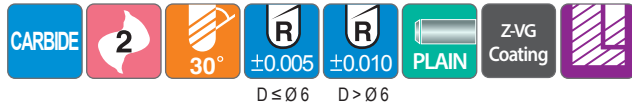
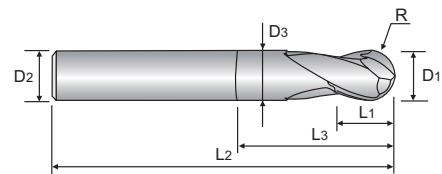
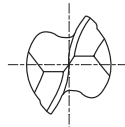


END MILLS for HARDENED MATERIAL



CARBIDE, 2 FLUTE BALL NOSE

- Designed for machining high-hardened materials, dry cutting, and high-speed cutting.
- Consistently delivers an exceptional workpiece finish and boasts high wear resistance.



D ≤ Ø6 D > Ø6

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

GFJ68

SERIES

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
GFJ68002	R0.1	0.2	4	0.3	-	40	-
GFJ68003	R0.15	0.3	4	0.5	-	40	-
GFJ68004	R0.2	0.4	4	0.6	-	40	-
GFJ68005	R0.25	0.5	4	0.7	-	40	-
GFJ68006	R0.3	0.6	4	0.9	-	40	-
GFJ68007	R0.35	0.7	4	1.1	-	40	-
GFJ68008	R0.4	0.8	4	1.2	-	40	-
GFJ68009	R0.45	0.9	4	1.4	-	40	-
GFJ68010	R0.5	1.0	6	1.5	3	50	0.95
GFJ68015	R0.75	1.5	6	2	4	50	1.45
GFJ68020	R1.0	2.0	6	2.5	5	50	1.95
GFJ68025	R1.25	2.5	6	3	7	50	2.4
GFJ68030	R1.5	3.0	6	4	10	60	2.85
GFJ68040	R2.0	4.0	6	5	10	60	3.85
GFJ68050	R2.5	5.0	6	6	12	60	4.85
GFJ68060	R3.0	6.0	6	7	15	60	5.85
GFJ68080	R4.0	8.0	8	9	15	60	7.7
GFJ68080080	R4.0	8.0	8	9	15	80	7.7
GFJ68100	R5.0	10.0	10	11	25	60	9.7
GFJ68100080	R5.0	10.0	10	11	25	80	9.7
GFJ68120	R6.0	12.0	12	14	25	80	11.7

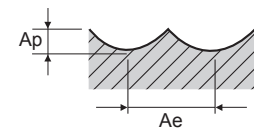
RECOMMENDED CUTTING CONDITIONS

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

GFJ68 SERIES

2 FLUTE BALL NOSE

ISO	VDI 3323	Material Description	Ae(mm)	Ap(mm)	Parameter	Diameter (Ø)																
						0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	
P	5	Non-alloy steel	0.05D	0.02D	Vc	16	25	33	41	49	66	82	124	164	164	164	153	138	147	154	138	
					fz	0.013	0.016	0.021	0.026	0.032	0.043	0.053	0.059	0.063	0.100	0.133	0.171	0.192	0.207	0.218	0.234	
					RPM	26,250	26,250	26,250	26,250	26,250	26,250	26,250	26,250	26,100	17,400	13,050	9,750	7,300	5,850	4,900	3,650	
					FEED	695	865	1095	1385	1675	2250	2770	3120	3290	3465	3465	3340	2800	2425	2135	1705	
	8-9	Low alloy steel	0.05D	0.02D	Vc	16	25	33	41	49	66	82	124	164	164	164	153	138	147	154	138	
					fz	0.013	0.016	0.021	0.026	0.032	0.043	0.053	0.059	0.063	0.100	0.133	0.171	0.192	0.207	0.218	0.234	
					RPM	26,250	26,250	26,250	26,250	26,250	26,250	26,250	26,250	26,100	17,400	13,050	9,750	7,300	5,850	4,900	3,650	
					FEED	695	865	1095	1385	1675	2250	2770	3120	3290	3465	3465	3340	2800	2425	2135	1705	
	11.1	High alloyed steel, and tool steel	0.05D	0.02D	Vc	16	25	33	41	49	66	82	124	164	164	164	153	138	147	154	138	
					fz	0.013	0.016	0.021	0.026	0.032	0.043	0.053	0.059	0.063	0.100	0.133	0.171	0.192	0.207	0.218	0.234	
					RPM	26,250	26,250	26,250	26,250	26,250	26,250	26,250	26,250	26,100	17,400	13,050	9,750	7,300	5,850	4,900	3,650	
					FEED	695	865	1095	1385	1675	2250	2770	3120	3290	3465	3465	3340	2800	2425	2135	1705	
	11.2		0.05D	0.02D	Vc	16	25	33	41	49	66	82	119	158	157	158	147	133	141	146	132	
					fz	0.012	0.015	0.019	0.023	0.028	0.036	0.046	0.052	0.055	0.092	0.122	0.151	0.168	0.180	0.192	0.206	
					RPM	26,250	26,250	26,250	26,250	26,250	26,250	25,200	25,100	16,700	12,550	9,350	7,050	5,600	4,650	3,500		
					FEED	605	780	980	1215	1445	1905	2425	2600	2770	3060	3060	2820	2370	2020	1790	1445	
H	38.1	Hardened steel	0.05D	0.02D	Vc	16	25	33	41	49	66	82	119	158	157	158	147	133	141	146	132	
					fz	0.012	0.015	0.019	0.023	0.028	0.036	0.046	0.052	0.055	0.092	0.122	0.151	0.168	0.180	0.192	0.206	
					RPM	26,250	26,250	26,250	26,250	26,250	26,250	26,250	25,200	25,100	16,700	12,550	9,350	7,050	5,600	4,650	3,500	
					FEED	605	780	980	1215	1445	1905	2425	2600	2770	3060	3060	2820	2370	2020	1790	1445	
	38.2		0.05D	0.02D	Vc	15	22	30	37	45	59	74	106	132	131	132	124	109	119	124	111	
					fz	0.012	0.015	0.018	0.023	0.027	0.037	0.046	0.051	0.055	0.083	0.110	0.137	0.154	0.164	0.175	0.186	
					RPM	23,650	23,650	23,650	23,650	23,650	23,650	23,650	22,600	21,000	13,900	10,500	7,900	5,800	4,750	3,950	2,950	
					FEED	555	695	865	1095	1270	1735	2185	2310	2310	2310	2165	1790	1560	1385	1095	1095	
	39.1		0.05D	0.02D	Vc	13	20	26	33	40	53	66	92	116	116	116	112	99	106	108	100	
					fz	0.011	0.013	0.017	0.021	0.025	0.033	0.041	0.046	0.049	0.074	0.099	0.124	0.138	0.148	0.159	0.169	
					RPM	21,000	21,000	21,000	21,000	21,000	21,000	19,450	18,400	12,350	9,200	7,100	5,250	4,200	3,450	2,650		
					FEED	445	560	695	865	1040	1385	1735	1790	1820	1820	1760	1445	1240	1095	895	895	
	39.2		0.05D	0.02D	Vc	12	17	23	29	35	46	58	82	106	104	106	95	87	93	96	87	
					fz	0.011	0.013	0.016	0.020	0.025	0.033	0.041	0.045	0.048	0.073	0.096	0.122	0.135	0.145	0.157	0.157	
					RPM	18,400	18,400	18,400	18,400	18,400	18,400	17,350	16,800	11,050	8,400	6,050	4,600	3,700	3,050	2,300		
					FEED	390	485	605	750	925	1215	1500	1560	1615	1615	1615	1475	1240	1070	955	720	
	40		Chilled Cast Iron	0.05D	0.02D	Vc	16	25	33	41	49	66	82	119	158	157	158	147	133	141	146	132
						fz	0.012	0.015	0.019	0.023	0.028	0.036	0.046	0.052	0.055	0.092	0.122	0.151	0.168	0.180	0.192	0.206
						RPM	26,250	26,250	26,250	26,250	26,250	26,250	25,200	25,100	16,700	12,550	9,350	7,050	5,600	4,650	3,500	
						FEED	605	780	980	1215	1445	1905	2425	2600	2770	3060	3060	2820	2370	2020	1790	1445
	41		Hardened Cast Iron	0.05D	0.02D	Vc	15	22	30	37	45	59	74	106	132	131	132	124	109	119	124	111
						fz	0.012	0.015	0.018	0.023	0.027	0.037	0.046	0.051	0.055	0.083	0.110	0.137	0.154	0.164	0.175	0.186
						RPM	23,650	23,650	23,650	23,650	23,650	23,650	23,650	22,600	21,000	13,900	10,500	7,900	5,800	4,750	3,950	2,950
						FEED	555	695	865	1095	1270	1735	2185	2310	2310	2310	2165	1790	1560	1385	1095	1095



SOLID CARBIDE, END MILLS for Hardened Material

Specially optimized geometry and coating
for machining Hardened steels up to 65 HRC

◎ : Excellent ○ : Good

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		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 : p.75~82

SERIES

FLUTE

HELIX ANGLE

CUTTING EDGE SHAPE

SIZE MIN

SIZE MAX

PAGE

GFJ69

GFJ68

2

2

30°

30°

BALL NOSE

BALL NOSE

R0.2

R0.1

R2.0

R6.0

66

69

LONG LENGTH

-

Z-VG Coating

Z-VG Coating

