

BCF Roughing Ball

Indexable End Mill · Shank & Modular Types



D20mm ~ D50mm
• ***Shank & Modular***
Types
• ***For Materials ≤50HRC***



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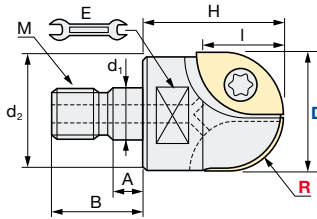
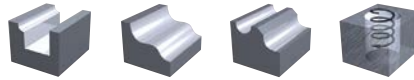
BCFM Roughing Ball - Modular Type

Q max
High Efficient


Roughing


Semi-Finishing

HRC
50

No. of Teeth
2


Inserts: p. 6

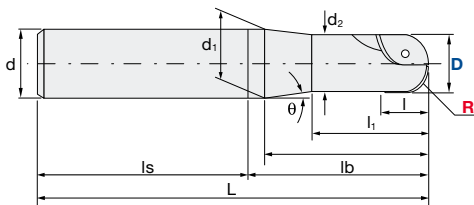


Diameter Holder only [mm]

0/-0.15 mm

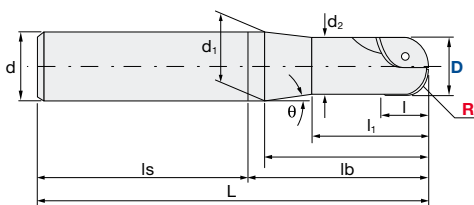
ID Code	Item Code	Flutes	D	R	H	I	d ₁	d ₂	A	B	C	E	M	Inserts x1	Inserts x1
FH522	BCFM-20	2	20	10	38	18	10.5	17.8	5.5	19	10	15	M10	ZCEW100CE*	ZCEW100SE*
FH523	BCFM-25		25	12.5		23	12.5	20.8		22		17	M12	ZCEW125CE*	ZCEW125SE*
FH524	BCFM-32		32	16		28	17	28.8		23		22	M16	ZCET160CE	ZCET160SE

* or ZCET

BCF-S Roughing Ball - Short




ID Code	Item Code	Flutes	D	R	L	d	l	l ₁	l ₂	l _b	l _s	θ°	d ₁	d ₂	Inserts x1	Inserts x1
FH034	BCF-2018S25S	2	20	10	140	25	18	30	52	60	80	5.7°	23.4	19	ZCEW100CE*	ZCEW100SE*
FH040	BCF-2523S32S		25	12.5	150	32	23	35	62	70		6.5°	30.1	24	ZCEW125CE*	ZCEW125SE*
FH044	BCF-3028S32S		30	15	160		28	50	72	80		3.1°	31.2	28.8	ZCEW150CE*	ZCEW150SE*
FH383	BCF-3228S32S		32	16			-	-	-	-		-	30.6	ZCET160CE	ZCET160SE	

* or ZCET

BCF-TE Roughing Ball - Taper Necked Long Shank


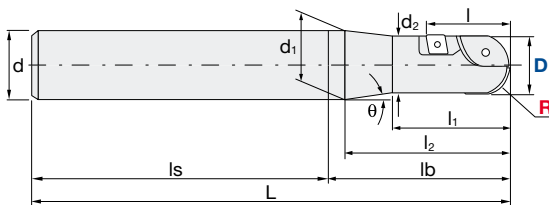
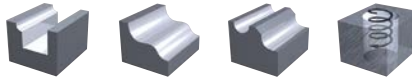
ID Code	Item Code	Flutes	D	R	L	d	l	l ₁	l ₂	l _b	l _s	θ°	d ₁	d ₂	Inserts x1	Inserts x1		
FH035	BCF-2018S25TE	2	20	10	250	25	18	30	72	80	170	3°	23.4	19	ZCEW100CE*	ZCEW100SE*		
FH036	BCF-2018S32TE				300					107	115	185	4°9'	31.2	18	ZCEW100CE*	ZCEW100SE*	
FH041	BCF-2523S32TE			25	12.5	350	32	23	35	97	105	195	2°8'	30.1	24	ZCEW125CE*	ZCEW125SE*	
FH045	BCF-3028S32TE			30	15									1°3'	28.8	28.8	ZCEW150CE*	ZCEW150SE*
FH386	BCF-3228S32TE			32	16					28	40	92	100	250	0°3'	31.2	30.6	ZCET160CE

* or ZCET

Parts	Clamp Screw 			Wrench 	
Body	ID Code	Item Code	Fastening Torque [Nm]	ID Code	Item Code
D 20	ET034	261-141	2.0Nm	ET011	104-T10
D 25	ET035	262-141	2.9Nm	ET012	104-T15
D 30 + D 32	ET036	263-141	4.9Nm	ET014	105-T20

BCF-L Roughing Ball - Long

Q max High Efficient	▽ Roughing	▽▽ Semi-Finishing	HRC 50	No. of Teeth 2
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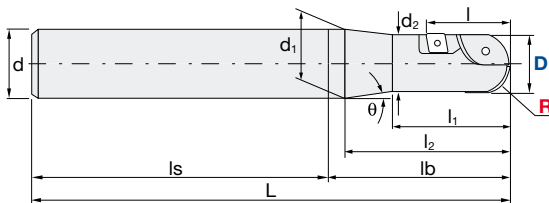


Inserts: p. 6


 Diameter Holder only [mm]
0/-0.15 mm

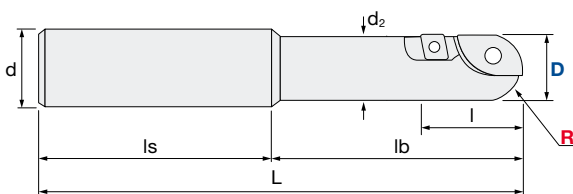
ID Code	Item Code	Flutes	D	R	L	d	l	l ₁	l ₂	lb	ls	θ°	d ₁	d ₂	Inserts x1	Inserts x1	Inserts x2
FH038	BCF-2030S25L	2	20	10	150	25	30	35	62	70	80	5.3°	24	18.5	ZCEW100CE*	ZCEW100SE*	CPMT080204
FH043	BCF-2539S32L		25	12.5	180		39	50	72	80		9.7°	23.5		ZCEW125CE*	ZCEW125SE*	CPMT090308
FH047	BCF-3043S32L		30	15	200	32		60	92			2.7°	31	28	ZCEW150CE*	ZCEW150SE*	CPMT090308
FH384	BCF-3243S32L		32	16		43		-	-	100	100	-	30.3	-	ZCET160CE	ZCET160SE	CPMT090308
FH363	BCF-4050S42L		40	20	250	42	50	-	-	150		-	38.6	-	ZCEW200CE	ZCEW200SE	CPMT090308

* or ZCET

BCF-E Roughing Ball - Extra Long






ID Code	Item Code	Flutes	D	R	L	d	l	l ₁	l ₂	lb	ls	θ°	d ₁	d ₂	Inserts x1	Inserts x1	Inserts x2
FH037	BCF-2030S25E	2	20	10	250	25	30	35	62	70	180	5.2°	24	18.5	ZCEW100CE*	ZCEW100SE*	CPMT080204
FH039	BCF-2030S32E											12.4°	30.4		ZCEW100CE*	ZCEW100SE*	CPMT080204
FH042	BCF-2539S32E		25	12.5	300	32	39	50	72	80	220	9.7°	31	23.5	ZCEW125CE*	ZCEW125SE*	CPMT090308
FH046	BCF-3043S32E		30	15				60	92			2.7°		28	ZCEW150CE*	ZCEW150SE*	CPMT090308
FH385	BCF-3243S32E		32	16	350		43	-	-	100	250	-	30.3	-	ZCET160CE	ZCET160SE	CPMT090308

* or ZCET

BCF-ST Roughing Ball - Straight Neck Long Shank


ID Code	Item Code	Flutes	D	R	L	d	l	lb	ls	d ₂	Inserts x1	Inserts x1	Inserts x2
FH439	BCF-2030S20ST080	2	20	10	180	20	30	80	100	18.5	ZCEW100CE*	ZCEW100SE*	CPMT080204
FH440	BCF-2030S20ST150				250			150			ZCEW100CE*	ZCEW100SE*	CPMT080204
FH441	BCF-2539S32ST100		25	12.5	200	32	39	100		23.5	ZCEW125CE*	ZCEW125SE*	CPMT090308
FH442	BCF-2539S32ST150				250			150			ZCEW125CE*	ZCEW125SE*	CPMT090308
FH487	BCF-3243S32ST100		32	16	200	43	100	200		30	ZCET160CE	ZCET160SE	CPMT090308
FH488	BCF-3243S32ST200				300						ZCET160CE	ZCET160SE	CPMT090308

* or ZCET

Parts	Clamp Screw R Insert 			Clamp Screw Peripheral Insert 			Wrench R Insert 		Wrench Peripheral Insert 	
Body	ID Code	Item Code	Fastening Torque [Nm]	ID Code	Item Code	Fastening Torque [Nm]	ID Code	Item Code	ID Code	Item Code
D 20	ET034	261-141	2.0Nm	ET033	251-141	1.1Nm	ET011	104-T10	ET013	104-T8
D 25	ET035	262-141	2.9Nm	ET035	262-141	2.9Nm	ET012	104-T15	ET012	104-T15
D 30	ET036	263-141	4.9Nm	ET035	262-141	2.9Nm	ET014	105-T20	ET012	104-T15
D 32	ET036	263-141	4.9Nm	ET035	262-141	2.9Nm	ET014	105-T20	ET012	104-T15
D 40	ET150	571-141A	9.8Nm	ET035	262-141	2.9Nm	ET167	105-T30A	ET012	104-T15

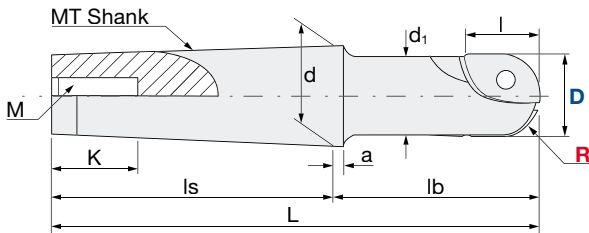
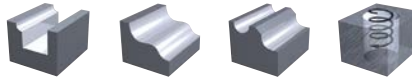
BCF-MT Roughing Ball - MT Shank

Q max
High Efficient


Roughing


Semi-Finishing

HRC
50

No. of Teeth
2


Inserts: p. 6







Diameter Holder only [mm]

0/-0.15 mm

ID Code	Item Code	Flutes	D	R	I	MT	L	lb	Is	d	d ₁	a	K	M	Inserts x1	Inserts x1	Inserts x2
FH443	BCF-20MT2	2	20	10	18	MT2	129	65	64	17.78	19				ZCEW100CE*	ZCEW100SE*	
FH444	BCF-25MT3		25	12.5	23	MT3	166	85	81	23.825	24				ZCEW125CE*	ZCEW125SE*	
FH445	BCF-32MT4		32	16	28	MT4	217.5	115	102.5	31.267	30.6				ZCET160CE	ZCET160SE	
FH446	BCF-40MT5		40	20	50	MT5	226	96.5	129.5	44.399	38.6				ZCEW200CE	ZCEW200SE	CPMT090308

* or ZCET

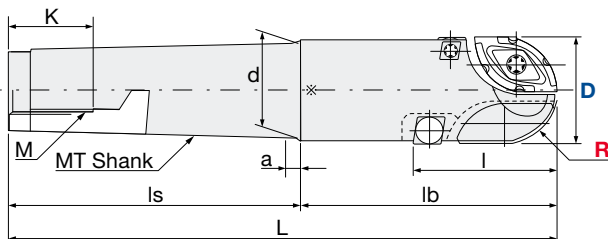
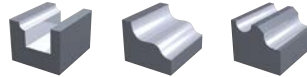
Parts BCF		Clamp Screw		Clamp Screw Peripheral Insert			Wrench		Wrench Peripheral Insert	
										
Body	ID Code	Item Code	Fastening Torque [Nm]	ID Code	Item Code	Fastening Torque [Nm]	ID Code	Item Code	ID Code	Item Code
BCF-20MT2	ET034	261-141	2.0Nm	–	–	–	ET011	104-T10	–	–
BCF-25MT3	ET035	262-141	2.9Nm	–	–	–	ET012	104-T15	–	–
BCF-32MT4	ET036	263-141	4.9Nm	–	–	–	ET014	105-T20	–	–
BCF-40MT5	ET150	571-141A	9.8Nm	ET035	262-141	2.9Nm	ET167	105-T30A	ET012	104-T15

BCU Roughing Ball - Heavy Roughing MT Shank

Q max
High Efficient


Roughing

HRC
50





No. of Teeth
2


Diameter Holder only [mm]

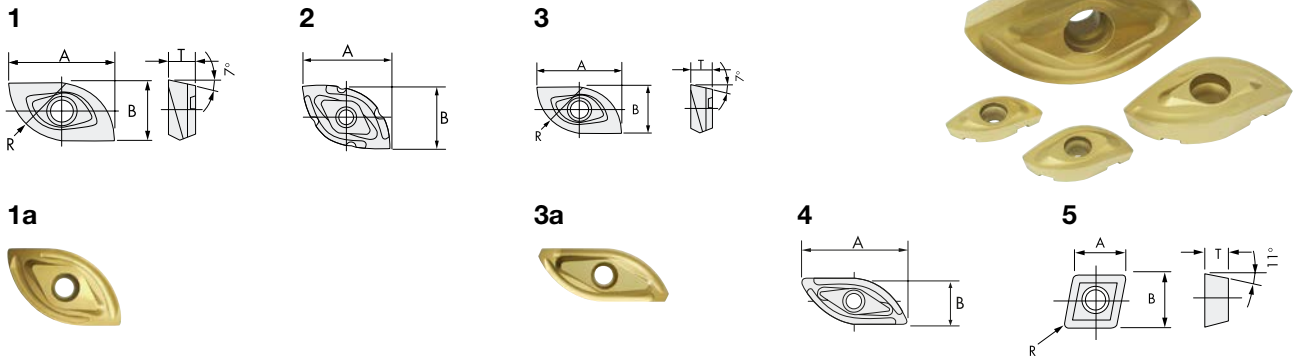
0/-0.15 mm

ID Code	Item Code	Flutes	D	R	I	MT	L	lb	Is	d	a	K	M	Inserts x1	Inserts x1	Inserts x2
FH362	BCU-5063SMT5	2	50	25	63	MT5	236	100	136	44.741	6.5	52.5	M20	ZCET250CE	ZCET250SK	CPMT120408
FH364	BCU-5063LMT5						286	150						ZCET250CE	ZCET250SK	CPMT120408

* or ZCET

Parts BCU	Clamp Screw R Insert			Clamp Screw Peripheral Insert			Wrench R Insert		Wrench Peripheral Insert	
										
Body	ID Code	Item Code	Fastening Torque [Nm]	ID Code	Item Code	Fastening Torque [Nm]	ID Code	Item Code	ID Code	Item Code
BCU-5063SMT5 BCU-5063LMT5	ET150	571-141A	9.8Nm	ET037	263-143	4.9Nm	ET167	105-T30A	ET014	105-T20

INSERTS | Roughing Ball



ID Code	Item Code	Grade	C-Coated		G-Coated	R	I(A)	T	W(B)	Figure
			CY250	CY9020	HC844					
WF583	ZCET100CE	CY9020		●		10	18.3	4.74	10	1a
WF132	ZCEW100CE	HC844			●					1
WF588	ZCET100SE	CY9020		●			16.7	4.24	8.1	3a
WF135	ZCEW100SE	HC844			●					3
WF584	ZCET125CE	CY9020		●		12.5	23.1	6.1	12.3	1a
WF138	ZCEW125CE	HC844			●					1
WF589	ZCET125SE	CY9020		●			20.8	5.4	9.3	3a
WF141	ZCEW125SE	HC844			●					3
WF585	ZCET150CE	CY9020		●		15	28.3	7.59	14.9	1a
WF144	ZCEW150CE	HC844			●					1
WF590	ZCET150SE	CY9020		●			25.7	7.09	11.8	3a
WF147	ZCEW150SE	HC844			●					3
WF586	ZCET160CE	CY9020		●		16	28.8	7.45	15.4	1a
WF539	ZCET160CE	HC844			●					1a
WF591	ZCET160SE	CY9020		●			26.3	6.96	12.4	3a
WF540	ZCET160SE	HC844			●					3a
WF514	ZCEW200CE	HC844			●	20	35.4	8	20.1	1
WF515	ZCEW200SE	HC844			●		31.9	7	15.7	3
WF587	ZCET250CE	CY250	●			25	38.8	–	26	2
WF512	ZCET250CE	HC844			●					
WF592	ZCET250SK	CY250	●				45.03	–	18.95	4
WF513	ZCET250SK	HC844			●					
WF025	CPMT080204	HC844			●	0.4	7.94	2.38	7.94	5
WF034	CPMT090308	HC844			●	0.8	9.525	3.18	9.525	5
WF041	CPMT120408	HC844			●	0.8	12.7	4.76	12.7	5

● = Available insert and grade combination

BCF | Recommended Cutting Conditions



			D 20						
Work piece material	Insert Grade	Parameter	Roughing ▽		Semi Finishing ▽▽				
			Big a_p	Small a_p	SK50	SK40	General	General	
I Carbon steel II Alloy steel (<30HRC)	CY9020 CY250 HC844	n (min ⁻¹)	3,500	3,500	3,500	5,840	2,870	3,500	
		V_c (m/min)	220	220	220	367	180	220	
		V_f (mm/min)	1,050	1,750	4,200	7,000	570	1,050	
		f_z (mm)	0.15	0.25	0.6	0.6	0.1	0.15	
		a_p (mm)	10	3	1	0.5	24	5	
		a_e (mm)	5	3	6	6	3	--	
III Tool steel Alloy steel (30-40HRC)	CY9020 CY250 HC844	n (min ⁻¹)	2,230	2,230	2,230	3,450	2,230	2,550	
		V_c (m/min)	140	140	140	217	140	160	
		V_f (mm/min)	670	1,120	2,680	4,140	450	610	
		f_z (mm)	0.15	0.25	0.6	0.6	0.1	0.12	
		a_p (mm)	10	3	1	0.5	24	5	
		a_e (mm)	3	3	6	6	2	--	
IV Tool steel Pre-hardened steel (40-50HRC)	CY9020 CY250 HC844	n (min ⁻¹)	1,270	1,590	1,110	1,860	1,110	1,430	
		V_c (m/min)	80	100	70	117	70	90	
		V_f (mm/min)	380	640	1,330	1,330	110	340	
		f_z (mm)	0.15	0.2	0.6	0.6	0.05	0.12	
		a_p (mm)	6	3	0.5	0.5	24	4	
		a_e (mm)	3	3	6	6	2	--	
VIII Cast iron GG GGG	CY9020 CY250 HC844	n (min ⁻¹)	3,180	3,820	3,500	5,840	3,180	3,500	
		V_c (m/min)	200	240	220	367	200	220	
		V_f (mm/min)	1,590	2,670	7,000	11,680	510	1,050	
		f_z (mm)	0.25	0.35	1	1	0.08	0.15	
		a_p (mm)	10	3	1	0.5	24	5	
		a_e (mm)	5	3	6	6	3	--	
Maximum f_z (mm)			<1.2						
Maximum a_p (mm)			<30						

BCF | Recommended Cutting Conditions



				D 25					
Work piece material		Insert Grade	Parameter	Side Milling		Semi Finishing		Deep Side Milling	Slotting
				▽		▽▽			
				Big a _p	Small a _p	SK50	SK40	General	General
I II	Carbon steel Alloy steel (<30HRC)	CY9020 CY250 HC844	n (min ⁻¹)	2,800	2,800	2,800	4,670	2,290	2,800
			V _c (m/min)	220	220	220	367	180	220
			V _f (mm/min)	840	1,400	3,360	5,600	690	840
			f _z (mm)	0.15	0.25	0.6	0.6	0.15	0.15
			a _p (mm)	12	4	1	0.5	30	7
			a _e (mm)	6	4	7.5	7.5	4	--
III	Tool steel Alloy steel (30-40HRC)	CY9020 CY250 HC844	n (min ⁻¹)	2,040	2,040	1,660	2,760	1,780	2,040
			V _c (m/min)	160	160	130	217	140	160
			V _f (mm/min)	610	1,020	2,000	3,300	530	490
			f _z (mm)	0.15	0.25	0.6	0.6	0.15	0.12
			a _p (mm)	12	4	1	0.5	30	7
			a _e (mm)	4	4	7.5	7.5	2	--
IV	Tool steel Pre-hardened steel (40-50HRC)	CY9020 CY250 HC844	n (min ⁻¹)	1,020	1,270	890	1,480	890	1,150
			V _c (m/min)	80	100	70	116	70	90
			V _f (mm/min)	310	510	1,070	1,780	140	280
			f _z (mm)	0.15	0.2	0.6	0.6	0.08	0.12
			a _p (mm)	8	4	0.5	0.5	30	5
			a _e (mm)	4	4	7.5	7.5	2	--
VIII	Cast iron GG GGG	CY9020 CY250 HC844	n (min ⁻¹)	2,550	3,060	2,800	4,670	2,550	2,800
			V _c (m/min)	200	240	220	367	200	220
			V _f (mm/min)	1,280	2,140	5,600	9,350	610	840
			f _z (mm)	0.25	0.35	1	1	0.12	0.15
			a _p (mm)	12	4	1	0.5	30	7
			a _e (mm)	6	4	7.5	7.5	4	--
Maximum f _z (mm)			<1.2						
Maximum a _p (mm)			<39						

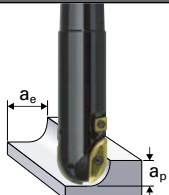
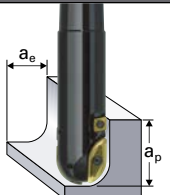
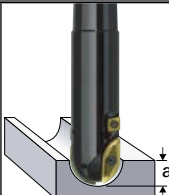


BCF | Recommended Cutting Conditions



			D 32							
Work piece material		Insert Grade	Parameter	Side Milling		Semi Finishing		Deep Side Milling	Slotting	
				▽		▽▽				
				Big a _p	Small a _p	SK50	SK40	General	General	
I II	Carbon steel Alloy steel (<30HRC)	CY9020 CY250 HC844	n (min ⁻¹)	2,190	2,190	2,190	3,640	1,790	2,190	
			V _c (m/min)	220	220	220	366	180	220	
			V _f (mm/min)	880	1,310	2,640	4,370	720	880	
			f _z (mm)	0.2	0.3	0.6	0.6	0.2	0.2	
			a _p (mm)	15	5	1	0.5	36	9	
			a _e (mm)	8	5	9.6	9.6	5	--	
III	Tool steel Alloy steel (30-40HRC)	CY9020 CY250 HC844	n (min ⁻¹)	1,590	1,590	1,290	2,150	1,390	1,590	
			V _c (m/min)	160	160	130	216	140	160	
			V _f (mm/min)	640	950	1,550	2,580	560	480	
			f _z (mm)	0.2	0.3	0.6	0.6	0.2	0.15	
			a _p (mm)	15	5	1	0.5	36	9	
			a _e (mm)	5	5	9.6	9.6	2	--	
IV	Tool steel Pre-hardened steel (40-50HRC)	CY9020 CY250 HC844	n (min ⁻¹)	800	1,000	700	1,160	700	900	
			V _c (m/min)	80	100	70	117	70	90	
			V _f (mm/min)	320	500	840	1,390	140	270	
			f _z (mm)	0.2	0.25	0.6	0.6	0.1	0.15	
			a _p (mm)	10	5	0.5	0.5	36	6	
			a _e (mm)	5	5	9.6	9.6	2	--	
VIII	Cast iron GG GGG	CY9020 CY250 HC844	n (min ⁻¹)	1,990	2,390	2,190	3,640	1,990	2,190	
			V _c (m/min)	200	240	220	366	200	220	
			V _f (mm/min)	1,190	2,150	4,380	7,280	720	880	
			f _z (mm)	0.3	0.45	1	1	0.18	0.2	
			a _p (mm)	15	5	1	0.5	36	9	
			a _e (mm)	8	5	9.6	9.6	5	--	
Maximum f _z (mm)			<1.2							
Maximum a _p (mm)			<43							

BCU | Recommended Cutting Conditions



			D 50							
										
Work piece material	Insert Grade	Parameter	Side Milling				Deep Side Milling	Slotting		
			Roughing ▽							
			Big a _p		Small a _p		General	General		
I Carbon steel II Alloy steel (<30HRC)	CY250 HC844	n (min ⁻¹)	830	1,400	1,400	1,400	1,150	1,400		
		V _c (m/min)	130	220	220	220	180	220		
		V _f (mm/min)	250	560	840	1,120	460	700		
		f _z (mm)	0.15	0.2	0.3	0.4	0.2	0.25		
		a _p (mm)	50	25	15	8	60	15		
		a _e (mm)	8	15	10	8	5	--		
III Tool steel Alloy steel (30-40HRC)	CY250 HC844	n (min ⁻¹)	760	1,020	1,020	1,020	890	1,020		
		V _c (m/min)	120	160	160	160	140	160		
		V _f (mm/min)	230	410	510	820	360	310		
		f _z (mm)	0.15	0.2	0.25	0.4	0.2	0.15		
		a _p (mm)	50	25	15	8	60	15		
		a _e (mm)	6	15	8	8	4	--		
IV Tool steel Pre-hardened steel (40-50HRC)	CY250 HC844	n (min ⁻¹)	380	510	510	640	450	570		
		V _c (m/min)	60	80	80	100	70	90		
		V _f (mm/min)	90	160	260	380	140	170		
		f _z (mm)	0.12	0.16	0.25	0.3	0.15	0.15		
		a _p (mm)	50	25	15	8	60	10		
		a _e (mm)	5	15	8	8	4	--		
VIII Cast iron GG GGG	CY250 HC844	n (min ⁻¹)	1,270	1,530	1,530	1,530	1,270	1,400		
		V _c (m/min)	200	240	240	240	200	220		
		V _f (mm/min)	510	920	1,530	1,840	640	700		
		f _z (mm)	0.2	0.3	0.5	0.6	0.25	0.25		
		a _p (mm)	50	25	15	8	60	15		
		a _e (mm)	5	15	10	8	4	--		
Maximum f _z (mm)			<0.8							
Maximum a _p (mm)			<63							

1. The cutting conditions in this table show condition for $VB_{30}=0.3$ mm (flank wear 0.3 mm in 30 min tool life).
2. Cutting conditions on high-speed machine tools are recommended for contouring path milling.
3. 3 – 5 degree slant milling angle is recommended for slant milling in pocket, with 70% of feed speed.













4. Please set slant angle under 3 degree for high hard materials.
5. Please adjust milling speed and feed considering parameters on this table as standards according to conditions.
6. In case of using Long Type, please use by 70% of the parameters for revolution speed and feed speed.

BCU

1. Please adjust milling speed and feed speed considering parameters on this table as standards according conditions.
2. In case of using Long Type or Long Shank Type, please use by 70% of the parameters above.

3. In using of machine on under 15kW, set up condition for revolution speed is 60% and for feed speed is 35%. (Cutting conditions above are based on over 22kW)

FIELD DATA | Roughing Ball | Machining Examples

Overview Fielddata for BCF (incl. Modular Type)												
No.	Material	Job	Strategy	Tool Dia.	Substrate	V_c (m/min)	n (1/min)	f_z (mm)	V_t (mm/min)	a_p (mm)	a_s (mm)	Application photo
1	EN-JL1040/ GG25	Form	Raster 3D-Up & Down	25	CY9020	220	2,801	0.50	2,801	0.5	1	
2	EN-JL1040/ GG25	Form	Raster 3D-Up & Down	32	CY9020	250	2,487	0.80	3,979	2	1	
3	EN-JS1070/ GGG70	Form	Raster 3D-Up & Down	25	CY9020	180	2,292	0.65	2,979	2.8	5	
4	EN-JS2070/ GGG70L	Form	Z-Constant	32	HC844	201	1,999	0.63	2,499	2.5	8	
5	EN-JS2070/ GGG70L	Form	Raster 3D-Up & Down	32	HC844	402	3,999	0.63	4,998	0.5	6	
6	1.7140/G47CrMn6	Form	Z-Constant	25	HC844	220	2,801	0.70	3,922	3	5	
7	1.7140/G47CrMn6	Form	Raster 3D-Up & Down	25	HC844	250	3,183	0.70	4,456	0.5	4	
8	1.2312/ 40CrMnMoS8-6	2.5 D	Z-Constant	32	HC844	362	3,601	0.69	4,969	1.5	2.5	
9	1.2738/ 40CrMnNiMo8-6-4	Form	Raster 3D-Up & Down	32	CY9020	160	1,592	0.30	955	5	5	
10	1.2738/ 40CrMnNiMo8-6-4	Form	Raster 3D-Up & Down	32	HC844	180	1,790	0.50	1,790	4	2	
11	39NiCrMo3	Form	Raster 3D-Up & Down	32	CY9020	201	1,999	1.00	3,999	2	6	
12	1.3912/ Invar (39%Ni)	Form	Raster 3D-Up & Down	25	CY9020	196	2,496	0.40	1,996	4	2.5	

➔ For more information about Modular Tools and available Shanks please check our brochures:

Indexable Modular No. 328.x



AS/ASC Shanks No. 708



⚠ Attention on Safety

1. Cautions regarding handling

- (1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
- (2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

2. Cautions regarding mounting

- (1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
- (2) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (3) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

3. Cautions during use

- (1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
- (2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
- (3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equipment such as safety goggles should be worn to create a safe environment for work.
- (4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. Please caution of fire while using oil base coolant, fire prevention is necessary.
- (5) Do not use the tool for any purpose other than that for which it is intended.

4. Cautions regarding regrinding

- (1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
- (2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
- (3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with the local laws and regulations regarding prevention of hazards due to specified chemical substances.

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