599	3,50
4,5	0,50	4,099	4,00
5	0,50	4,599	4,50
5,5	0,50	5,099	5,00
6	0,75	5,378	5,20
7	0,75	6,378	6,20
8	0,75	7,378	7,20
8	1,00	7,153	7,00
9	0,75	8,378	8,20
9	1,00	8,153	8,00
10	0,75	9,378	9,20
10	1,00	9,153	9,00
10	1,25	8,912	8,80
11	0,75	10,378	10,20
11	1,00	10,153	10,00
12	1,00	11,153	11,00
12	1,25	10,912	10,80
12	1,50	10,676	10,50
14	1,00	13,153	13,00
14	1,25	12,912	12,80
14	1,50	12,676	12,50
15	1,00	14,153	14,00
15	1,50	13,676	13,50
16	1,00	15,153	15,00
16	1,50	14,676	14,50
17	1,00	16,153	16,00
17	1,50	15,676	15,50
18	1,00	17,153	17,00
18	1,50	16,676	16,50
18	2,00	16,210	16,00
20	1,00	19,153	19,00
20	1,50	18,676	18,50
20	2,00	18,210	18,00
22	1,00	21,153	21,00
22	1,50	20,676	20,50
22	2,00	20,210	20,00
24	1,00	23,153	23,00
24	1,50	22,676	22,50
24	2,00	22,210	22,00
25	1,00	24,153	24,00
25	1,50	23,676	23,50

Metric-ISO threads fine pitch			
MF	Pitch mm.	Maximun core dia. mm.	Drill size mm.
25	2,00	23,210	23,00
26	1,50	24,676	24,50
27	1,00	26,153	26,00
27	1,50	25,676	25,50
27	2,00	25,210	25,00
28	1,00	27,153	27,00
28	1,50	26,676	26,50
28	2,00	26,210	26,00
30	1,00	29,153	29,00
30	1,50	28,676	28,50
30	2,00	28,210	28,00
30	3,00	27,252	27,00
32	1,50	30,675	30,50
32	2,00	30,210	30,00
33	1,50	31,676	31,50
33	2,00	31,210	31,00
33	3,00	30,252	30,00
35	1,50	33,676	33,50
36	1,50	34,676	34,50
36	2,00	34,210	34,00
36	3,00	33,252	33,00
38	1,50	36,676	36,50
39	1,50	37,676	37,50
39	2,00	37,210	37,00
39	3,00	36,252	36,00
40	1,50	38,676	38,50
40	2,00	38,210	38,00
40	3,00	37,252	37,00
42	1,50	40,676	40,50
42	2,00	40,210	40,00
42	3,00	39,252	39,00
45	1,50	43,676	43,50
45	2,00	43,210	43,00
45	3,00	42,252	42,00
48	1,50	46,676	46,50
48	2,00	46,210	46,00
48	3,00	45,252	45,00
50	1,50	48,676	48,50
50	2,00	48,210	48,00
50	3,00	47,252	47,00
52	1,50	50,676	50,50
52	2,00	50,210	50,00
52	3,00	49,252	49,00

METRIC ISO THREADS

Nominal dimensions UNI 4535-64
Production tolerances on tap flank diameter for ISO 6H Nut threads
Limit dimensions-Nut threads ISO 6H

Coarse pitch threads

Dimensions in mm

$H = 0{,}86603P$

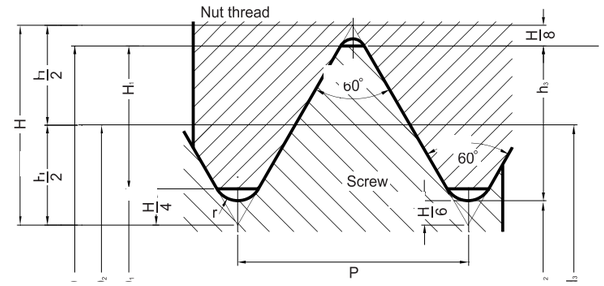
$H_1 = \frac{5}{8}H = 0{,}54127P$

$h_3 = \frac{17}{24}H = 0{,}61343P$

$d_2 = D_2 = d - \frac{3}{4}H = d - 0{,}64952P$

$d_3 = d - 2h_3 = d - 1{,}22687P$

$r = \frac{H}{6} = 0{,}14434P$



Nominal diameter	Pitch	Flank diameter	Minor diameter		Thread depth		Radius	Flank diameter Tap tolerance 6H d_2		Flank diameter Nut tolerance 6H	
			Screw	Nut	Screw	Nut					
d = D	P	$d_2 = D_2$	d_3	D_1	h_3	H_1	r	min.	max.	min.	max.
M 1,6	0,35	1,373	1,171	1,221	0,215	0,189	0,051	1,393	1,407	1,373	1,458
M 1,8	0,35	1,573	1,371	1,421	0,215	0,189	0,051	1,593	1,607	1,573	1,658
M 2	0,4	1,740	1,509	1,567	0,245	0,217	0,058	1,761	1,776	1,740	1,830
M 2,2	0,45	1,908	1,648	1,713	0,276	0,244	0,065	1,931	1,946	1,908	2,003
M 2,5	0,45	2,208	1,948	2,013	0,276	0,244	0,065	2,231	2,246	2,208	2,303
M 3	0,5	2,675	2,387	2,459	0,307	0,271	0,072	2,699	2,715	2,675	2,775
M 3,5	0,6	3,110	2,764	2,850	0,368	0,325	0,087	3,137	3,155	3,110	3,222
M 4	0,7	3,545	3,141	3,242	0,429	0,379	0,101	3,574	3,593	3,545	3,663
M 4,5	0,75	4,013	3,580	3,688	0,460	0,406	0,108	4,042	4,061	4,013	4,131
M 5	0,8	4,480	4,019	4,134	0,491	0,433	0,115	4,510	4,530	4,480	4,605
M 6	1	5,350	4,773	4,917	0,613	0,541	0,144	5,385	5,409	5,350	5,500
M 7	1	6,350	5,773	5,917	0,613	0,541	0,144	6,385	6,409	6,350	6,500
M 8	1,25	7,188	6,466	6,647	0,767	0,677	0,180	7,226	7,251	7,188	7,348
M 9	1,25	8,188	7,466	7,647	0,767	0,677	0,180	8,226	8,251	8,188	8,348
M 10	1,5	9,026	8,160	8,376	0,920	0,812	0,217	9,068	9,096	9,026	9,206
M 11	1,5	10,026	9,160	9,376	0,920	0,812	0,217	10,068	10,096	10,026	10,206
M 12	1,75	10,863	9,853	10,106	1,074	0,947	0,253	10,911	10,943	10,863	11,063
M 14	2	12,701	11,546	11,835	1,227	1,083	0,289	12,752	12,786	12,701	12,913
M 16	2	14,701	13,546	13,835	1,227	1,083	0,289	14,752	14,786	14,701	14,913
M 18	2,5	16,376	14,933	15,294	1,534	1,353	0,361	16,430	16,466	16,376	16,600
M 20	2,5	18,376	16,933	17,294	1,534	1,353	0,361	18,430	18,466	18,376	18,600
M 22	2,5	20,376	18,933	19,294	1,534	1,353	0,361	20,430	20,466	20,376	20,600
M 24	3	22,051	20,319	20,752	1,840	1,624	0,433	22,115	22,157	22,051	22,316
M 27	3	25,051	23,319	23,752	1,840	1,624	0,433	25,115	25,157	25,051	25,316
M 30	3,5	27,727	25,706	26,211	2,147	1,894	0,505	27,794	27,839	27,727	28,007
M 33	3,5	30,727	28,706	29,211	2,147	1,894	0,505	30,794	30,839	30,727	31,007
M 36	4	33,402	31,093	31,670	2,454	2,165	0,577	33,473	33,520	33,402	33,702
M 39	4	36,402	34,093	34,670	2,454	2,165	0,577	36,473	36,520	36,402	36,702
M 42	4,5	39,077	36,479	37,129	2,760	2,436	0,650	39,152	39,202	39,077	39,392
M 45	4,5	42,077	39,479	40,129	2,760	2,436	0,650	42,152	42,202	42,077	42,392
M 48	5	44,752	41,866	42,587	3,067	2,706	0,722	44,832	44,885	44,752	45,087
M 52	5	48,752	45,866	46,587	3,067	2,706	0,722	48,832	48,885	48,752	49,087
M 56	5,5	52,428	49,252	50,046	3,374	2,977	0,794	52,512	52,568	52,428	52,783
M 60	5,5	56,428	53,252	54,046	3,374	2,977	0,794	56,512	56,568	56,428	56,783
M 64	6	60,103	56,639	57,505	3,681	3,248	0,866	60,193	60,253	60,103	60,478
M 68	6	64,103	60,639	61,505	3,681	3,248	0,866	64,193	64,253	64,103	64,478
Metric thread MA(old UNI 159 Profile)											**Nut tolerance SH8**
M 1,7	0,35	1,473	1,246	1,246	0,227	0,227	0,040	1,493	1,507	1,473	1,529
M 2,3	0,4	2,040	1,780	1,780	0,260	0,260	0,040	2,061	2,076	2,040	2,120
M 2,6	0,45	2,308	2,016	2,016	0,292	0,292	0,050	2,331	2,346	2,308	2,388

Trouble	Causes	Solutions
Tapped hole oversize	Incorrect tap in use (cutting geometry unsuitable for application)	Use tap selected from the relevant material group
	Faulty alignment	Ensure that the tap is correctly aligned with the core hole axis
	Cold welding	Improve lubrication and direction of coolant Adjust cutting speed
	Re-ground tap (lead-in is not concentric)	Regrind tap lead correctly on a suitable tap grinding machine

Trouble	Causes	Solutions
Stripped threads	Incorrect tap in use (cutting geometry incorrect for application	Use a tap from the relevant material group.
	Spindle speed and feed rate not synchronized	Check feed rate programming and / or pitch of leading spindle Use a tapping spindle with axial float
	Insufficient start pressure exerted on tap with peel-cut	Increase start pressure

Trouble	Causes	Solutions
Bell mouthed tapped hole	Incorrect start pressure applied to tap	Use a tapping spindle with axial float

Trouble	Causes	Solutions
Unsatisfactory thread surface finish	Incorrect tap in use (Cutting geometry unsuitable for application)	Select tap from the relevant material group
	The tap is blunt	Replace or re-grind tap
	Tap badly re-ground	Re-grind tap again. Check that cutting geometry is suitable for material
	Coolant lacking in lubricating qualities and / or quantity	Ensure the use of asuitable coolant and an ample supply

APPLICATION AND USE OF THREADING TAPS

Trouble	Causes	Solutions
Partial chipping of tap	Swarf jamming	Check cutting speed Use alternative tap type
	Tap has jammed against bottom of core hole	Check hole and thread depths Drill core hole deeper
	Tap incorrectly re-ground (lead-in diameter too small therefore too few cutting teeth)	Ensure that original values ore maintained when regrinding
	Irregular workpiece material structure	Adjust cutting speed Improve lubricating quality of coolant

Trouble	Causes	Solutions
Excessive tap wear	Incorrect cutting speed	Adjust cutting speed to suit workpiece material
	Coolant lacking in lubricating qualities and / or quantity	Ensure the use of a suitable coolant and an ample supply Check that coolant is reaching the cutting zone
	Surface of the core hole is compacted	Check core hole drilling conditions (drill carefully to reduce risk of surface compacting) Check drill cutting edges

Trouble	Causes	Solutions
Tap breakage	Incorrect tap in use (cutting geometry unsuitable for application)	Use tap from the relevant material group
	Centering error	Ensure that axes of tap and core hole are aligned
	Blunt tap	Re-grind tap Ensure that taps are stored carefully
	Tap has reached bottom of core hole	Use tapping spindle with axial float and slipping clutch
	Core hole too small	Select core hole as per chart, pages 142～143 of this catalogue

SOLID CARBIDE

TIALN THREAD MILLS

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Europa Tool 8TH EDITION

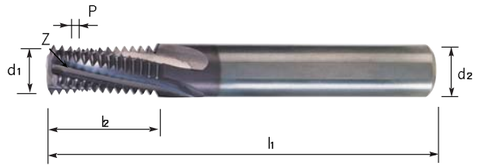
SOLID CARBIDE TIALN THREAD MILLS

PRODUCTS	SERIES	DESCRIPTION	PAGE
	180323	SOLID CARBIDE THREAD MILL FOR ISO METRIC INTERNAL THREAD - DIN 13	357
	181323	SOLID CARBIDE THREAD MILL FOR ISO METRIC FINE INTERNAL THREAD - DIN 13	357
	182323	SOLID CARBIDE THREAD MILL FOR UNC INTERNAL THREAD	358
	183323	SOLID CARBIDE THREAD MILL FOR UNF INTERNAL THREAD	358
	183423	SOLID CARBIDE THREAD MILL FOR NPT INTERNAL THREAD	359
		CUTTING DATA	360/361

FOR ISO METRIC INTERNAL THREAD - DIN 13

MG | DIN 374HA | TIALN COATED | 60°

Series No. 180323



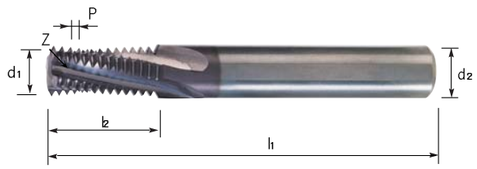
MATERIAL : SOLID CARBIDE
SHANK : DIN6535 HA
SPRIAL ANGLE :15 DEG
THREAD LENGTH : 2XD

NOMINAL DIA. (D)	PITCH (P)	CUTTER DIA. d1	O/ALL LENGTH l1	THREAD LENGTH l2	SHK DIA. d2	NO.OF FLUTES (Z)	EUROPA ORDER CODE
M6	1.0	4.50	57	13	6	3	**1803230600**
M8	1.25	6.00	65	17.5	6	3	**1803230800**
M10	1.5	7.50	72	21	8	4	**1803231000**
M12	1.75	9.50	80	26.25	10	4	**1803231200**
M14	2.0	10.00	83	30	10	4	**1803231400**
M16	2.0	12.00	92	34	12	4	**1803231600**

FOR ISO METRIC FINE INTERNAL THREAD - DIN 13

MG | DIN 374HA | TIALN COATED | 60°

Series No. 181323



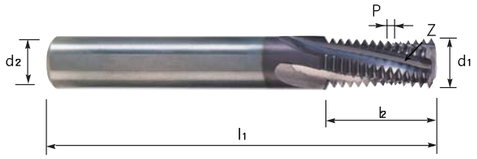
MATERIAL : SOLID CARBIDE
SHANK : DIN6535 HA
SPRIAL ANGLE :15 DEG
THREAD LENGTH : 1.5XD

NOMINAL DIA. (D)	PITCH (P)	CUTTER DIA. d1	O/ALL LENGTH l1	THREAD LENGTH l2	SHK DIA. d2	NO.OF FLUTES (Z)	EUROPA ORDER CODE
M8	1.0	6.00	57	13	6	3	**1813230800**
M8	0.75	6.00	57	12.75	6	3	**1813230801**
M10	1.0	8.00	63	16	8	4	**1813231000**
M12	1.5	9.50	72	19.5	10	4	**1813231200**
M12	1.25	9.50	72	18.75	10	4	**1813231201**
M12	1.00	9.50	72	19	10	4	**1813231202**
M14	1.50	10.00	83	22.5	10	4	**1813231400**
M14	1.00	10.00	83	22	10	4	**1813231401**
M16	1.50	12.00	83	25.5	12	4	**1813231600**
M16	1.00	12.00	83	25	12	4	**1813231601**
M18	1.50	14.00	92	28.5	14	5	**1813231800**
M18	1.00	14.00	92	28	14	5	**1813231801**
M20	1.50	16.00	92	31.5	16	5	**1813232000**
M20	1.00	16.00	92	31	16	5	**1813232001**

FOR UNC INTERNAL THREAD - ANSI B 1.1

MG | DIN 374HA | TIALN COATED | 60°

Series No. 182323



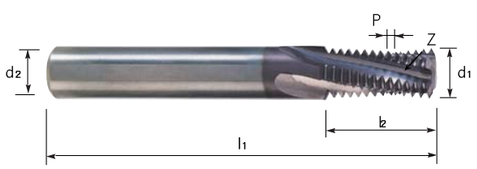
MATERIAL : SOLID CARBIDE
SHANK : DIN6535 HA
SPRIAL ANGLE :15 DEG
THREAD LENGTH : 2XD

NOMINAL DIA. (D)	PITCH (P)	CUTTER DIA. d1	O/ALL LENGTH l1	THREAD LENGTH l2	SHK DIA. d2	NO.OF FLUTES (Z)	EUROPA ORDER CODE
1/4	20	4.50	57	14	6	3	**1823230160**
5/16	18	5.80	65	16.9	6	3	**1823230200**
3/8	16	7.00	72	20.6	8	4	**1823230240**
7/16	14	8.00	72	23.6	8	4	**1823230280**
1/2	13	9.50	80	27.4	10	4	**1823230320**
9/16	12	10.00	83	31.8	10	4	**1823230360**
5/8	11	12.00	92	34.6	12	4	**1823230400**
3/4	10	14.00	104	40.6	14	5	**1823230480**
7/8	9	15.90	100	39.51	16	4	**1823230560**
1``	8	19.20	120	38.1	20	4	**1823230640**
1.1/8	7	19.90	120	43.54	20	4	**1823230720**

FOR UNF INTERNAL THREAD - ANSI B 1.1

MG | DIN 374HA | TIALN COATED | 60°

Series No. 183323

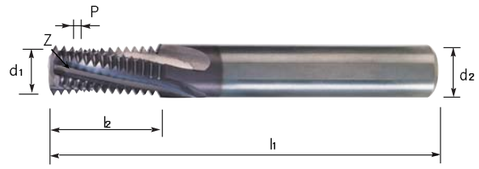


NOMINAL DIA. (D)	PITCH (P)	CUTTER DIA. d1	O/ALL LENGTH l1	THREAD LENGTH l2	SHK DIA. d2	NO.OF FLUTES (Z)	EUROPA ORDER CODE
1/4	28	5.00	57	13.6	6	3	**1833230160**
5/16	24	6.00	65	16.9	6	3	**1833230200**
3/8	24	8.00	72	20.1	8	4	**1833230240**
7/16	20	8.00	72	24.1	8	4	**1833230280**
1/2	20	10.00	80	26.7	10	4	**1833230320**
9/16	18	12.00	83	29.6	12	4	**1833230360**
5/8	18	12.00	92	33.9	12	4	**1833230400**
3/4	16	14.00	104	39.7	14	5	**1833230480**
7/8	14	15.90	100	39.91	16	4	**1833230560**
1-1.1/2	12	15.90	100	38.1	16	4	**1833230640**

FOR NPT INTERNAL THREAD

MG | DIN 374HA | TIALN COATED | 60°

Series No. 183423



MATERIAL : SOLID CARBIDE
SHANK : DIN6535 HA
SPRIAL ANGLE :15 DEG
THREAD LENGTH : 2XD

NOMINAL DIA. (D)	PITCH (P)	CUTTER DIA. d1	O/ALL LENGTH l1	THREAD LENGTH l2	SHK DIA. d2	NO.OF FLUTES (Z)	EUROPA ORDER CODE
7.6	27	1/8	60	9.41	8	4	**1834230080**
9.9	18	1/4-3/8	70	14.1	10	4	**1834230160**
15.9	14	1/2-3/4	100	19.96	16	4	**1834230320**
15.9	11.5	1-2.1/2	100	26.5	16	4	**1834230640**

ADVANTAGE OF THREAD MILLING

- Higher cutting speeds and feeds than tapping
- Reduce the horse power required(vs tapping)
- Make smaller, easier to remove, chips than taps
- Controlling chips load thanks to the cutting parameters.
- One tool for blind holes and through holes.
- In some cases, only one tool will machine both internal and external threads.
- Pitch diameter can be controlled by CNC offset.
- One tool for right and left hand threads
- Full thread to the bottom of a blind
- No reversal of the spindle required
- Consistent, predictable production even in exotic materials.
- Exact pitch, no widening of the thread
- Cut multiple lead threads with only program change
- Outstanding workpiece surface thanks to variation of the cutting parameters.

PROGRAMMING OF THREAD MILLING

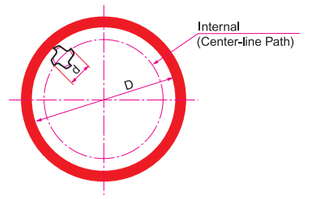
Program Data

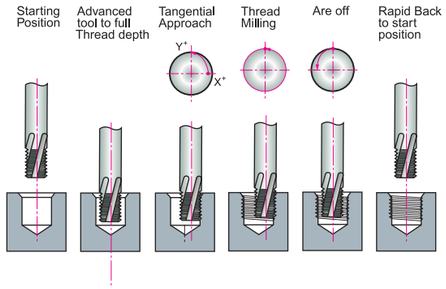
G Codes for Thread Milling

G00 Fast Feed Linear
G01 Linear Movement
G02 Circular/Helical Interpolation C.W.
G03 Circular/Helical Interpolation A.C.W.
G17 X, Y Plane(Vertical Machining)
G18 Z, X Plane(Horizontal Machining)
G19 Y, Z Plane(Using 90° Head)
G40 Cutter Radius Compensation Cancel
G41 Cutter Radius Compensation Left
G42 Cutter Radius Compensation Right
G43 Tool Length Compensation Plus
G49 Tool Length Compensation Cancel
G90 Absolute Command
G91 Incremental Command
M03 Clockwise Rotation of Spindle
M05 Spindle stop
M08 Coolant On
X Horizontal Co-ordinate
Y Horizontal Co-ordinate
Z Vertical Co-ordinate
I X Co-ordinate to Center of Arc Travel
J Y Co-ordinate to Center of Arc Travel
S Spindle Speed R.P.M.
F Feed mm/min

CNC Internal Thread Milling

G90	**G00**	**X…**	**Y…**	**Z5**	**S…**
G91	**G00**	**Z…(A3+2)**			
Y…(A5)					
G41	**G01**	**X…(A6)**	**F…**		
G03	**X…(A6)**	**Y…(A6)**	**Z…(A4)**	**I…(A6)**	**J0**
G03	**X0**	**Y0**	**Y…(A2)**	**I0**	**J…(A1)**
G03	**X…(A6)**	**Y…(A6)**	**Z…(A4)**	**I0**	**J…(A6)**
G00	**G40**	**X…(A6)**	**Y…(A5)**		
G90	**Z5**				





<Explanation of Parameters>

A1 : 1/2 Nominal Thread Diameter 1/2D
A2 : Thread Pitch
A3 : Thread Depth
A4 : 1/4P(for climb milling and right-hand thread)
A5 : Beginning of Contour in Y 0.5xP
A6 : Arc Off (A1 - A5)

RECOMMENDED CUTTING SPEED

Material	Cutting Speed (m/min)	Feed per Tooth(fz)	
		Cutter Diameter ≤ ø8.0	Cutter Diameter > ø8.0
Low Carbon Steel Medium Carbon Steel	80-250	0.03 0.07	0.05 0.15
High Carbon Steel	50-250	0.03 0.07	0.05 0.15
Alloy Steel	50-180	0.02 0.05	0.05 0.12
Heat Treated Steel	50-180	0.02 0.05	0.05 0.12
Stainless Steel	80-200	0.03 0.07	0.05 0.12
Cast Lron	50-180	0.03 0.07	0.05 0.15
Chrome-Nickel Alloys Titanium Alloys	20-180	0.02 0.05	0.04 0.10
Non Ferrous Material	100-400	0.04 0.10	0.08 0.25

TO CALCULATE SPEED & FEED RATES

Calculate R.P.M of cutter

$$N = \frac{1000 \times V}{d \times \pi}$$

Calculate Feed per Revolution

$$F_1 = fz \times Z \times N$$

Finally Calculate Feed at Tool Center Line

$$F_2 = \frac{F_1 \times (D-d)}{D}$$

N: R.P.M
V: Recommended Cutting Speed
d: Diameter of Cutter
F_1: Feed at Cutting Edge
fz: Recommended Feed per Tooth
Z: Number of Teeth
F_2: Feed at Center Line of Cutting
F_1: Feed at Cutting Edge
D: Major Diameter of Component

EUROPA TOOL

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EDP No. INDEX

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