



List 52100 - PHOENIX® PFB: SA
List 78014 - PHOENIX® PFB: SS
List 52604 - PHOENIX® PFB: ASF
List 78114 - PHOENIX® PFB: SF

	Work Material	Tensile Strength - Hardness	Milling Speed Vc (SFM)	Depth of Cut Aa (in)	Feed Per Tooth fz (in/t)			
					Ø0.236-0.312 (6-8mm)	Ø0.375-0.500 (10-12mm)	Ø0.625-0.750 (16-20mm)	Ø1.000-1.250 (25-32mm)
P	Mild Steels, Carbon Steels (1010, 1018)	~180 HB	985 (655-1310)	0.02Dc	0.0040	0.0047	0.0055	0.0071
	Carbon Steels, Alloy Steels (1050, 4140)	~280 HB	985 (655-1310)	0.02Dc	0.0028	0.0040	0.0047	0.0055
	Die Steels (H13, D2)	~280 HB	820 (495-1150)	0.02Dc	0.0028	0.0040	0.0047	0.0055
M	Stainless Steels (304SS, 420SS)	~250 HB	820 (495-1150)	0.02Dc	0.0028	0.0047	0.0055	0.0067
K	Cast Iron (FC250)	~350 N/mm ²	1310 (985-1640)	0.02Dc	0.0047	0.0055	0.0071	0.0086
	Ductile Cast Iron (60-40-18)	~600 N/mm ²	985 (655-1310)	0.02Dc	0.0040	0.0047	0.0055	0.0071
N	Aluminum Alloys (6061, 7075)	~13% Si	1640 (1310-1970)	0.03Dc	0.0047	0.0055	0.0071	0.0086
	Copper Alloys (C1100)	-	985 (655-1310)	0.03Dc	0.0043	0.0051	0.0067	0.0079
	Graphite	-	1640 (1310-1970)	0.03Dc	0.0055	0.0067	0.0083	0.0098
	CFRP	-	1310 (985-1640)	0.03Dc	0.0043	0.0051	0.0067	0.0079
S	Heat Resistant Alloys (Inconel 718)	-	165 (65-260)	0.015Dc	0.0016	0.0020	0.0024	0.0024
	Titanium Alloy (Ti-6Al-4V)	-	295 (130-395)	0.02Dc	0.0024	0.0031	0.0043	0.0051
H	Pre-hardened Steel (P20, Stavax)	40 - 43 HRC	655 (330-985)	0.015Dc	0.0024	0.0028	0.0031	0.0040
	Die Cast Steels (A2, S7)	43 - 48 HRC	590 (295-655)	0.015Dc	0.0020	0.0024	0.0028	0.0028
	Hardened Steels (D2)	50 - 55 HRC	490 (330-820)	0.01Dc	0.0020	0.0024	0.0028	0.0028

PFB-BR & PFB-LZ Insert Cutting Conditions

	Work Material	Tensile Strength - Hardness	Milling Speed Vc (SFM)	Depth of Cut		Feed Per Tooth fz (in/t)		
				Pitch (mm)	Depth of Cut (in)	Ø10-12mm	Ø16-20mm	Ø25-32mm
P	Mild Steels, Carbon Steels (1010, 1018)	~180 HB	985 (655 - 2625)	Based on Cusp Height (see chart on next page)	0.0078	0.0047	0.0055	0.0071
	Carbon Steels, Alloy Steels (1050, 4140)	~280 HB	985 (655 - 2625)		0.0078	0.0039	0.0047	0.0055
	Die Steels (H13, D2)	~280 HB	820 (490 - 1970)		0.0078	0.0039	0.0047	0.0055
M	Stainless Steels (304SS, 420SS)	~250 HB	820 (490 - 2130)		0.0078	0.0047	0.0055	0.0067
K	Cast Iron (FC250)	~350 N/mm ²	1310 (985 - 2625)		0.0078	0.0055	0.0071	0.0087
	Ductile Cast Iron (60-40-18)	~600 N/mm ²	985 (655 - 2625)		0.0078	0.0047	0.0055	0.0071
S	Heat Resistant Alloys (Inconel 718)	-	165 (80 - 260)		0.0059	0.0019	0.0024	0.0024
	Titanium Alloy (Ti-6Al-4V)	-	295 (130 - 395)		0.0078	0.0031	0.0044	0.0051
H	Pre-hardened Steel (P20, Stavax)	40 - 43 HRC	655 (330 - 1150)		0.0059	0.0027	0.0031	0.0039
	Die Cast Steels (A2, S7)	43 - 48 HRC	590 (295 - 1150)	0.0059	0.0024	0.0027	0.0027	
	Hardened Steels (D2)	50 - 55 HRC	495 (330 - 985)	0.0039	0.0024	0.0027	0.0027	





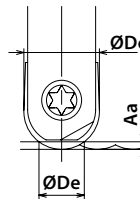
Effective Cutting Diameter

Depth of Cut Aa		Effective Cutting Diameter (ØDe)																			
		ØDc		ØDc		ØDc		ØDc		ØDc		ØDc		ØDc		ØDc		ØDc			
(inch)	(mm)	0.250"	6mm	0.275"	7mm	0.315"	8 mm	0.375"	10 mm	0.500"	12 mm	0.625"	16 mm	0.750"	20 mm	1.000"	25 mm	1.181"	30 mm	1.250"	32mm
0.004	0.1	0.063	1.5	0.063	1.6	0.071	1.8	0.077	2.0	0.089	2.2	0.100	2.5	0.109	2.8	0.126	3.2	0.137	3.5	0.142	3.6
0.008	0.2	0.088	2.2	0.091	2.3	0.099	2.5	0.108	2.8	0.125	3.1	0.141	3.6	0.154	4.0	0.178	4.5	0.194	4.9	0.197	5.0
0.012	0.3	0.107	2.6	0.110	2.8	0.121	3.0	0.132	3.4	0.153	3.7	0.172	4.3	0.188	4.9	0.218	5.4	0.237	6.0	0.244	6.2
0.016	0.4	0.122	3.0	0.130	3.3	0.138	3.5	0.152	3.9	0.176	4.3	0.197	5.0	0.217	5.6	0.251	6.3	0.273	6.9	0.280	7.1
0.020	0.5	0.136	3.3	0.142	3.6	0.154	3.9	0.169	4.4	0.196	4.8	0.220	5.6	0.242	6.2	0.280	7.0	0.305	7.7	0.311	7.9
0.031	0.8	0.165	4.1	0.177	4.5	0.188	4.8	0.207	5.4	0.241	6.0	0.271	7.0	0.299	7.8	0.347	8.8	0.378	9.7	0.394	10.0
0.039	1.0	-	-	-	-	-	-	0.229	6.0	0.268	6.6	0.302	7.7	0.333	8.7	0.387	9.8	0.422	10.8	0.437	11.1
0.059	1.5	-	-	-	-	-	-	0.273	7.1	0.323	7.9	0.365	9.3	0.404	10.5	0.471	11.9	0.515	13.1	0.531	13.5
0.079	2.0	-	-	-	-	-	-	-	-	0.365	8.9	0.415	10.6	0.460	12.0	0.539	13.6	0.590	15.0	0.610	15.5
0.098	2.5	-	-	-	-	-	-	-	-	-	-	0.455	11.6	0.506	13.2	0.595	15.0	0.652	16.6	0.677	17.2
0.118	3.0	-	-	-	-	-	-	-	-	-	-	-	-	0.546	14.3	0.645	16.2	0.708	18.0	0.736	18.7
0.138	3.5	-	-	-	-	-	-	-	-	-	-	-	-	0.581	15.2	0.690	17.3	0.759	19.3	0.787	20.0
0.157	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.728	18.3	0.802	20.4	0.835	21.2
0.117	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.706	21.4	0.874	22.2
0.197	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.881	22.3	0.913	23.2

Note: Effective cutting diameter is based on cutting depth (Aa)

How to determine effective cutting diameter:

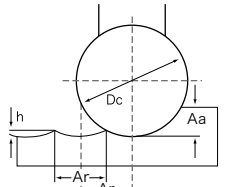
Ex: Dc = 0.500"
Aa = 0.020"
De = 2√(0.020(0.500-0.020))
De = 0.196"



$$De = 2 \sqrt{a_a(D_c - a_a)}$$

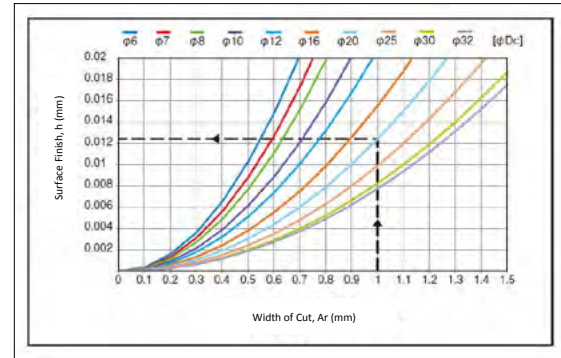
Recommended Width of Cut & Surface Roughness

Tool Dia ØDc		Width of Cut Ar		Surface Finish h	
(inch)	(mm)	(inch)	(mm)	(inch)	(mm)
0.250	6	0.0157	0.4	0.00027	0.007
0.275	7	0.0177	0.45	0.00027	0.007
0.315	8	0.0197	0.5	0.00031	0.008
0.375	10	0.0236	0.6	0.00037	0.009
0.500	12	0.0275	0.7	0.00038	0.010
0.625	16	0.0315	0.8	0.00040	0.010
0.750	20	0.0394	1.0	0.00052	0.012
1.000	25	0.0472	1.2	0.00055	0.014
1.181	30	0.0512	1.3	0.00055	0.014
1.250	32	0.0551	1.4	0.00059	0.015



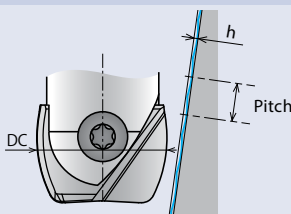
$$h = 0.5 (D_c - \sqrt{D_c^2 - Ar^2})$$

Dc=20mm
Ar=1mm
->h=0.0125mm

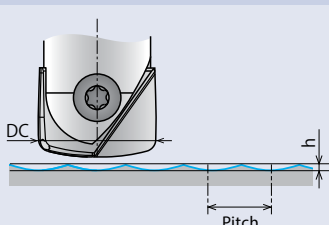


Theoretical Cusp Height

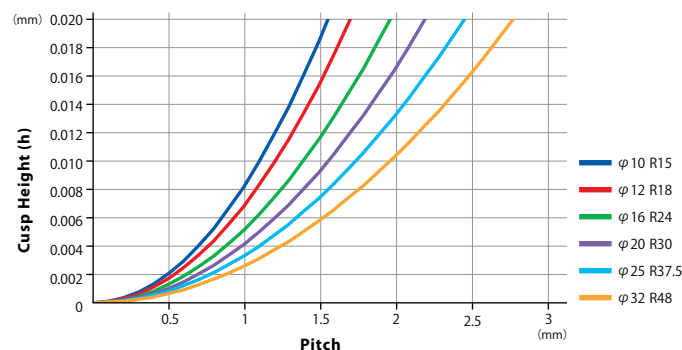
PFB-BR
Barrel Type Tool



PFB-LZ
Lens Type Tool



Cusp Height and Pitch



$$h = 0.5 \times (2 \times RE_2 - \sqrt{(2 \times RE_2)^2 - P^2})$$

h: Cusp Height P: Pitch RE2: Peripheral Edge R

