



HSS
MILLING
CUTTERS

General Works. Available Dovetail, Woodruff Keyseat, T-slot, Side Milling Cutters and HSS (8% cobalt) Corner Rounding, Shell End Mills

◎ : Excellent ○ : Good

Recommended cutting conditions : P 811

SERIES	ML012, ML022 ML112, ML122 ML212, ML222	ML032, ML042 ML132, ML142 ML232, ML242	ML062 ML162 ML262
	DOVETAIL CUTTERS	DOVETAIL CUTTERS	WOODRUFF KEYSEAT CUTTERS
FLUTE	-	-	-
HELIX ANGLE	0°	0°	10°-20°
SIZE MIN	D16.0	D16.0	D10.5
SIZE MAX	D50.0	D38.0	D45.5
PAGE	792	793	794

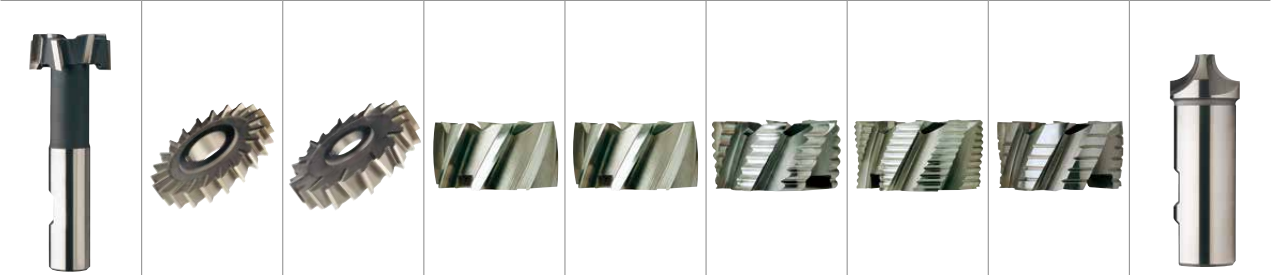
Type A, C, E	Type B, D, F	Type B, D, F
Uncoated	Uncoated	Uncoated
HSS-E	HSS-E	HSS-E



ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment		HB	HRc			
P	1	Non-alloy steel	About 0.15% C	Annealed	125		◎	◎	◎
	2		About 0.45% C	Annealed	190	13	◎	◎	◎
	3		About 0.45% C	Quenched & Tempered	250	25	◎	◎	◎
	4		About 0.75% C	Annealed	270	28	◎	◎	◎
	5		About 0.75% C	Quenched & Tempered	300	32	◎	◎	◎
	6	Low alloy steel		Annealed	180	10	◎	◎	◎
	7			Quenched & Tempered	275	29	◎	◎	◎
	8			Quenched & Tempered	300	32	◎	◎	◎
	9			Quenched & Tempered	350	38	○	○	○
	10	High alloyed steel, and tool steel		Annealed	200	15	◎	◎	◎
	11			Quenched & Tempered	325	35	○	○	○
M	12	Stainless steel	Ferritic / Martensitic	Annealed	200	15			
	13		Martensitic	Quenched & Tempered	240	23			
	14		Austenitic		180	10			
K	15	Grey cast iron	Pearlitic / ferritic		180	10			
	16		Pearlitic (Martensitic)		260	26			
	17	Nodular cast iron	Ferritic		160	3			
	18		Pearlitic		250	25			
	19	Malleable cast iron	Ferritic		130				
	20		Pearlitic		230	21			
N	21	Aluminum-wrought alloy	Not Curable		60		○	○	○
	22		Curable	Hardened	100		○	○	○
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75		○	○	○
	24		≤ 12% Si, Curable	Hardened	90		○	○	○
	25		> 12% Si, Not Curable		130		○	○	○
	26	Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%		110				
	27		CuZn, CuSnZn (Brass)		90				
	28		CuSn, lead-free copper and electrolytic copper		100				
	29	Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic						
	30		Rubber, Wood, etc.						
S	31	Heat Resistant Super Alloys	Fe Based	Annealed	200	15			
	32			Cured	280	30			
	33		Ni or Co Based	Annealed	250	25			
	34			Cured	350	38			
	35			Cast	320	34			
	36	Titanium Alloys	Pure Titanium		400 Rm				
	37		Alpha + Beta Alloys	Hardened	1050 Rm				
H	38	Hardened steel		Hardened	550	55			
	39			Hardened	630	60			
	40	Chilled Cast Iron		Cast	400	42			
	41	Hardened Cast Iron		Hardened	550	55			

ML072 ML172 ML272	ML092	ML102	E2675	E2676	E2677	E2678	E2679	E2498
T-SLOT CUTTERS	SIDE AND FACE MILLING CUTTERS	SIDE AND FACE MILLING CUTTERS	SHELL END MILL	SHELL END MILL	ROUGHING SHELL END MILL	ROUGHING SHELL END MILL	ROUGHING & FINISHING SHELL END MILL	CORNER ROUNDING CUTTERS
-	-	-	Multi Flute	Multi Flute	Multi Flute	Multi Flute	Multi Flute	4
10°-20°	10°	-	30°	42°	30°	30°	30°	0°
D12.5	D50.0	D50.0	D30.0	D30.0	D40.0	D40.0	D40.0	D8.0
D40.0	D125.0	D200.0	D160.0	D100.0	D160.0	D160.0	D160.0	D56.0
796	797	799	805	806	807	808	809	810

Type AA, AB, AD	with STRAIGHT TEETH	with STAGGERED TEETH	-	for ALUMINUM	-	-	-	-
Uncoated	Uncoated	Uncoated	Uncoated	Uncoated	Uncoated	Uncoated	Uncoated	Uncoated
HSS-E	HSS-E	HSS-E	HSS Co8	HSS Co8	HSS Co8	HSS Co8	HSS Co8	HSS Co8



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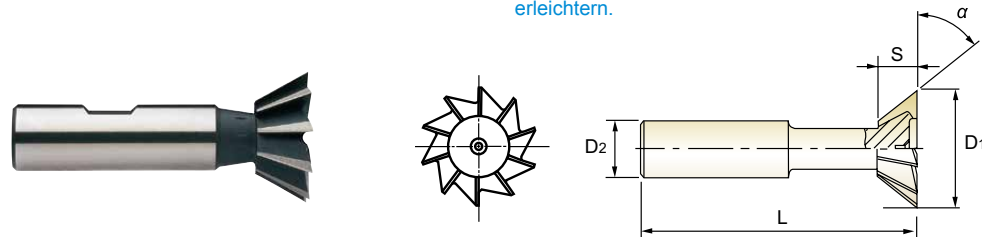
PLAIN SHANK **ML012, ML022** SERIES
FLAT SHANK **ML112, ML122** SERIES
THREAD SHANK **ML212, ML222** SERIES

HSS-E, DOVETAIL CUTTERS TYPE “A”, “C”, “E”

● HSS-E, WINKELFRÄSER FORM “A”, “C”, “E”
○ Fraise HSS-E pour queue d'aronde Type "A", "C", "E"
○ FRESE AD ANGOLO DIVERGENTE TIPO “A”, “C”, “E”

► Recommended for use in place of arbor and threaded hole type cutters to reduce set time and facilitate handling.

► Empfohlen zur Nutzung anstelle von Arbor und threaded hole type Cutters um Montierzeit zu verkürzen und Handhabung zu erleichtern.

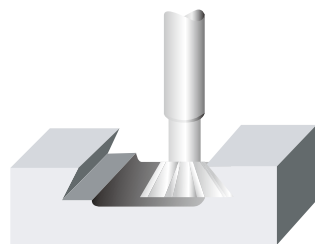


Unit : mm								
EDP No.			Cutter Diameter	Width of Face	Divergent Taper Angle	Shank Diameter	Overall Length	No. of Teeth
PLAIN	FLAT	THREAD	D1(js16)	S(js14)	$\alpha(\pm 15^\circ)$	D2(h6)	L(js18)	Z
ML01201601	ML11201601	-	16.0	4	45°	12	60	6
ML01202001	ML11202001	▲ ML21202001	20.0	5	45°	12	63	6
ML01202201	ML11202201	-	22.0	6	45°	12	67	6
ML01202501	ML11202501	▲ ML21202501	25.0	6.3	45°	16	67	8
ML01202801	ML11202801	-	28.0	7.5	45°	16	67	8
ML01203201	ML11203201	-	32.0	8	45°	16	71	10
ML01203801	ML11203801	-	38.0	10	45°	16	80	12
ML02201601	ML12201601	▲ ML22201601	16.0	6.3	60°	12	60	6
ML02202001	ML12202001	-	20.0	8	60°	12	63	6
ML02202201	ML12202201	-	22.0	9	60°	12	67	6
ML02202501	ML12202501	-	25.0	10	60°	16	67	8
ML02202801	ML12202801	-	28.0	11	60°	16	67	8
ML02203201	ML12203201	-	32.0	12.5	60°	16	71	10
ML02203801	ML12203801	-	38.0	16	60°	16	80	12
ML02204001	ML12204001	▲ ML22204001	40.0	13	60°	25	85	12
ML02205001	ML12205001	-	50.0	16	60°	25	100	16

▲ : Only available till stock runs out

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm						
	over3 to 6	over6 to 10	over10 to 18	over18 to 30	over30 to 50	over50 to 80
Tolerance range in mm						
js16	± 0.375	± 0.45	± 0.55	± 0.65	± 0.80	± 0.95
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37
js18	± 0.90	± 1.10	± 1.35	± 1.65	± 1.95	± 2.30
Tolerance range in μm						
h6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16	0 - 19



◎ : Excellent ○ : Good

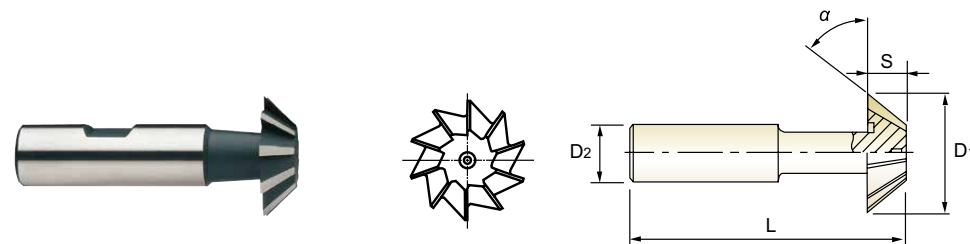
ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloy steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	200	280	250	350	320
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



PLAIN SHANK **ML032, ML042** SERIES
FLAT SHANK **ML132, ML142** SERIES
THREAD SHANK **ML232, ML242** SERIES

HSS-E, DOVETAIL CUTTERS TYPE “B”, “D”, “F”

● HSS-E, WINKELFRÄSER FORM “B”, “D”, “F”
○ Fraise HSS-E pour queue d'arronde Type "B", "D", "F"
○ FRESE AD ANGOLO CONVERGENTE TIPO “B”, “D”, “F”

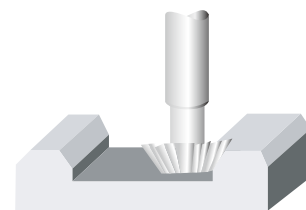


Unit : mm								
EDP No.			Cutter Diameter	Width of Face	Divergent Taper Angle	Shank Diameter	Overall Length	No. of Teeth
PLAIN	FLAT	THREAD	D1(js16)	S(js14)	$\alpha(\pm 15^\circ)$	D2(h6)	L(js18)	Z
ML03201601	ML13201601	-	16.0	4	45°	12	60	6
ML03202001	ML13202001	-	20.0	5	45°	12	63	6
ML03202201	ML13202201	-	22.0	6	45°	12	67	6
ML03202501	ML13202501	▲ ML23202501	25.0	6.3	45°	16	67	8
ML03202801	ML13202801	-	28.0	7.5	45°	16	67	8
ML03203201	ML13203201	-	32.0	8	45°	16	71	10
ML03203801	ML13203801	-	38.0	10	45°	16	80	12
ML04201601	ML14201601	-	16.0	6.3	60°	12	60	6
ML04202001	ML14202001	▲ ML24202001	20.0	8	60°	12	63	6
ML04202201	ML14202201	-	22.0	9	60°	12	67	6
ML04202501	ML14202501	-	25.0	10	60°	16	67	8
ML04202801	ML14202801	-	28.0	11	60°	16	67	8
ML04203201	ML14203201	-	32.0	12.5	60°	16	71	10
ML04203801	ML14203801	-	38.0	16	60°	16	80	12

▲ : Only available till stock runs out

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm						
	over3 to 6	over6 to 10	over10 to 18	over18 to 30	over30 to 50	over50 to 80
Tolerance range in mm						
js16	± 0.375	± 0.45	± 0.55	± 0.65	± 0.80	± 0.95
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37
js18	± 0.90	± 1.10	± 1.35	± 1.65	± 1.95	± 2.30
Tolerance range in μm						
h6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16	0 - 19



◎ : Excellent ○ : Good

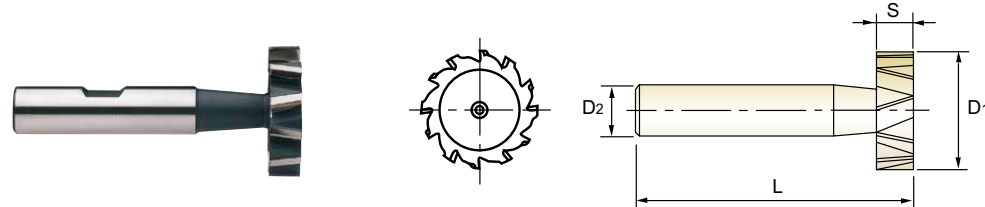
ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloy steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	200	280	250	350	320
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



PLAIN SHANK **ML062** SERIES
FLAT SHANK **ML162** SERIES
THREAD SHANK **ML262** SERIES

HSS-E, WOODRUFF KEYSEAT CUTTERS TYPE "B", "D", "F"

● HSS-E, SCHLITZFRÄSER FORM "B", "D", "F"
● Fraise HSS-E WOODRUFF Type "B", "D", "F"
● FRESE PER CHIAVETTE WOODRUFF TIPO "B", "D", "F"

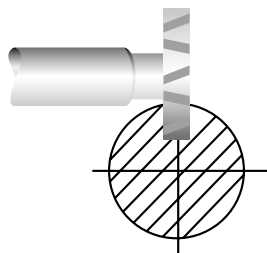


HSS-E DIN 850 N 10~12° DIN 1835A DIN 1835B DIN 1835D P.814

EDP No.			Cutter Diameter	Width of Face	Shank Diameter	Overall Length	No. of Teeth
PLAIN	FLAT	THREAD	D ₁ (h11)	S(e8)	D ₂ (h6)	L(js18)	Z
ML06210E01	ML16210E01	-	10.5	2	6	50	8
ML06210E02	ML16210E02	-	10.5	2.5	6	50	8
ML06210E03	ML16210E03	-	10.5	3	6	50	8
ML06213E01	ML16213E01	-	13.5	2	10	56	8
ML06213E02	ML16213E02	-	13.5	2.5	10	56	8
ML06213E03	ML16213E03	-	13.5	3	10	56	8
ML06213E04	ML16213E04	-	13.5	4	10	56	8
ML06216E01	ML16216E01	-	16.5	2.5	10	56	8
ML06216E02	ML16216E02	-	16.5	3	10	56	8
ML06216E03	ML16216E03	-	16.5	4	10	56	8
ML06216E04	ML16216E04	-	16.5	5	10	56	8
ML06219E01	ML16219E01	-	19.5	3	10	56	8
ML06219E02	ML16219E02	-	19.5	4	10	63	8
ML06219E03	ML16219E03	-	19.5	5	10	63	8
ML06219E04	ML16219E04	-	19.5	6	10	63	8
ML06222E01	ML16222E01	-	22.5	4	10	63	10
ML06222E02	ML16222E02	▲ ML26222E02	22.5	5	10	63	10
ML06222E03	ML16222E03	-	22.5	6	10	63	10
ML06222E04	ML16222E04	-	22.5	8	10	63	10
ML06225E01	ML16225E01	-	25.5	5	10	63	10

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm						
	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50
Tolerance range in mm						
js18	± 0.90	± 1.10	± 1.35	± 1.65	± 1.95	± 2.30
Tolerance range in μm						
h11	0 -60	0 -75	0 -90	0 -110	0 -130	0 -160
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -106
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16



◎ : Excellent ○ : Good

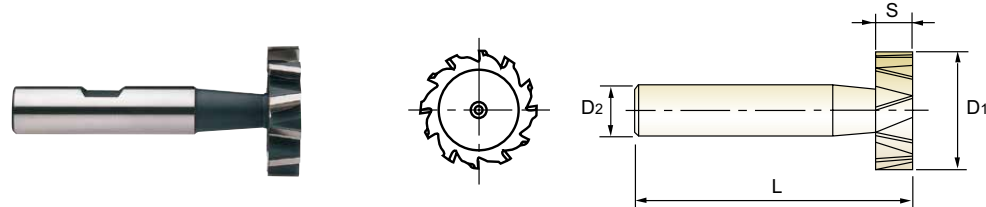
ISO	P										M					K									
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron						
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20					
HRC																									
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230					
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎														
ISO	N										S										H				
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron		Hardened Cast Iron			
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41				
HRC																									
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550				
Recommended	◎	◎	◎	◎	◎																				



PLAIN SHANK **ML062** SERIES
FLAT SHANK **ML162** SERIES
THREAD SHANK **ML262** SERIES

HSS-E, WOODRUFF KEYSEAT CUTTERS TYPE "B", "D", "F"

● HSS-E, SCHLITZFRÄSER FORM "B", "D", "F"
● Fraise HSS-E WOODRUFF Type "B", "D", "F"
● FRESE PER CHIAVETTE WOODRUFF TIPO "B", "D", "F"



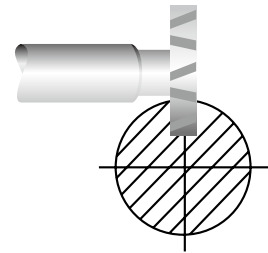
HSS-E DIN 850 N 10~12° DIN 1835A DIN 1835B DIN 1835D P.814

EDP No.			Cutter Diameter	Width of Face	Shank Diameter	Overall Length	No. of Teeth
PLAIN	FLAT	THREAD	D ₁ (h11)	S(e8)	D ₂ (h6)	L(js18)	Z
ML06225E02	ML16225E02	-	25.5	6	10	63	10
ML06225E03	ML16225E03	-	25.5	7	10	63	10
ML06225E04	ML16225E04	-	25.5	8	10	63	10
ML06228E01	ML16228E01	▲ ML26228E01	28.5	5	10	63	10
ML06228E02	ML16228E02	-	28.5	6	10	63	10
ML06228E03	ML16228E03	-	28.5	7	10	63	10
ML06228E04	ML16228E04	-	28.5	8	10	63	10
ML06228E05	ML16228E05	▲ ML26228E05	28.5	10	12	71	10
ML06232E01	ML16232E01	-	32.5	5	12	71	12
ML06232E02	ML16232E02	-	32.5	6	12	71	12
ML06232E03	ML16232E03	▲ ML26232E03	32.5	7	12	71	12
ML06232E04	ML16232E04	-	32.5	8	12	71	12
ML06232E05	ML16232E05	▲ ML26232E05	32.5	10	12	71	12
ML06238E01	ML16238E01	-	38.5	7	12	71	12
ML06238E02	ML16238E02	-	38.5	8	12	71	12
ML06238E03	ML16238E03	-	38.5	9	12	71	12
ML06238E04	ML16238E04	-	38.5	10	12	71	12
ML06245E01	ML16245E01	-	45.5	10	12	71	14

▲ : Only available till stock runs out

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm						
	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50
Tolerance range in mm						
js18	± 0.90	± 1.10	± 1.35	± 1.65	± 1.95	± 2.30
Tolerance range in μm						
h11	0 -60	0 -75	0 -90	0 -110	0 -130	0 -160
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -106
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16



◎ : Excellent ○ : Good

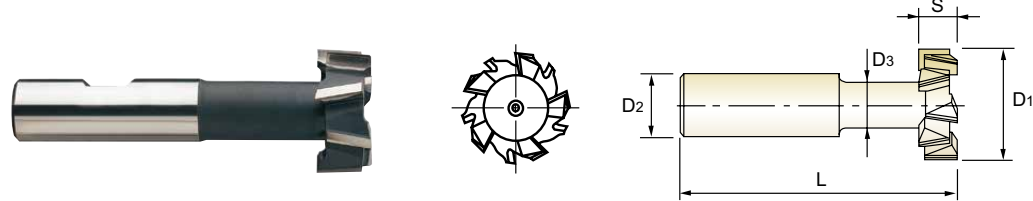
ISO	P										M					K									
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron			Malleable cast iron					
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20					
HRC	13	13	25	28	32	10	29	32	38	15	35	12	23	10	10	26	3	25	21						
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230					
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○														
ISO	N										S										H				
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)				Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast iron		Hardened Cast iron		
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41				
HRC											15	30	25	38	34			55	60	42	55				
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550				
Recommended	○	○	○	○	○																				



PLAIN SHANK	ML072 SERIES
FLAT SHANK	ML172 SERIES
THREAD SHANK	ML272 SERIES

HSS-E, T-SLOT CUTTERS TYPE "AA", "AB", "AD"

- HSS-E, SCHAFTERFRÄSER FÜR T-NUTEN FORM "AA", "AB", "AD"
● Fraise HSS-E pour rainure en "T" Type "AA", "AB", "AD"
● FRESE PER SCANALATURE A T - DENTI ALTERNATI

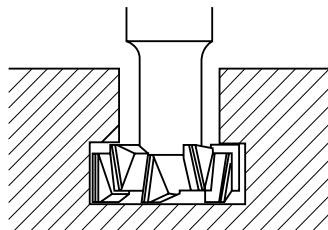


								Unit : mm
EDP No.			Cutter Diameter	Width of Face	Shank Diameter	Neck Diameter	Overall Length	No. of Teeth
PLAIN	FLAT	THREAD	D ₁ (d11)	S(d11)	D ₂ (h6)	D ₃ (h12)	L(js18)	Z
ML07212E01	ML17212E01	-	12.5	6	10	5	57	6
ML07201601	ML17201601	-	16.0	8	10	6.5	62	6
ML07201801	ML17201801	-	18.0	8	12	8	70	6
ML07201901	ML17201901	-	19.0	9	12	8	71	6
ML07202101	ML17202101	-	21.0	9	12	10	74	6
ML07202201	ML17202201	-	22.0	10	12	10	75	6
ML07202501	ML17202501	-	25.0	11	16	12	82	6
ML07202801	ML17202801	▲ ML27202801	28.0	12	16	13	83	6
ML07203201	ML17203201	-	32.0	14	16	15	90	8
ML07203601	ML17203601	▲ ML27203601	36.0	16	25	17	103	8
ML07204001	ML17204001	▲ ML27204001	40.0	18	25	19	108	8

▲ : Only available till stock runs out

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm							
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120
Tolerance range in mm							
h12	0 - 0.12	0 - 0.15	0 - 0.18	0 - 0.21	0 - 0.25	0 - 0.30	0 - 0.35
js18	± 0.90	± 1.10	± 1.35	± 1.65	± 1.95	± 2.30	± 2.70
Tolerance range in µm							
d11	- 30 - 105	- 40 - 130	- 50 - 160	- 65 - 195	- 80 - 240	- 100 - 290	- 120 - 340
h6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16	0 - 19	0 - 22



◎ : Excellent ○ : Good

ISO	P										M					K				
Material Description	Non-alloy steel					Low alloy steel					High alloy steel, and tool steel					Stainless steel				
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
Material Description	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	400 Rm	1050 Rm	550	630	400
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



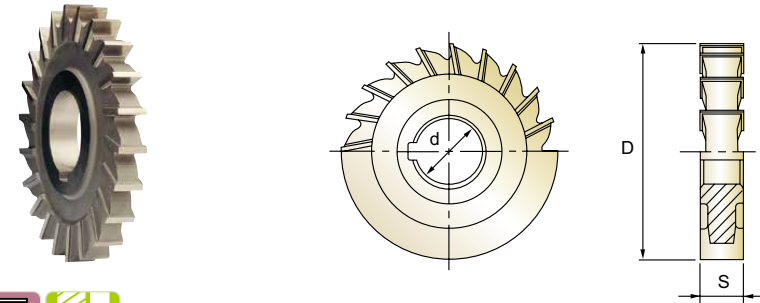
STRAIGHT TEETH ML092 SERIES

HSS-E, SIDE AND FACE MILLING CUTTERS with STRAIGHT TEETH

- HSS-E, SCHEIBENFRÄSER mit GERADEVERZAHNT
● Fraise HSS-E 3 Tailles, denture droite
● FRESE A DISCO A TRE TAGLI - DENTI DRITTI

► The tools are used for general purpose side and straddle milling where deep cut is not required.

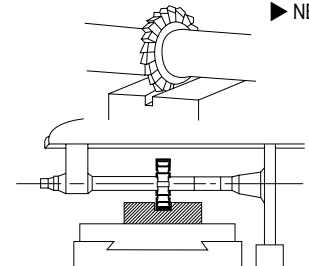
► Diese Werkzeuge werden bei allgemeinen Seiten-und Breitfräsen eingesetzt, wo Tiefschnitte nicht vorkommen.



EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D ₁ (js14)	S(k11)	d(H7)	Z
ML09205001	50.0	4	16	18
ML09205002	50.0	5	16	18
ML09205003	50.0	6	16	18
ML09205004	50.0	8	16	16
ML09205005	50.0	10	16	16
ML09206301	63.0	5	22	22
ML09206302	63.0	6	22	22
ML09206303	63.0	8	22	20
ML09206304	63.0	10	22	20
ML09206305	63.0	12	22	20
ML09208001	80.0	6	22	24
ML09208002	80.0	8	22	24
ML09208003	80.0	10	22	24
ML09208004	80.0	12	22	20
ML09208005	80.0	6	27	24
ML09208006	80.0	8	27	24
ML09208007	80.0	10	27	24
ML09208008	80.0	12	27	20
ML09210001	100.0	6	27	26
ML09210002	100.0	8	27	26

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm								
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180
Tolerance range in mm								
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50
Tolerance range in µm								
k11	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 220 0	+ 250 0
H7	+ 12 0	+ 15 0	+ 18 0	+ 21 0	+ 25 0	+ 30 0	+ 35 0	+ 40 0



◎ : Excellent ○ : Good

ISO	P										M					K				
Material Description	Non-alloy steel					Low alloy steel					High alloy steel, and tool steel					Stainless steel				
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
Material Description	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	400 Rm	1050 Rm	550	630	400
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

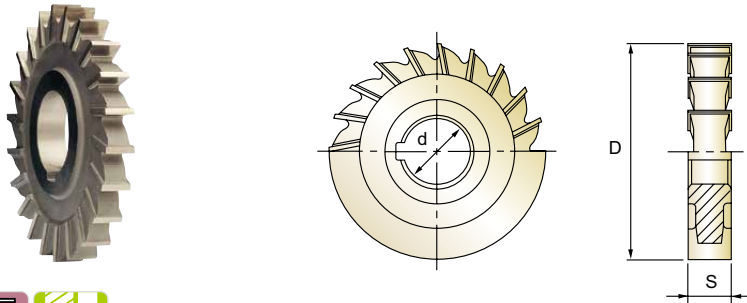


HSS-E, SIDE AND FACE MILLING CUTTERS with STRAIGHT TEETH

● **HSS-E, SCHEIBENFRÄSER mit GERADEVERZAHNT**
● **Fraise HSS-E 3 Tailles, denture droite**
● **FRESE A DISCO A TRE TAGLI - DENTI DRITTI**

► The tools are used for general purpose side and straddle milling where deep cut is not required.

► Diese Werkzeuge werden bei allgemeinen Seiten-und Breitfräsen eingesetzt, wo Tiefschnitte nicht vorkommen.



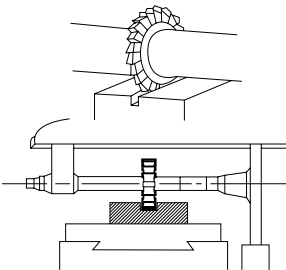
HSS-E DIN 885-B H P.816

EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D ₁ (js14)	S(k11)	d(H7)	Z
ML09210003	100.0	10	27	22
ML09210004	100.0	6	32	26
ML09210005	100.0	8	32	26
ML09210006	100.0	10	32	22
ML09210007	100.0	12	32	22
ML09212501	125.0	8	32	30
ML09212502	125.0	10	32	30
ML09212503	125.0	12	32	24

Unit : mm

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm								
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180
Tolerance range in mm								
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50
Tolerance range in µm								
k11	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 220 0	+ 250 0
H7	+ 12 0	+ 15 0	+ 18 0	+ 21 0	+ 25 0	+ 30 0	+ 35 0	+ 40 0



◎ : Excellent ○ : Good																											
ISO	P										M				K												
Material Description	Non-alloy steel					Low alloy steel				High alloy steel, and tool steel		Stainless steel				Grey cast iron		Nodular cast iron		Malleable cast iron							
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20							
HRC		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21							
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230							
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	◎																
ISO	N										S										H						
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron							
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41						
HRC											15	30	25	38	34			55	60	42	55						
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550						
Recommended	○	○	○	○	○																						

◎ : Excellent ○ : Good

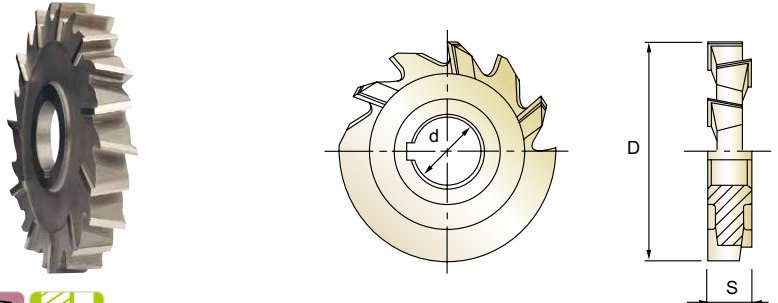


HSS-E, SIDE AND FACE MILLING CUTTERS with STAGGERED TEETH

● **HSS-E, SCHEIBENFRÄSER mit KREUZVERZAHNT**
● **Fraise HSS-E 3 Tailles, denture alternée**
● **FRESE A DISCO A TRE TAGLI - DENTI ALTERNATI**

► The type of cutter is recommended for slotting operations. The alternate spiral effectively counteracts all tendency to chatter.

► Dieser Typ ist zum Schlitzfräsen geeignet. Das alternierende Spiral wirkt allen Schnatterbewegungen entgegen.



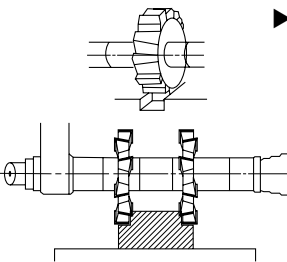
HSS-E DIN 885-A H P.817

EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D(js14)	S(k11)	d(H7)	Z
ML10205001	50.0	3	16	14
ML10205002	50.0	4	16	14
ML10205003	50.0	5	16	14
ML10205004	50.0	6	16	14
ML10205005	50.0	7	16	14
ML10205006	50.0	8	16	14
ML10205007	50.0	9	16	14
ML10205008	50.0	10	16	14
ML10206301	63.0	3	22	16
ML10206302	63.0	4	22	16
ML10206303	63.0	5	22	16
ML10206304	63.0	6	22	16
ML10206305	63.0	7	22	16
ML10206306	63.0	8	22	16
ML10206307	63.0	9	22	16
ML10206308	63.0	10	22	16
ML10206309	63.0	12	22	16
ML10206310	63.0	14	22	16
ML10206311	63.0	16	22	16
ML10206312	63.0	18	22	16

Unit : mm

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm									
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180	over 180 to 250
Tolerance range in mm									
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50	± 0.575
Tolerance range in µm									
k11	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 220 0	+ 250 0	+ 290 0
H7	+ 12 0	+ 15 0	+ 18 0	+ 21 0	+ 25 0	+ 30 0	+ 35 0	+ 40 0	+ 46 0



► NEXT PAGE

ISO	P														M						K									
Material Description	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel					Stainless steel						Grey cast iron			Nodular cast iron			Malleable cast iron		
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20										
HRC		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25												
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180																
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎																			
ISO	N										S										H									
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)				Non Metallic Materials		Heat Resistant Super Alloys						Titanium Alloys		Hardened steel		Chilled Cast Iron		Hardened Cast Iron						
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41									
HRC											15	30	25	38	34			55	60											
HB	60	100	75	90	130	110	90	100			200	280	250	350	320			400 Rm	1050 Rm	550	630	400	550							
Recommended	○	○	○	○	○																									

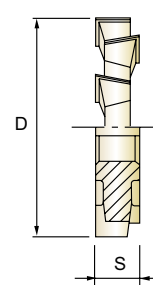
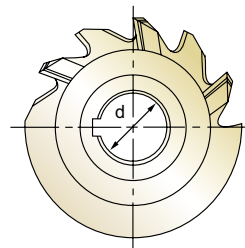
◎ : Excellent ○ : Good

HSS-E, SIDE AND FACE MILLING CUTTERS with STAGGERED TEETH

 HSS-E, SCHEIBENFRÄSER mit KREUZVERZAHNT
 **Fraise HSS-E 3 Tailles, denture alternée**
 **FRESE A DISCO A TRE TAGLI - DENTI ALTERNATI**

- The type of cutter is recommended for slotting operations.
The alternate spiral effectively counteracts all tendency to chatter.

► Dieser Typ ist zum Schlitzfräsen geeignet. Das alternierende Spiral wirkt allen Schnatterbewegungen entgegen.

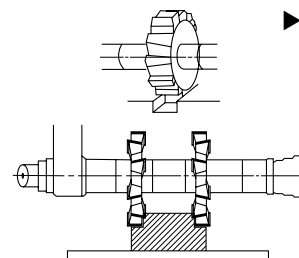


Unit : mm

EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D(js14)	S(k11)	d(H7)	Z
ML10208001	80.0	3	22	18
ML10208002	80.0	4	22	18
ML10208003	80.0	5	22	18
ML10208004	80.0	6	22	18
ML10208005	80.0	7	22	18
ML10208006	80.0	8	22	18
ML10208007	80.0	9	22	18
ML10208008	80.0	10	22	18
ML10208009	80.0	12	22	18
ML10208010	80.0	14	22	18
ML10208011	80.0	16	22	18
ML10208012	80.0	18	22	18
ML10208013	80.0	20	22	18
ML10208014	80.0	4	27	18
ML10208015	80.0	5	27	18
ML10208016	80.0	6	27	18
ML10208017	80.0	7	27	18
ML10208018	80.0	8	27	18
ML10208019	80.0	9	27	18
ML10208020	80.0	10	27	18

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm									
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180	over 180 to 250
Tolerance range in mm									
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50	± 0.575
Tolerance range in µm									
k11	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 220 0	+ 250 0	+ 290 0
H7	+ 12 0	+ 15 0	+ 18 0	+ 21 0	+ 25 0	+ 30 0	+ 35 0	+ 40 0	+ 46 0



◎ : Excellent ○ : Good

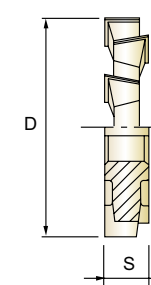
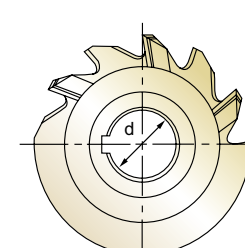
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HSS-E, SIDE AND FACE MILLING CUTTERS with STAGGERED TEETH

 **HSS-E, SCHEIBENFRÄSER mit KREUZVERZAHNT**
 **Fraise HSS-E 3 Tailles, denture alternée**
 **FRESE A DISCO A TRE TAGLI - DENTI ALTERNATI**

- The type of cutter is recommended for slotting operations.
The alternate spiral effectively counteracts all tendency to chatter.

► Dieser Typ ist zum Schlitzfräsen geeignet. Das alternierende Spiral wirkt allen Schnatterbewegungen entgegen.



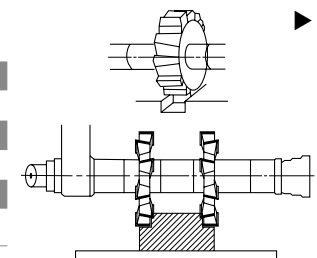
P.817

Unit : mm

EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D(js14)	S(k11)	d(H7)	Z
ML10208021	80.0	12	27	18
ML10208022	80.0	14	27	18
ML10208023	80.0	16	27	18
ML10208024	80.0	18	27	18
ML10208025	80.0	20	27	18
ML10210001	100.0	3	27	20
ML10210002	100.0	4	27	20
ML10210003	100.0	5	27	20
ML10210004	100.0	6	27	20
ML10210005	100.0	7	27	20
ML10210006	100.0	8	27	20
ML10210007	100.0	9	27	20
ML10210008	100.0	10	27	20
ML10210009	100.0	12	27	20
ML10210010	100.0	14	27	20
ML10210011	100.0	15	27	20
ML10210012	100.0	16	27	20
ML10210013	100.0	18	27	20
ML10210014	100.0	20	27	20
ML10210015	100.0	4	32	20

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm									
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180	over 180 to 250
Tolerance range in mm									
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50	± 0.575
Tolerance range in µm									
k11	+75 0	+90 0	+110 0	+130 0	+160 0	+190 0	+220 0	+250 0	+290 0
H7	+12 0	+15 0	+18 0	+21 0	+25 0	+30 0	+35 0	+40 0	+46 0



◎ : Excellent ○ : Good

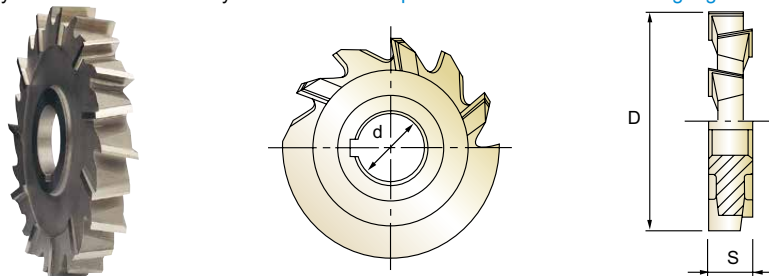
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**HSS-E, SIDE AND FACE MILLING CUTTERS with STAGGERED TEETH**

● **HSS-E, SCHEIBENFRÄSER mit KREUZVERZAHNT**
● **Fraise HSS-E 3 Tailles, denture alternée**
● **FRESE A DISCO A TRE TAGLI - DENTI ALTERNATI**

► The type of cutter is recommended for slotting operations.
The alternate spiral effectively counteracts all tendency to chatter.

► Dieser Typ ist zum Schlitzfräsen geeignet. Das alternierende
Spiral wirkt allen Schnatterbewegungen entgegen.



EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D(js14)	S(k11)	d(H7)	Z
ML10210016	100.0	5	32	20
ML10210017	100.0	6	32	20
ML10210018	100.0	7	32	20
ML10210019	100.0	8	32	20
ML10210020	100.0	9	32	20
ML10210021	100.0	10	32	20
ML10210022	100.0	12	32	20
ML10210023	100.0	14	32	20
ML10210024	100.0	15	32	20
ML10210025	100.0	16	32	20
ML10210026	100.0	18	32	20
ML10210027	100.0	20	32	20
ML10212501	125.0	5	32	22
ML10212502	125.0	6	32	22
ML10212503	125.0	8	32	22
ML10212504	125.0	10	32	22
ML10212505	125.0	12	32	22
ML10212506	125.0	14	32	22
ML10212507	125.0	16	32	22
ML10212508	125.0	18	32	22

Unit : mm

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm									
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180	over 180 to 250
Tolerance range in mm									
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50	± 0.575
Tolerance range in µm									
k11	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 220 0	+ 250 0	+ 290 0
H7	+ 12 0	+ 15 0	+ 18 0	+ 21 0	+ 25 0	+ 30 0	+ 35 0	+ 40 0	+ 46 0

◎ : Excellent ○ : Good

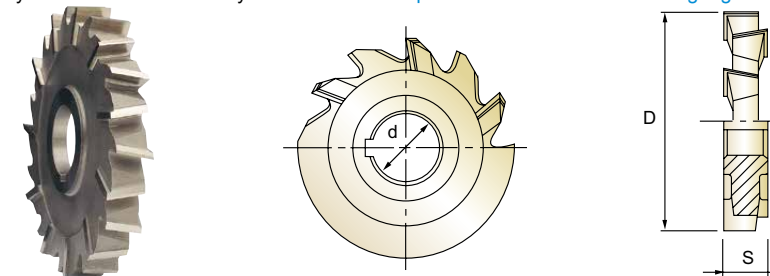
ISO	P										M				K						
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron		
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
HRC	13	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25			
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎										
ISO	N										S						H				
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys		Hardened steel	Chilled Cast iron	Hardened Cast iron		
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRC											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended	◎	◎	◎	◎	◎																

**HSS-E, SIDE AND FACE MILLING CUTTERS with STAGGERED TEETH**

● **HSS-E, SCHEIBENFRÄSER mit KREUZVERZAHNT**
● **Fraise HSS-E 3 Tailles, denture alternée**
● **FRESE A DISCO A TRE TAGLI - DENTI ALTERNATI**

► The type of cutter is recommended for slotting operations.
The alternate spiral effectively counteracts all tendency to chatter.

► Dieser Typ ist zum Schlitzfräsen geeignet. Das alternierende
Spiral wirkt allen Schnatterbewegungen entgegen.



EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D(js14)	S(k11)	d(H7)	Z
ML10212509	125.0	20	32	22
ML10216001	160.0	6	32	26
ML10216002	160.0	8	32	26
ML10216003	160.0	10	32	26
ML10216004	160.0	12	32	26
ML10216005	160.0	14	32	26
ML10216006	160.0	16	32	26
ML10216007	160.0	18	32	26
ML10216008	160.0	20	32	26
ML10216009	160.0	6	40	26
ML10216010	160.0	8	40	26
ML10216011	160.0	10	40	26
ML10216012	160.0	12	40	26
ML10216013	160.0	14	40	26
ML10216014	160.0	16	40	26
ML10216015	160.0	18	40	26
ML10216016	160.0	20	40	26
ML10220001	200.0	10	40	30
ML10220002	200.0	12	40	30
ML10220003	200.0	14	40	30

Unit : mm

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm									
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180	over 180 to 250
Tolerance range in mm									
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50	± 0.575
Tolerance range in µm									
k11	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 220 0	+ 250 0	+ 290 0
H7	+ 12 0	+ 15 0	+ 18 0	+ 21 0	+ 25 0	+ 30 0	+ 35 0	+ 40 0	+ 46 0

◎ : Excellent ○ : Good

ISO	P										M				K						
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron		
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	130	230	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	○	○											
ISO	N										S						H				
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys		Hardened steel	Chilled Cast iron	Hardened Cast iron		
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended	○	○	○	○	○																



STAGGERED TEETH

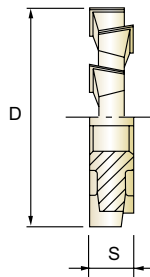
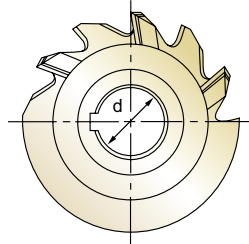
ML102 SERIES

HSS-E, SIDE AND FACE MILLING CUTTERS with STAGGERED TEETH

● HSS-E, SCHEIBENFRÄSER mit KREUZVERZAHNT
() Fraise HSS-E 3 Tailles, denture alternée
() FRESE A DISCO A TRE TAGLI - DENTI ALTERNATI

► The type of cutter is recommended for slotting operations.
The alternate spiral effectively counteracts all tendency to chatter.

► Dieser Typ ist zum Schlitzfräsen geeignet. Das alternierende
Spiral wirkt allen Schnatterbewegungen entgegen.

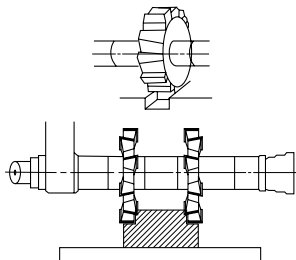


HSS-E DIN 885-A H P.817

EDP No.	Cutter Diameter	Width of Face	Internal Diameter	No. of Teeth
	D(js14)	S(k11)	d(H7)	Z
ML10220004	200.0	16	40	30
ML10220005	200.0	18	40	30
ML10220006	200.0	20	40	30
ML10220007	200.0	22	40	30
ML10220008	200.0	25	40	30

Tolerances according to DIN 7160 & 7161

	Nominal-Diameter in mm							
	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50	over 50 to 80	over 80 to 120	over 120 to 180
Tolerance range in mm								
js14	± 0.15	± 0.18	± 0.215	± 0.26	± 0.31	± 0.37	± 0.435	± 0.50
Tolerance range in µm								
k11	+75 0	+90 0	+110 0	+130 0	+160 0	+190 0	+220 0	+250 0
H7	+12 0	+15 0	+18 0	+21 0	+25 0	+30 0	+35 0	+40 0



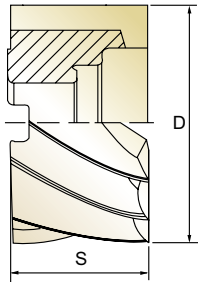
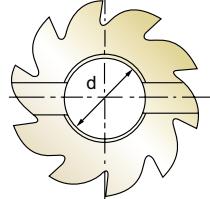
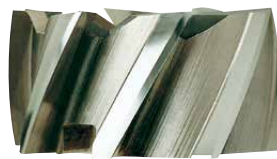
ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloy steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HRc	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



E2675 SERIES

HSSCo8, MULTI FLUTE SHELL END MILL

● HSSCo8, MULTI SCHNEIDEN WALZENSTIRNFRÄSER
() Fraise HSSCo8, multi-dents trou lisse
() FRESA CILINDRICA FRONTALE, MULTI TAGLIENTE



HSS Co8 DIN 841 N 6-10 30° P.818

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2675300	30.0	30	13	6
E2675350	35.0	35	16	6
E2675400	40.0	20	16	8
E2675402	40.0	40	16	8
E2675500	50.0	25	22	8
E2675502	50.0	50	22	8
E2675600	60.0	30	27	8
E2675601	60.0	60	27	8
E2675750	75.0	35	27	10
E2675751	75.0	75	27	10
E2675900	90.0	35	27	10
E2675902	110.0	35	32	10

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAlN-COATING is available on your request.

HSS Co8 DIN 1880 N 8-14 30° P.818

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2675401	40.0	32	16	8
E2675501	50.0	36	22	8
E2675630	63.0	40	27	8
E2675800	80.0	45	27	10
E2675901	100.0	50	32	10
E2675903	125.0	56	40	12
E2675904	160.0	63	50	14

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAlN-COATING is available on your request.

Mill Dia. Tolerance(mm)	Width of Face Tolerance(mm)	Internal Dia. Tolerance(mm)
+ 0.25 - 0.15	+ 0.5 - 0	+ 0.02 - 0

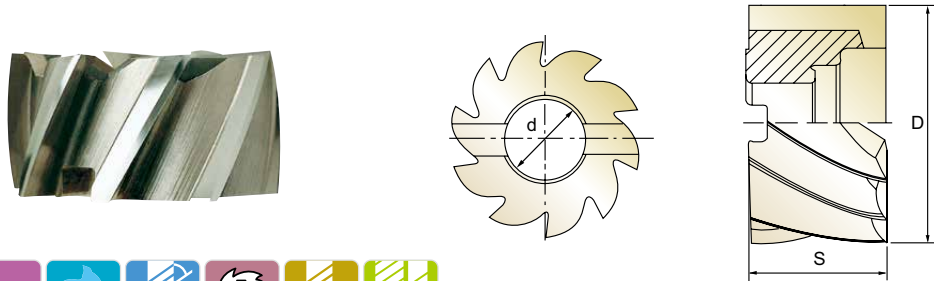
ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloy steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HRc	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



E2676 SERIES

HSSCo8, MULTI FLUTE SHELL END MILL for ALUMINUM

● HSSCo8, MULTI SCHNEIDEN WALZENSTIRNFRÄSER für ALUMINIUM
● Fraise HSSCo8, multi-dents trou lisse pour aluminium
● FRESA CILINDRICA FRONTALE MULTI TAGLIENTE, PER ALLUMINIO



HSS Co8 DIN 841 W 4&6 42° P.818

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2676300	30.0	30	● 13	4
E2676400	40.0	20	● 16	4
E2676402	40.0	40	● 16	4
E2676500	50.0	25	22	6
E2676502	50.0	50	22	6
E2676600	60.0	30	27	6
E2676601	60.0	60	27	6
E2676750	75.0	75	27	6

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAIN-COATING is available on your request.

HSS Co8 DIN 1880 W 4&6 42° P.818

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2676401	40.0	32	● 16	4
E2676501	50.0	36	22	6
E2676630	63.0	40	27	6
E2676800	80.0	45	27	6
E2676901	100.0	50	32	6

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAIN-COATING is available on your request.

Mill Dia. Tolerance(mm)	Width of Face Tolerance(mm)	Internal Dia. Tolerance(mm)
+ 0.25 - 0.15	+ 0.5 - 0	+ 0.02 - 0

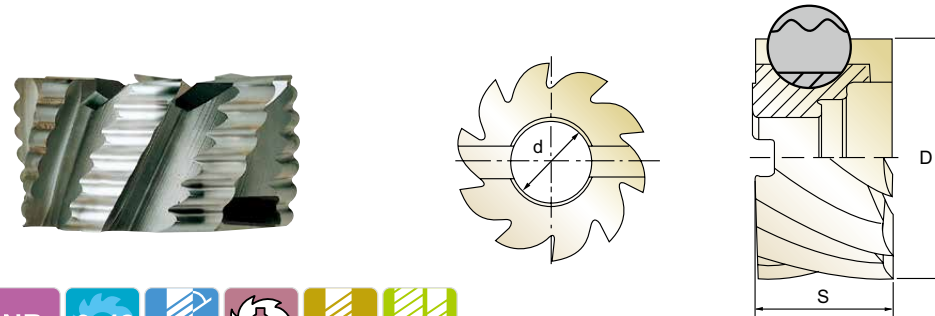
ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	200	280	250	350	320
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



E2677 SERIES

HSSCo8, MULTI FLUTE ROUGHING SHELL END MILL - COARSE

● HSSCo8, MULTI SCHNEIDEN WALZENSTIRN-SCHRUPPFRÄSER - GROBES
● Fraise HSSCo8, multi-dents trou lisse, ébauche, pas grossier
● FRESA CILINDRICA FRONTALE MULTI TAGLIENTE, PER SGROSSATURA



HSS Co8 DIN 841 NR 6-12 30° P.819

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2677401	40.0	40	● 16	6
E2677501	50.0	50	22	8
E2677600	60.0	30	27	8
E2677601	60.0	60	27	8
E2677750	75.0	35	27	10
E2677751	75.0	75	27	10
E2677900	90.0	35	27	10
E2677902	110.0	35	32	12

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAIN-COATING is available on your request.

HSS Co8 DIN 1880 NR 6-12 30° P.819

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2677400	40.0	32	● 16	6
E2677500	50.0	36	22	8
E2677630	63.0	40	27	8
E2677800	80.0	45	27	10
E2677901	100.0	50	32	10
E2677903	125.0	56	40	12
E2677904	160.0	63	50	12

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAIN-COATING is available on your request.

Mill Dia. Tolerance(mm)	Width of Face Tolerance(mm)	Internal Dia. Tolerance(mm)
+ 0.25 - 0.15	+ 0.5 - 0	+ 0.02 - 0

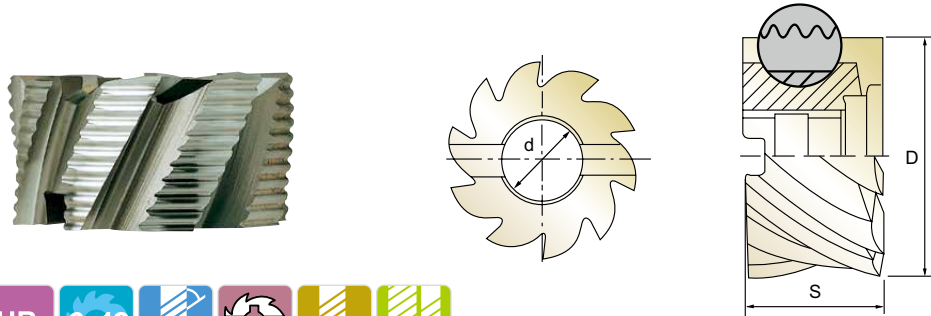
ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	200	280	250	350	320
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



E2678 SERIES

HSSCo8, MULTI FLUTE ROUGHING SHELL END MILL - FINE

● HSSCo8, MULTI SCHNEIDEN WALZENSTIRN-SCHRUPPFRÄSER - FEINES
● Fraise HSSCo8, multi-dents trou lisse, ébauche, pas fin
● FRESA CILINDRICA FRONTALE MULTI TAGLIENTE, PER SGROSSATURA



HSS Co8 DIN 841 HR 6-12 30° P.819

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2678401	40.0	40	● 16	6
E2678501	50.0	50	22	8
E2678600	60.0	30	27	8
E2678601	60.0	60	27	8
E2678750	75.0	35	27	10
E2678751	75.0	75	27	10
E2678900	90.0	35	27	10
E2678902	110.0	35	32	12

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAlN-COATING is available on your request.

HSS Co8 DIN 1880 HR 6-12 30° P.819

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2678400	40.0	32	● 16	6
E2678500	50.0	36	22	8
E2678630	63.0	40	27	8
E2678800	80.0	45	27	10
E2678901	100.0	50	32	10
E2678903	125.0	56	40	12
E2678904	160.0	63	50	12

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAlN-COATING is available on your request.

Mill Dia. Tolerance(mm)	Width of Face Tolerance(mm)	Internal Dia. Tolerance(mm)
+0.25 -0.15	+0.5 -0	+0.02 -0

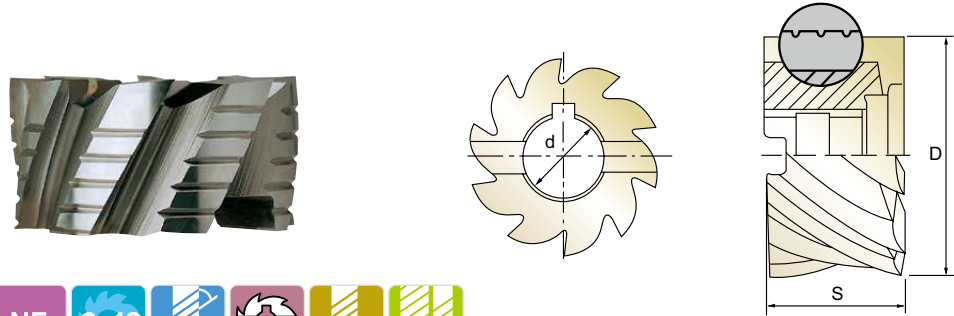
ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	400 Rm	1050 Rm	550	630	42
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



E2679 SERIES

HSSCo8, MULTI FLUTE ROUGHING & FINISHING SHELL END MILL

● HSSCo8, MULTI SCHNEIDEN WALZENSTIRN-SCHRUPPSCHLICHTFRÄSER
● Fraise HSSCo8, multi-dents trou lisse, ébauche et finition
● FRESA CILINDRICA FRONTALE MULTI TAGLIENTE, SEMI FINITURA



HSS Co8 DIN 841 NF 6-12 30° P.819

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2679401	40.0	40	● 16	6
E2679501	50.0	50	22	8
E2679600	60.0	30	27	8
E2679601	60.0	60	27	8
E2679750	75.0	35	27	10
E2679751	75.0	75	27	10
E2679900	90.0	35	27	10
E2679902	110.0	35	32	12

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAlN-COATING is available on your request.

HSS Co8 DIN 1880 NF 6-12 30° P.819

EDP No.	Mill Diameter	Width of Face	Internal Diameter	No. of Teeth
	D	S	d	Z
E2679400	40.0	32	● 16	6
E2679500	50.0	36	22	8
E2679630	63.0	40	27	8
E2679800	80.0	45	27	10
E2679901	100.0	50	32	10
E2679903	125.0	56	40	12
E2679904	160.0	63	50	12

● Tolerance of Internal Diameter = +0.018 ~ 0
► TIN-COATING, TiCN-COATING & TiAlN-COATING is available on your request.

Mill Dia. Tolerance(mm)	Width of Face Tolerance(mm)	Internal Dia. Tolerance(mm)
+0.25 -0.15	+0.5 -0	+0.02 -0

ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	400 Rm	1050 Rm	550	630	42
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



FLAT SHANK

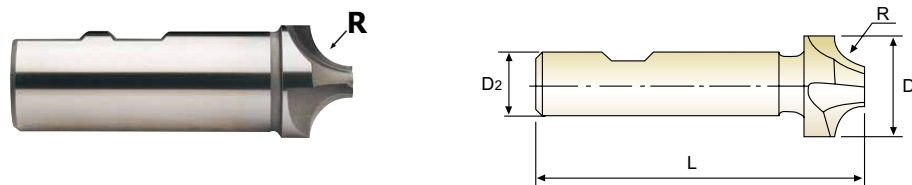
E2498 SERIES

HSSCo8, 4 FLUTE CORNER ROUNING CUTTERS

● HSSCo8, 4 SCHNEIDEN VIERTELKREISFRÄSER
() Fraise HSSCo8, 1/4 de cercle, 4 dents
() 4 TAGLIENTI PER RAGGIATURA DI SPIGOLI

► These tools can be adapted for many screw machine applications as end formmng tools to form a specific radius.

► Dieses Werkzeug kann an vielen Scrow maschine als Finishingtool für spezielle Radien montiert werden.



Unit : mm

EDP No.	Radius	Outside Diameter	Shank Diameter	Overall Length
	R(H11)	D	D2(h6)	L
E2498010	R1.0	8.0	10	60
E2498015	R1.5	9.0	10	60
E2498020	R2.0	10.0	10	60
E2498025	R2.5	11.0	10	60
E2498030	R3.0	12.0	12	60
E2498035	R3.5	13.0	12	60
E2498040	R4.0	14.0	12	60
E2498045	R4.5	15.0	12	60
E2498050	R5.0	16.0	12	60
E2498055	R5.5	19.0	16	67
E2498060	R6.0	20.0	16	67
E2498065	R6.5	21.0	16	71
E2498070	R7.0	22.0	16	71
E2498075	R7.5	23.0	16	71
E2498080	R8.0	24.0	16	71
E2498085	R8.5	25.0	25	85
E2498090	R9.0	26.0	25	85
E2498095	R9.5	27.0	25	85

► TIN-COATING, TICN-COATING & TiAIN-COATING is available on your request.

► NEXT PAGE

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm						
	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50
Tolerance range in µm						
H11	+60 0	+75 0	+90 0	+110 0	+130 0	+160 0
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16

◎ : Excellent ○ : Good

ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



FLAT SHANK

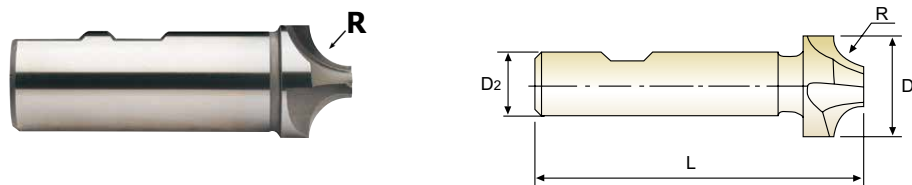
E2498 SERIES

HSSCo8, 4 FLUTE CORNER ROUNING CUTTERS

● HSSCo8, 4 SCHNEIDEN VIERTELKREISFRÄSER
() Fraise HSSCo8, 1/4 de cercle, 4 dents
() 4 TAGLIENTI PER RAGGIATURA DI SPIGOLI

► These tools can be adapted for many screw machine applications as end formmng tools to form a specific radius.

► Dieses Werkzeug kann an vielen Scrow maschine als Finishingtool für spezielle Radien montiert werden.



Unit : mm

EDP No.	Radius	Outside Diameter	Shank Diameter	Overall Length
	R(H11)	D	D2(h6)	L
E2498100	R10.0	28.0	25	85
E2498105	R10.5	31.0	25	90
E2498110	R11.0	32.0	25	90
E2498120	R12.0	34.0	25	90
E2498125	R12.5	41.0	25	100
E2498130	R13.0	42.0	25	100
E2498140	R14.0	44.0	25	100
E2498150	R15.0	46.0	25	100
E2498160	R16.0	48.0	25	100
E2498180	R18.0	52.0	32	112
E2498200	R20.0	56.0	32	112

► TIN-COATING, TICN-COATING & TiAIN-COATING is available on your request.

Tolerances according to DIN 7160 & 7161

Nominal-Diameter in mm						
	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30	over 30 to 50
Tolerance range in µm						
H11	+60 0	+75 0	+90 0	+110 0	+130 0	+160 0
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16

◎ : Excellent ○ : Good

ISO	P										M					K				
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel					Stainless steel				
Material Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	125	13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
ISO	N										S					H				
	Aluminum-wrought alloy					Aluminum-cast, alloyed					Copper and Copper Alloys (Bronze / Brass)					Non Metallic Materials				
Material Description	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HRc	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ML012, ML112, ML022, ML122, ML212, ML222 SERIES

MULTI FLUTE DOVETAIL CUTTERS
TYPE 'A', 'C', 'E'

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø)							
				16.0	20.0	25.0	32.0	40.0	50.0	63.0	
P	1	Non-alloy steel	Vc	30	30	30	30	30	30	30	
			fz	0.03	0.037	0.026	0.042	0.043	0.03	0.031	
			RPM	597	477	382	298	239	191	152	
			FEED	107	106	79	125	123	92	75	
	2		Vc	15	15	15	15	15	15	15	
			fz	0.031	0.036	0.031	0.041	0.043	0.026	0.031	
			RPM	298	239	191	149	119	95	76	
			FEED	56	52	47	61	62	40	38	
	3-4		Vc	10	10	10	10	10	10	10	
			fz	0.031	0.035	0.028	0.04	0.042	0.03	0.033	
			RPM	199	159	127	99	80	64	51	
			FEED	37	33	29	40	40	31	27	
	5		Vc	10	10	10	10	10	10	10	
			fz	0.021	0.02	0.02	0.02	0.022	0.02	0.023	
			RPM	199	159	127	99	80	64	51	
			FEED	25	19	20	20	21	20	19	
	6	Low alloy steel	Vc	15	15	15	15	15	15	15	
			fz	0.031	0.036	0.031	0.041	0.043	0.026	0.031	
			RPM	298	239	191	149	119	95	76	
			FEED	56	52	47	61	62	40	38	
	7		Vc	10	10	10	10	10	10	10	
			fz	0.031	0.035	0.028	0.04	0.042	0.03	0.033	
			RPM	199	159	127	99	80	64	51	
			FEED	37	33	29	40	40	31	27	
	8-9		Vc	10	10	10	10	10	10	10	
			fz	0.021	0.02	0.02	0.02	0.022	0.02	0.023	
			RPM	199	159	127	99	80	64	51	
			FEED	25	19	20	20	21	20	19	
	10		High alloyed steel, and tool steel	Vc	15	15	15	15	15	15	15
				fz	0.031	0.036	0.031	0.041	0.043	0.026	0.031
				RPM	298	239	191	149	119	95	76
				FEED	56	52	47	61	62	40	38
	11.1	Vc		10	10	10	10	10	10	10	
		fz		0.021	0.02	0.02	0.02	0.022	0.02	0.023	
		RPM		199	159	127	99	80	64	51	
		FEED		25	19	20	20	21	20	19	
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed		Vc	95	85	90	90	95	85	90
				fz	0.03	0.04	0.029	0.041	0.042	0.03	0.033
				RPM	1890	1353	1146	895	756	541	455
				FEED	340	325	266	367	381	260	240



RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ML032, ML132, ML042, ML142, ML232, ML242 SERIES

MULTI FLUTE DOVETAIL CUTTERS
TYPE 'B', 'D', 'F'

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø)				
				16.0	20.0	25.0	32.0	
P	1	Non-alloy steel	Vc	30	30	30	30	
			fz	0.03	0.037	0.026	0.042	
			RPM	597	477	382	298	
			FEED	107	106	79	125	
	2		Vc	15	15	15	15	
			fz	0.031	0.036	0.031	0.041	
			RPM	298	239	191	149	
			FEED	56	52	47	61	
	3-4		Vc	10	10	10	10	
			fz	0.031	0.035	0.028	0.04	
			RPM	199	159	127	99	
			FEED	37	33	29	40	
	5		Vc	10	10	10	10	
			fz	0.021	0.02	0.02	0.02	
			RPM	199	159	127	99	
			FEED	25	19	20	20	
	6	Low alloy steel	Vc	15	15	15	15	
			fz	0.031	0.036	0.031	0.041	
			RPM	298	239	191	149	
			FEED	56	52	47	61	
	7		Vc	10	10	10	10	
			fz	0.031	0.035	0.028	0.04	
			RPM	199	159	127	99	
			FEED	37	33	29	40	
	8-9		Vc	10	10	10	10	
			fz	0.021	0.02	0.02	0.02	
			RPM	199	159	127	99	
			FEED	25	19	20	20	
	10		High alloyed steel, and tool steel	Vc	15	15	15	15
				fz	0.031	0.036	0.031	0.041
				RPM	298	239	191	149
				FEED	56	52	47	61
	11.1	Vc		10	10	10	10	
		fz		0.021	0.02	0.02	0.02	
		RPM		199	159	127	99	
		FEED		25	19	20	20	
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed		Vc	95	85	90	90
				fz	0.03	0.04	0.029	0.041
				RPM	1890	1353	1146	895
				FEED	340	325	266	367



RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ML062, ML162, ML262 SERIES

MULTI FLUTES WOODRUFF KEYSEAT CUTTERS
TYPE 'B', 'D', 'F'

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø)									
				10.5	13.5	16.5	19.5	22.5	28.5	32.5	45.5		
P	1	Non-alloy steel	Vc	30	30	30	30	30	30	30	30		
			fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07		
			RPM	909	707	579	490	424	335	294	210		
			FEED	73	57	116	137	170	168	212	206		
	2		Vc	20	20	20	20	20	20	20	20		
			fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07		
			RPM	606	472	386	326	283	223	196	140		
			FEED	49	38	77	91	113	112	141	137		
	3-4		Vc	15	15	15	15	15	15	15	15		
			fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07		
			RPM	455	354	289	245	212	168	147	105		
			FEED	36	28	58	69	85	84	106	103		
	5		Vc	10	10	10	10	10	10	10	10		
			fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07		
			RPM	303	236	193	163	141	112	98	70		
			FEED	24	19	39	46	57	56	71	69		
	6	Low alloy steel	Vc	20	20	20	20	20	20	20	20		
			fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07		
			RPM	606	472	386	326	283	223	196	140		
			FEED	49	38	77	91	113	112	141	137		
	7		Vc	15	15	15	15	15	15	15	15		
			fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07		
			RPM	455	354	289	245	212	168	147	105		
			FEED	36	28	58	69	85	84	106	103		
	8-9		Vc	10	10	10	10	10	10	10	10		
			fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07		
			RPM	303	236	193	163	141	112	98	70		
			FEED	24	19	39	46	57	56	71	69		
	10		High alloyed steel, and tool steel	Vc	20	20	20	20	20	20	20	20	
				fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07	
				RPM	606	472	386	326	283	223	196	140	
				FEED	49	38	77	91	113	112	141	137	
	11.1			Vc	10	10	10	10	10	10	10	10	
				fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07	
				RPM	303	236	193	163	141	112	98	70	
				FEED	24	19	39	46	57	56	71	69	
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed		Vc	100	100	100	100	100	100	90	100	
				fz	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07	
				RPM	3032	2358	1929	1632	1415	1117	881	700	
				FEED	243	189	386	457	566	558	635	686	



RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ML072, ML172, ML272 SERIES

MULTI FLUTE T-SLOT CUTTERS
TYPE 'AA', 'AB', 'AD'

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø)											
				12.5	16.0	18.0	19.0	21.0	22.0	25.0	28.0	32.0	50.0	63.0	
P	1	Non-alloy steel	Vc	30	30	30	30	30	30	30	30	30	40	50	
			fz	0.008	0.013	0.014	0.017	0.018	0.021	0.028	0.036	0.036	0.037	0.036	
			RPM	764	597	531	503	455	434	382	341	298	255	253	
			FEED	37	47	45	51	49	55	64	74	86	75	73	
	2		Vc	15	15	15	15	15	15	15	15	15	20	25	
			fz	0.007	0.011	0.012	0.013	0.016	0.019	0.026	0.037	0.035	0.037	0.04	
			RPM	382	298	265	251	227	217	191	171	149	127	126	
			FEED	16	20	19	20	22	25	30	38	42	38	40	
	3-4		Vc	10	10	10	10	10	10	10	10	10	15	15	
			fz	0.005	0.007	0.01	0.014	0.017	0.019	0.022	0.028	0.025	0.028	0.029	
			RPM	255	199	177	168	152	145	127	114	99	95	76	
			FEED	8	8	11	14	15	16	17	19	20	21	18	
	6	Low alloy steel	Vc	15	15	15	15	15	15	15	15	15	20	25	
			fz	0.007	0.011	0.012	0.013	0.016	0.019	0.026	0.037	0.035	0.037	0.04	
			RPM	382	298	265	251	227	217	191	171	149	127	126	
			FEED	16	20	19	20	22	25	30	38	42	38	40	
	7		Vc	10	10	10	10	10	10	10	10	10	15	15	
			fz	0.005	0.007	0.01	0.014	0.017	0.019	0.022	0.028	0.025	0.028	0.029	
			RPM	255	199	177	168	152	145	127	114	99	95	76	
			FEED	8	8	11	14	15	16	17	19	20	21	18	
	10		High alloyed steel, and tool steel	Vc	15	15	15	15	15	15	15	15	15	20	25
				fz	0.007	0.011	0.012	0.013	0.016	0.019	0.026	0.037	0.035	0.037	0.04
				RPM	382	298	265	251	227	217	191	171	149	127	126
				FEED	16	20	19	20	22	25	30	38	42	38	40
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed		Vc	90	90	95	90	95	90	90	90	90	125	145
				fz	0.008	0.013	0.015	0.017	0.019	0.021	0.026	0.034	0.034	0.036	0.036
				RPM	2292	1790	1680	1508	1440	1302	1146	1023	895	796	733
				FEED	110	140	151	154	164	164	179	209	244	229	211

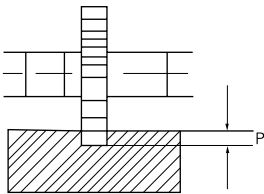


RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ML092 SERIES MULTI FLUTES SIDE AND FACE MILLING CUTTERS WITH STRAIGHT TEETH

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø)				
				50.0	63.0	80.0	100.0	125.0
P	1	Non-alloy steel	Vc	25	25	25	25	25
			fz	0.045	0.058	0.06	0.063	0.066
			RPM	159	126	99	80	64
			FEED	129	161	143	130	126
			Vc	20	20	20	20	20
			fz	0.04	0.036	0.041	0.038	0.05
			RPM	127	101	80	64	51
			FEED	92	80	78	63	76
			Vc	15	15	15	15	15
			fz	0.034	0.031	0.033	0.034	0.042
			RPM	95	76	60	48	38
			FEED	58	52	47	42	48
	5	High alloyed steel, and tool steel	Vc	10	10	10	10	10
			fz	0.031	0.029	0.03	0.03	0.036
			RPM	64	51	40	32	25
			FEED	36	32	29	25	28
			Vc	20	20	20	20	20
			fz	0.04	0.036	0.041	0.038	0.05
	6	Low alloy steel	RPM	127	101	80	64	51
			FEED	92	80	78	63	76
			Vc	15	15	15	15	15
			fz	0.034	0.031	0.033	0.034	0.042
			RPM	95	76	60	48	38
			FEED	58	52	47	42	48
	8-9	High alloyed steel, and tool steel	Vc	10	10	10	10	10
			fz	0.031	0.029	0.03	0.03	0.036
			RPM	64	51	40	32	25
			FEED	36	32	29	25	28
			Vc	20	20	20	20	20
			fz	0.04	0.036	0.041	0.038	0.05
	10	Low alloy steel	RPM	127	101	80	64	51
			FEED	92	80	78	63	76
			Vc	10	10	10	10	10
			fz	0.031	0.029	0.03	0.03	0.036
			RPM	64	51	40	32	25
			FEED	36	32	29	25	28
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed	Vc	100	100	100	100	100
			fz	0.018	0.023	0.026	0.024	0.033
			RPM	637	505	398	318	255
			FEED	206	256	248	199	252



MILLING DEPTH P = WIDTH OF FACES

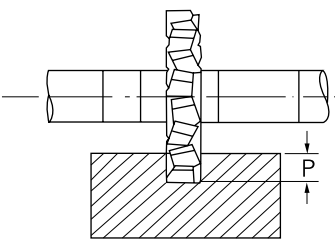


RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ML102 SERIES MULTI FLUTE SIDE AND FACE MILLING CUTTERS WITH STAGGERED TEETH

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø)						
				50.0	63.0	80.0	100.0	125.0	160.0	200.0
P	1	Non-alloy steel	Vc	25	25	25	25	25	25	25
			fz	0.058	0.08	0.081	0.081	0.072	0.081	0.079
			RPM	159	126	99	80	64	50	40
			FEED	129	162	145	129	101	105	94
			Vc	20	20	20	20	20	20	20
			fz	0.053	0.052	0.055	0.05	0.055	0.05	0.048
			RPM	127	101	80	64	51	40	32
			FEED	94	84	79	64	62	52	46
	3-4	High alloyed steel, and tool steel	Vc	15	15	15	15	15	15	15
			fz	0.044	0.043	0.044	0.044	0.045	0.044	0.041
			RPM	95	76	60	48	38	30	24
			FEED	59	52	47	42	38	34	29
			Vc	10	10	10	10	10	10	10
			fz	0.039	0.04	0.04	0.039	0.039	0.04	0.039
	5	Low alloy steel	RPM	64	51	40	32	25	20	16
			FEED	35	32	29	25	22	21	19
	6	High alloyed steel, and tool steel	Vc	20	20	20	20	20	20	20
			fz	0.053	0.052	0.055	0.05	0.055	0.05	0.048
			RPM	127	101	80	64	51	40	32
			FEED	94	84	79	64	62	52	46
	7	Low alloy steel	Vc	15	15	15	15	15	15	15
			fz	0.044	0.043	0.044	0.044	0.045	0.044	0.041
			RPM	95	76	60	48	38	30	24
			FEED	59	52	47	42	38	34	29
	8-9	High alloyed steel, and tool steel	Vc	10	10	10	10	10	10	10
			fz	0.039	0.04	0.04	0.039	0.039	0.04	0.039
			RPM	64	51	40	32	25	20	16
			FEED	35	32	29	25	22	21	19
	10	Low alloy steel	Vc	20	20	20	20	20	20	20
			fz	0.053	0.052	0.055	0.05	0.055	0.05	0.048
			RPM	127	101	80	64	51	40	32
			FEED	94	84	79	64	62	52	46
	11.1	High alloyed steel, and tool steel	Vc	10	10	10	10	10	10	10
			fz	0.039	0.04	0.04	0.039	0.039	0.04	0.039
			RPM	64	51	40	32	25	20	16
			FEED	35	32	29	25	22	21	19
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed	Vc	100	100	100	100	100	100	100
			fz	0.023	0.031	0.035	0.031	0.036	0.029	0.031
			RPM	637	505	398	318	255	199	159
			FEED	205	251	251	197	202	150	148



MILLING DEPTH P = WIDTH OF FACES

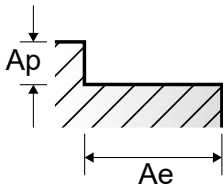


RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

E2675 SERIES MULTI FLUTE SHELL END MILL

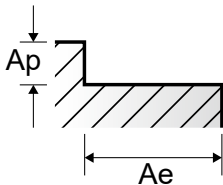
Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)						
						40.0	50.0	63.0	80.0	100.0	125.0	160.0
P	1-2	Non-alloy steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.07	0.078	0.092	0.1	0.115	0.12	0.131
					RPM	239	191	152	119	95	76	60
					FEED	134	119	112	119	110	110	109
	3-4	Non-alloy steel	0.75D	0.25D	Vc	25	25	25	25	25	25	30
					fz	0.075	0.077	0.091	0.1	0.119	0.113	0.119
					RPM	199	159	126	99	80	64	60
					FEED	119	98	92	99	95	86	99
	5	Non-alloy steel	0.75D	0.25D	Vc	20	20	20	20	20	20	20
					fz	0.071	0.078	0.09	0.094	0.117	0.108	0.116
					RPM	159	127	101	80	64	51	40
					FEED	90	79	73	75	74	66	65
	6	Low alloy steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.07	0.078	0.092	0.1	0.115	0.12	0.131
					RPM	239	191	152	119	95	76	60
					FEED	134	119	112	119	110	110	109
	7	Low alloy steel	0.75D	0.25D	Vc	25	25	25	25	25	25	30
					fz	0.075	0.077	0.091	0.1	0.119	0.113	0.119
					RPM	199	159	126	99	80	64	60
					FEED	119	98	92	99	95	86	99
	8	Low alloy steel	0.75D	0.25D	Vc	20	20	20	20	20	20	20
					fz	0.071	0.078	0.09	0.094	0.117	0.108	0.116
					RPM	159	127	101	80	64	51	40
					FEED	90	79	73	75	74	66	65
	9	High alloyed steel, and tool steel	0.75D	0.25D	Vc	10	10	10	10	10	10	10
					fz	0.078	0.08	0.1	0.1	0.117	0.146	0.125
					RPM	80	64	51	40	32	25	20
					FEED	50	41	40	40	37	45	35
	10	High alloyed steel, and tool steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.07	0.078	0.092	0.1	0.115	0.12	0.131
					RPM	239	191	152	119	95	76	60
					FEED	134	119	112	119	110	110	109
	11.1	High alloyed steel, and tool steel	0.75D	0.25D	Vc	20	20	20	20	20	20	20
					fz	0.071	0.078	0.09	0.094	0.117	0.108	0.116
					RPM	159	127	101	80	64	51	40
					FEED	90	79	73	75	74	66	65



E2676 SERIES MULTI FLUTE SHELL END MILL for ALUMINUM

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)						
						30.0	40.0	50.0	60.0	63.0	75.0	100.0
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed	0.75D	0.25D	Vc	100	105	95	95	95	105	100
					fz	0.05	0.06	0.069	0.1	0.115	0.13	0.151
					RPM	1061	836	605	504	480	446	398
					FEED	212	201	250	302	331	348	306

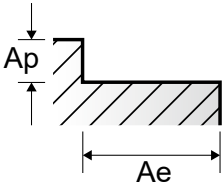


RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

E2677, E2678 SERIES MULTI FLUTE ROUGHING SHELL END MILL

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)						
						40.0	50.0	63.0	80.0	100.0	125.0	160.0
P	1-2	Non-alloy steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.069	0.078	0.092	0.1	0.115	0.12	0.153
					RPM	239	191	152	119	95	76	60
					FEED	99	119	112	119	110	110	110
	3-4	Non-alloy steel	0.75D	0.25D	Vc	25	25	25	25	25	25	30
					fz	0.071	0.077	0.091	0.1	0.119	0.113	0.139
					RPM	199	159	126	99	80	64	60
					FEED	85	98	92	99	95	86	100
	5	Non-alloy steel	0.75D	0.25D	Vc	20	20	20	20	20	20	20
					fz	0.071	0.078	0.09	0.094	0.117	0.108	0.135
					RPM	159	127	101	80	64	51	40
					FEED	68	79	73	75	74	66	64
	6	Low alloy steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.069	0.078	0.092	0.1	0.115	0.12	0.153
					RPM	239	191	152	119	95	76	60
					FEED	99	119	112	119	110	110	110
	7	Low alloy steel	0.75D	0.25D	Vc	25	25	25	25	25	25	30
					fz	0.071	0.077	0.091	0.1	0.119	0.113	0.139
					RPM	199	159	126	99	80	64	60
					FEED	85	98	92	99	95	86	100
	8	Low alloy steel	0.75D	0.25D	Vc	20	20	20	20	20	20	20
					fz	0.071	0.078	0.09	0.094	0.117	0.108	0.135
					RPM	159	127	101	80	64	51	40
					FEED	68	79	73	75	74	66	64
	9	High alloyed steel, and tool steel	0.75D	0.25D	Vc	10	10	10	10	10	10	10
					fz	0.073	0.08	0.1	0.1	0.117	0.146	0.146
					RPM	80	64	51	40	32	25	20
					FEED	35	41	40	40	37	45	35
	10	High alloyed steel, and tool steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.069	0.078	0.092	0.1	0.115	0.12	0.153
					RPM	239	191	152	119	95	76	60
					FEED	99	119	112	119	110	110	110
	11.1	High alloyed steel, and tool steel	0.75D	0.25D	Vc	20	20	20	20	20	20	20
					fz	0.071	0.078	0.09	0.094	0.117	0.108	0.135
					RPM	159	127	101	80	64	51	40
					FEED	68	79	73	75	74	66	64



E2679 SERIES MULTI FLUTE ROUGHING & FINISHING SHELL END MILL

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)						
						40.0	50.0	63.0	80.0	100.0	125.0	160.0
P	1-2	Non-alloy steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.069	0.078	0.092	0.1	0.115	0.12	0.153
					RPM	239	191	152	119	95	76	60
					FEED	99	119	112	119	110	110	110
	3-4	Non-alloy steel	0.75D	0.25D	Vc	25	25	25	25	25	25	30
					fz	0.071	0.077	0.091	0.1	0.119	0.113	0.139
					RPM	199	159	126	99	80	64	60
					FEED	85	98	92	99	95	86	100
	5	Non-alloy steel	0.75D	0.25D	Vc	20	20	20	20	20	20	20
					fz	0.071	0.078	0.09	0.094	0.117	0.108	0.135
					RPM	159	127	101	80	64	51	40
					FEED	68	79	73	75	74	66	64
	6	Low alloy steel	0.75D	0.25D	Vc	30	30	30	30	30	30	30
					fz	0.069	0.078	0.092	0.1	0.115	0.12	0.153
					RPM	239	191	152	119	95	76	60
					FEED	99	119	112	119	110	110	110
	7	Low alloy steel	0.75D	0.25D	Vc	25	25	25	25	25	25	30



RECOMMENDED CUTTING CONDITIONS EMPFOHLENE SCHNEIDPARAMETER

E2498 SERIES

4 FLUTE CORNER ROUNDING CUTTERS

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø)												
				8.0	9.0	10.0	11.0	12.0	14.0	16.0	20.0	24.0	28.0	34.0	48.0	
P	1	Non-alloy steel	Vc	20	20	20	20	20	20	20	20	20	20	20	20	
			fz	0.017	0.022	0.02	0.021	0.021	0.025	0.029	0.032	0.038	0.042	0.049	0.058	
			RPM	796	707	637	579	531	455	398	318	265	227	187	133	
			FEED	54	62	51	49	45	45	46	41	40	38	37	31	
	2		Vc	15	15	15	15	15	15	15	15	15	15	15	15	
			fz	0.015	0.016	0.016	0.019	0.019	0.023	0.029	0.033	0.039	0.04	0.048	0.053	
			RPM	597	531	477	434	398	341	298	239	199	171	140	99	
			FEED	36	34	31	33	30	31	35	32	31	27	27	21	
	3-4		Vc	10	10	10	10	10	10	10	10	10	10	10	10	
			fz	0.018	0.023	0.02	0.024	0.024	0.023	0.03	0.034	0.04	0.05	0.048	0.05	
			RPM	398	354	318	289	265	227	199	159	133	114	94	66	
			FEED	29	33	25	28	25	21	24	22	21	23	18	13	
	6	Low alloy steel	Vc	15	15	15	15	15	15	15	15	15	15	15	15	
			fz	0.015	0.016	0.016	0.019	0.019	0.023	0.029	0.033	0.039	0.04	0.048	0.053	
			RPM	597	531	477	434	398	341	298	239	199	171	140	99	
			FEED	36	34	31	33	30	31	35	32	31	27	27	21	
	7-8		Vc	10	10	10	10	10	10	10	10	10	10	10	10	
			fz	0.018	0.023	0.02	0.024	0.024	0.023	0.03	0.034	0.04	0.05	0.048	0.05	
			RPM	398	354	318	289	265	227	199	159	133	114	94	66	
			FEED	29	33	25	28	25	21	24	22	21	23	18	13	
	10		High alloyed steel, and tool steel	Vc	15	15	15	15	15	15	15	15	15	15	15	15
				fz	0.015	0.016	0.016	0.019	0.019	0.023	0.029	0.033	0.039	0.04	0.048	0.053
				RPM	597	531	477	434	398	341	298	239	199	171	140	99
				FEED	36	34	31	33	30	31	35	32	31	27	27	21
	11.1	Vc		10	10	10	10	10	10	10	10	10	10	10	10	
		fz		0.018	0.023	0.02	0.024	0.024	0.023	0.03	0.034	0.04	0.05	0.048	0.05	
		RPM		398	354	318	289	265	227	199	159	133	114	94	66	
		FEED		29	33	25	28	25	21	24	22	21	23	18	13	
N	21~25	Aluminum-wrought alloy, Aluminum-cast, alloyed		Vc	90	80	90	85	90	90	80	90	90	85	85	90
				fz	0.018	0.021	0.02	0.023	0.022	0.025	0.031	0.034	0.038	0.045	0.05	0.058
				RPM	3581	2829	2865	2460	2387	2046	1592	1432	1194	966	796	597
				FEED	258	238	229	226	210	205	197	195	181	174	159	138