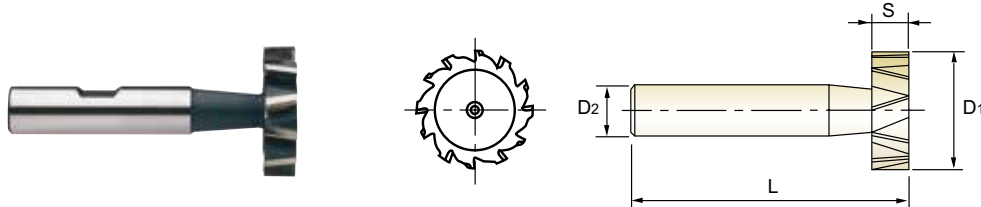


HSS-E, WOODRUFF KEYSEAT CUTTERS TYPE "B", "D", "F"

- 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
UNCOATED
p.C728

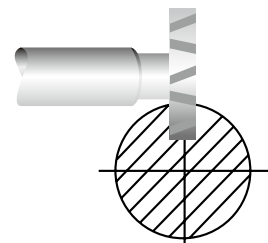
Unit : mm

EDP No.		Cutter Diameter	Width of Face	Shank Diameter	Overall Length	No. of Teeth
PLAIN	FLAT	D1(h11)	S(e8)	D2(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	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

▶ NEXT PAGE

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	over 50 to 80
Tolerance range in mm							
js18	± 0.90	± 1.10	± 1.35	± 1.65	± 1.95	± 2.30	± 2.70
Tolerance range in μm							
h11	0 -60	0 -75	0 -90	0 -110	0 -130	0 -160	0 -190
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89	-60 -106
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16	0 -19

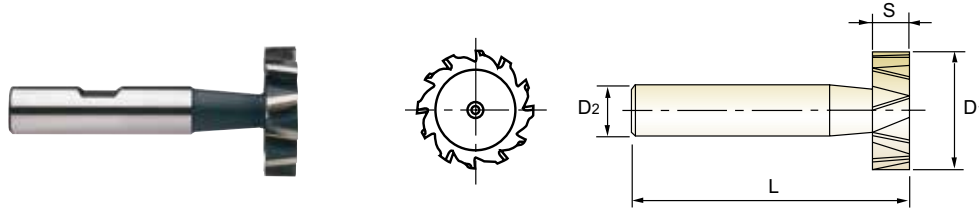


◎ : Excellent ○ : Good

ISO Material Description	P											M			K						
	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	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
ISO Material Description	N										S							H			
	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, 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"

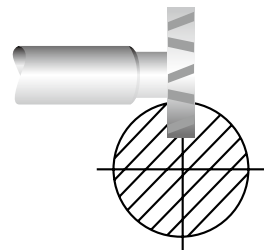


Unit : mm

EDP No.		Cutter Diameter	Width of Face	Shank Diameter	Overall Length	No. of Teeth
PLAIN	FLAT	D1(h11)	S(e8)	D2(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	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	28.5	10	12	71	10
ML06232E01	ML16232E01	32.5	5	12	71	12
ML06232E02	ML16232E02	32.5	6	12	71	12
ML06232E03	ML16232E03	32.5	7	12	71	12
ML06232E04	ML16232E04	32.5	8	12	71	12
ML06232E05	ML16232E05	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

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	over 50 to 80
Tolerance range in mm							
js18	± 0.90	± 1.10	± 1.35	± 1.65	± 1.95	± 2.30	± 2.70
Tolerance range in μm							
h11	0 -60	0 -75	0 -90	0 -110	0 -130	0 -160	0 -190
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89	-60 -106
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16	0 -19



◎ : Excellent ○ : Good

ISO Material Description	P										M			K							
	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 Material Description	N					S					H															
	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			15	30	25	38	34	200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	

SELECTION GUIDE



MILLING TOOLS

HSS

CBN
END MILLS

i-Xmill
END MILLS

i-SMART
MODULAR
END MILLS

X5070
END MILLS

4G MILL
END MILLS

X-POWER
PRO
END MILLS

TitaNox-
POWER
END MILLS

JET-POWER
END MILLS

V7 PLUS
END MILLS

ALU-POWER
HPC
END MILLS

ALU-
POWER
END MILLS

D-POWER
GRAPHITE
END MILLS

CRX S
END MILLS

K-2
END MILLS

ONLY ONE
COATED PM60
END MILLS

TANK-
POWER
END MILLS

GENERAL
HSS
END MILLS

**MILLING
CUTTERS**

TECHNICAL
DATA

SERIES	ML012, ML022 ML112, ML122	ML032, ML042 ML132, ML142	ML062 ML162
	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	C706	C707	C708

**HSS
MILLING
CUTTERS**

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



Please visit globalyg1.com/mat for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : p. C726



ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment	HB	HRc	ML012, ML022, ML112, ML122	ML032, ML042, ML132, ML142	ML062, ML162
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		Ferritic	130				
	20	Malleable cast iron	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	Cutting Alloys, PB>1%	110			
	27	(Bronze / Brass)	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		Annealed	250	25			
	34		Ni or Co Based 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			



RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

ML062, ML162 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	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	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	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	