



Leading Through Innovation



SOLID CARBIDE

CRX S END MILLS

CRX S FRÄSER

- DLC Coated Carbide End Mills for Copper
- DLC beschichtete VHM Fräser für die Kupfer

SELECTION GUIDE



SOLID CARBIDE
CRX S
END MILLS

DLC Coated Carbide End Mills for Copper

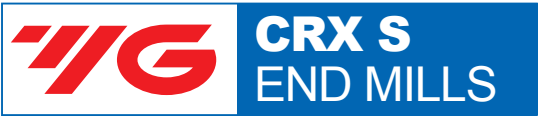


Please visit
globalyg1.com/mat
for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : p. C553

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			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						



PLAIN SHANK

SGED28 SERIES

CARBIDE, 2 FLUTE BALL NOSE DLC COATING

- VOLLHARTMETALL, 2 SCHNEIDEN STIRNRADIUS DLC BESCHICHTUNG
- FRAISE CARBURE, 2 DENTS, HÉMISPHERIQUE, REVÊTUE DLC
- 2 TAGLIENTI, SEMISFERICA, RIVESTIMENTO DLC

- ▶ Designed for copper, copper alloys, soft graphite, reinforced plastics and materials affiliated with non-ferrous metals.
- ▶ Tight radius tolerance is applied (±0.005mm tolerance under R3).
- ▶ Excellent surface roughness from Mirror Face of cutting edges
- ▶ Entwickelt für die Bearbeitung von Kupfer, Kupferlegierungen, sowie faserverstärkten Kunststoffen, NE- Metallen
- ▶ Hochgenaue Raduistoleranz (± 0.005mm Toleranz unter R3mm)
- ▶ Sehr gute Oberflächenrauigkeit wird durch die besonders behandelte Schneide erreicht



Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	R(±0.005)				
SGED28010	R0.5	1.0	6	2.5	50
SGED28015	R0.75	1.5	6	4	50
SGED28020	R1.0	2.0	6	5	50
SGED28030	R1.5	3.0	6	8	60
SGED28040	R2.0	4.0	6	8	70
SGED28050	R2.5	5.0	6	12	90
SGED28060	R3.0	6.0	6	12	90
SGED28080	R4.0	8.0	8	16	100
SGED28100	R5.0	10.0	10	20	100
SGED28120	R6.0	12.0	12	25	110

Size	Radius Tolerance (mm)	Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
up to R3	± 0.005	0 ~ - 0.012	h5
over R3		0 ~ - 0.015	

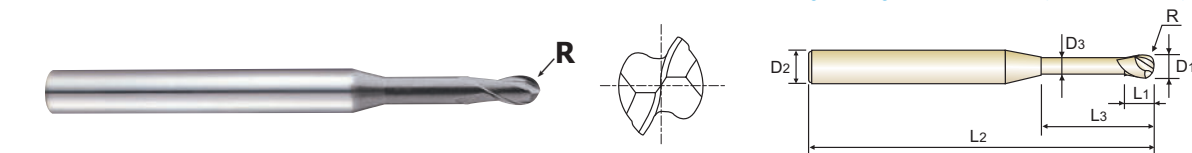
◎ : Excellent ○ : Good

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	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			
Recommend																							
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		
Recommend	○	○				◎	◎	◎	○														

CARBIDE, 2 FLUTE BALL NOSE DLC COATING with EXTENDED NECK

 VOLLHARTMETALL, 2 SCHNEIDEN STIRNRADIUS DLC BESCHICHTUNG MIT ABGESETZTEM SCHAFTTETL
 FRAISE CARBURE, 2 DENTS, HÉMISPHERIQUE, DÉTALONNÉE, REVÊTUE DLC
 2 TAGLIENTI, SEMISFERICA CON SCARICO ESTESO, RIV. DLC

- ▶ Designed to copper, copper alloys soft graphite, reinforced plastics and the materials affiliated with non-ferrous metals.
 - ▶ Tight radius tolerance is applied ($\pm 0.005\text{mm}$ tolerance under R3).
 - ▶ Excellent surface roughness thanks to Mirror Face of cutting edges
 - ▶ High strength and minimized vibration are available due to two step taper neck(under R0.5).
- ▶ Entwickelt für die Bearbeitung von Kupfer, Kupferlegierungen, sowie faserverstärkten Kunststoffen, NE- Metallen
 - ▶ Hochgenaue Radiustoleranz ($\pm 0.005\text{mm}$ Toleranz unter R3mm)
 - ▶ Sehr gute Oberflächenrauigkeit wird durch die besonders behandelte Schneide erreicht
 - ▶ Hohe Zähigkeit und verminderte Vibrationen werden durch den besonderen kegelförmigen Hals erreicht, (unter R 0,5mm)



CARBIDE 2 30° R ±0.005 R ±0.010 PLAIN DLC p.C554

R0.25~R3 R4~R6							Unit : mm
EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R	D1	D2	L1	L3	L2	D3
SGED2701516	R0.75	1.5	4	1.5	16	50	1.45
SGED2702006	R1.0	2.0	4	3	6	45	1.95
SGED2702010	R1.0	2.0	4	3	10	45	1.95
SGED2702012	R1.0	2.0	4	3	12	45	1.95
SGED2702016	R1.0	2.0	4	3	16	50	1.95
SGED2703012	R1.5	3.0	6	4	12	50	2.85
SGED2703016	R1.5	3.0	6	4	16	60	2.85
SGED2703020	R1.5	3.0	6	4	20	60	2.85
SGED2704010	R2.0	4.0	6	5	10	50	3.85
SGED2704012	R2.0	4.0	6	5	12	50	3.85
SGED2704020	R2.0	4.0	6	5	20	60	3.85
SGED2704025	R2.0	4.0	6	5	25	60	3.85
SGED2706020	R3.0	6.0	6	8	20	60	5.85
SGED2706030	R3.0	6.0	6	8	30	90	5.85
SGED2708020	R4.0	8.0	8	10	20	70	7.70
SGED2710025	R5.0	10.0	10	12	25	80	9.70
SGED2712025	R6.0	12.0	12	14	25	80	11.70

Size	Radius Tolerance (mm)	Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
up to R3	±0.005	0 ~ - 0.012	h5
over R3	±0.010	0 ~ - 0.015	

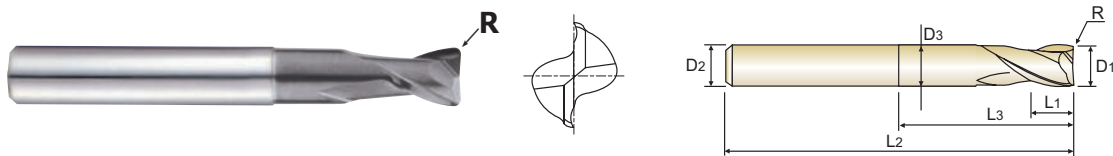
◎ : Excellent ○ : Good

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CARBIDE, 2 FLUTE CORNER RADIUS DLC COATING with EXTENDED NECK

 VOLLHARTMETALL, 2 SCHNEIDEN ECKENRADIUS DLC BESCHICHTUNG MIT ABGESETZTEM SCHAFTTETL
 **FRAISE CARBURE, 2 DENTS, TORIQUE, DÉTALONNÉE, REVÊTUE DLC**
 2 TAGLIENTI, TORICA CON SCARICO ESTESO, RIVESTIMENTO DLC

- Designed for copper, copper alloys, soft graphite, reinforced plastics and materials affiliated with non-ferrous metals.
 - Excellent surface roughness from Mirror Face of cutting edges
- Entwickelt für die Bearbeitung von Kupfer, Kupferlegierungen, sowie faserverstärkten Kunststoffen, NE- Metallen
 - Ausgelegt für verschiedene Anwendungen, z.B. schrappen, schrappschlichten und zur schlicht Bearbeitung, aufgrund der neuartigen Geometrie



EDP No.	Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R	D1	D2	L1	L3	L2	D3
SGED290400212	R0.2	4.0	6	6	12	50	3.85
SGED290400216	R0.2	4.0	6	6	16	60	3.85
SGED290400220	R0.2	4.0	6	6	20	60	3.85
SGED290400512	R0.5	4.0	6	6	12	50	3.85
SGED290400516	R0.5	4.0	6	6	16	60	3.85
SGED290400520	R0.5	4.0	6	6	20	60	3.85
SGED290600320	R0.3	6.0	6	9	20	60	5.85
SGED290600520	R0.5	6.0	6	9	20	60	5.85
SGED290601020	R1.0	6.0	6	9	20	60	5.85
SGED290800325	R0.3	8.0	8	12	25	65	7.70
SGED290800525	R0.5	8.0	8	12	25	65	7.70
SGED290801025	R1.0	8.0	8	12	25	65	7.70
SGED291000530	R0.5	10.0	10	15	30	70	9.70
SGED291001030	R1.0	10.0	10	15	30	70	9.70
SGED291200532	R0.5	12.0	12	18	32	80	11.70
SGED291201032	R1.0	12.0	12	18	32	80	11.70

Size	Corner Radius Tolerance (mm)	Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
up to Ø6	± 0.010	0 ~ - 0.012	h5
over Ø6	± 0.015	0 ~ - 0.015	

▶ NEXT PAGE

Size	Corner Radius Tolerance (mm)	Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
up to Ø6	± 0.010	0 ~ - 0.012	h5
over Ø6	± 0.015	0 ~ - 0.015	

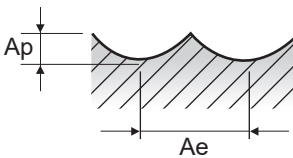
◎ : Excellent ○ : Good

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	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	
Recommend																					
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						
Recommend	○	○				◎	◎	◎	○							400 Rm	1050 Rm	550	630	400	550

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	15	26	3	25			
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommend																					
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						
Recommend	○	○				◎	◎	◎	○							400 Rm	1050 Rm	550	630	400	550

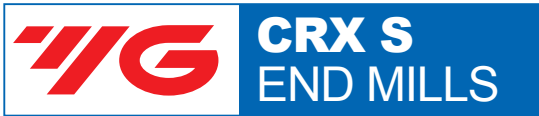
$V_c = \text{m/min.}$
 $f_z = \text{mm/tooth}$
 $\text{RPM} = \text{rev./min.}$
 $\text{FEED} = \text{mm/min.}$

- [illegible]



2 FLUTE CORNER RADIUS - S LOTTING														
ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)								
						1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0
N	21-22	Aluminum-wrought alloy	1.0D	0.5D	Vc	155	315	470	630	785	840	840	840	835
					fz	0.01	0.018	0.026	0.037	0.043	0.052	0.068	0.089	0.105
					RPM	49338	50134	49869	50134	49975	44563	33423	26738	22149
					FEED	987	1805	2593	3710	4298	4635	4545	4759	4651
	26-28	Copper and Copper Alloys (Bronze / Brass)	1.0D	0.5D	Vc	155	315	420	420	425	420	420	420	
					fz	0.01	0.017	0.026	0.031	0.039	0.047	0.063	0.079	0.095
					RPM	49338	50134	44563	33423	27056	22282	16711	13369	11141
					FEED	987	1705	2317	2072	2110	2094	2106	2112	2117
	29.1	Duroplastic	1.0D	0.5D	Vc	155	315	470	630	785	940	1255	1255	1265
					fz	0.007	0.014	0.021	0.026	0.034	0.042	0.057	0.069	0.084
					RPM	49338	50134	49869	50134	49975	49869	49935	39948	33555
					FEED	691	1404	2094	2607	3398	4189	5693	5513	5637

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)								
						1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0
N	21-22	Aluminum-wrought alloy	0.5D	1.0D	Vc	155	315	470	630	785	940	940	940	940
					fz	0.014	0.028	0.042	0.053	0.065	0.079	0.105	0.131	0.157
					RPM	49338	50134	49869	50134	49975	49869	37401	29921	24934
					FEED	1381	2807	4189	5314	6497	7879	7854	7839	7829
	26-28	Copper and Copper Alloys (Bronze / Brass)	0.5D	1.0D	Vc	155	315	470	630	630	630	630	630	
					fz	0.012	0.025	0.037	0.047	0.06	0.073	0.094	0.12	0.141
					RPM	49338	50134	49869	50134	40107	33423	25067	20054	16711
					FEED	1184	2507	3690	4713	4813	4880	4713	4813	4713
	29.1	Duroplastic	0.5D	1.0D	Vc	155	315	470	630	785	940	1255	1255	1265
					fz	0.012	0.025	0.037	0.05	0.065	0.075	0.084	0.105	0.125
					RPM	49338	50134	49869	50134	49975	49869	49935	39948	33555
					FEED	1184	2507	3690	5013	6497	7480	8389	8389	8389



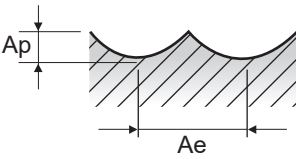
RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

SGED27 SERIES

2 FLUTE BALL

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

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)																					
						0.5	0.6	0.8	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0										
N	21	Aluminum-wrought alloy	0.05D	0.02D	Vc	80	95	125	155	250	245	240	240	245	250	250	250										
					fz	0.005	0.007	0.009	0.01	0.022	0.03	0.042	0.052	0.061	0.079	0.1	0.122										
					RPM	50930	50399	49736	49338	39789	25995	19099	15279	12998	9947	7958	6631										
						FEED	509	706	895	987	1751	1560	1604	1589	1586	1572	1592	1618									
						Vc	80	95	110	110	125	125	120	120	125	125	125	125	125								
						fz	0.005	0.007	0.009	0.011	0.02	0.028	0.038	0.047	0.055	0.072	0.091	0.111									
						RPM	50930	50399	43768	35014	19894	13263	9549	7639	6631	4974	3979	3316									
																				FEED	509	706	788	770	796	743	726
	Vc	80	95	125	155															315	370	360	365	370	375	375	375
						fz	0.004	0.005	0.006	0.006	0.013	0.019	0.027	0.033	0.039	0.05	0.064	0.077									
						RPM	50930	50399	49736	49338	50134	39258	28648	23237	19629	14921	11937	9947									
FEED						407	504	597	592	1303	1492	1547	1534	1531	1492	1528	1532										



SGED30, SGED31 SERIES

2 FLUTE - SLOTTING

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)											
						0.5	0.6	0.8	1.0	2.0	3.0	4.0	6.0	8.0	10.0	12.0	
N	21-22	Aluminum-wrought alloy	1.0D	0.5D	Vc	80	95	125	155	315	330	325	325	330	325	330	
					fz	0.005	0.006	0.008	0.01	0.01	0.023	0.032	0.048	0.064	0.081	0.097	
					RPM	50930	50399	49736	49338	50134	35014	25863	17242	13130	10345	8754	
					FEED	509	605	796	987	1003	1611	1655	1655	1681	1676	1698	
	26-28	Copper and Copper Alloys (Bronze / Brass)	1.0D	0.5D	Vc	80	95	105	110	160	165	160	165	165	160	165	
					fz	0.005	0.006	0.008	0.01	0.01	0.023	0.032	0.048	0.064	0.081	0.097	
					RPM	50930	50399	41778	35014	25465	17507	12732	8754	6565	5093	4377	
					FEED	509	605	668	700	509	805	815	840	840	825	849	
	29.1	Duroplastic	1.0D	0.5D	Vc	80	95	125	155	315	470	490	490	500	490	495	
					fz	0.001	0.002	0.002	0.003	0.004	0.007	0.009	0.014	0.018	0.023	0.028	
					RPM	50930	50399	49736	49338	50134	49869	38993	25995	19894	15597	13130	
					FEED	102	202	199	296	401	698	702	728	716	717	735	

2 FLUTE - SIDE CUTTING

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø)											
						0.5	0.6	0.8	1.0	2.0	3.0	4.0	6.0	8.0	10.0	12.0	
N	21-22	Aluminum-wrought alloy	0.5D	1.0D	Vc	80	95	125	130	260	260	265	270	265	265	270	
					fz	0.005	0.006	0.008	0.01	0.011	0.025	0.034	0.053	0.069	0.086	0.107	
					RPM	50930	50399	49736	41380	41380	27587	21088	14324	10544	8435	7162	
						FEED	509	605	796	828	910	1379	1434	1518	1455	1451	1533
						Vc	80	85	85	85	170	175	175	180	175	175	180
						fz	0.005	0.006	0.008	0.01	0.01	0.023	0.032	0.05	0.064	0.08	0.1
	26-28	Copper and Copper Alloys (Bronze / Brass)	0.5D	1.0D	RPM	50930	45094	33820	27056	27056	18568	13926	9549	6963	5570	4775	
					FEED	509	541	541	541	541	854	891	955	891	891	955	
					Vc	80	95	125	155	315	350	350	360	350	350	360	
	29.1	Duroplastic	0.5D	1.0D	fz	0.004	0.005	0.006	0.008	0.009	0.018	0.026	0.04	0.051	0.064	0.08	
					RPM	50930	50399	49736	49338	50134	37136	27852	19099	13926	11141	9549	
					FEED	407	504	597	789	902	1337	1448	1528	1420	1426	1528	

