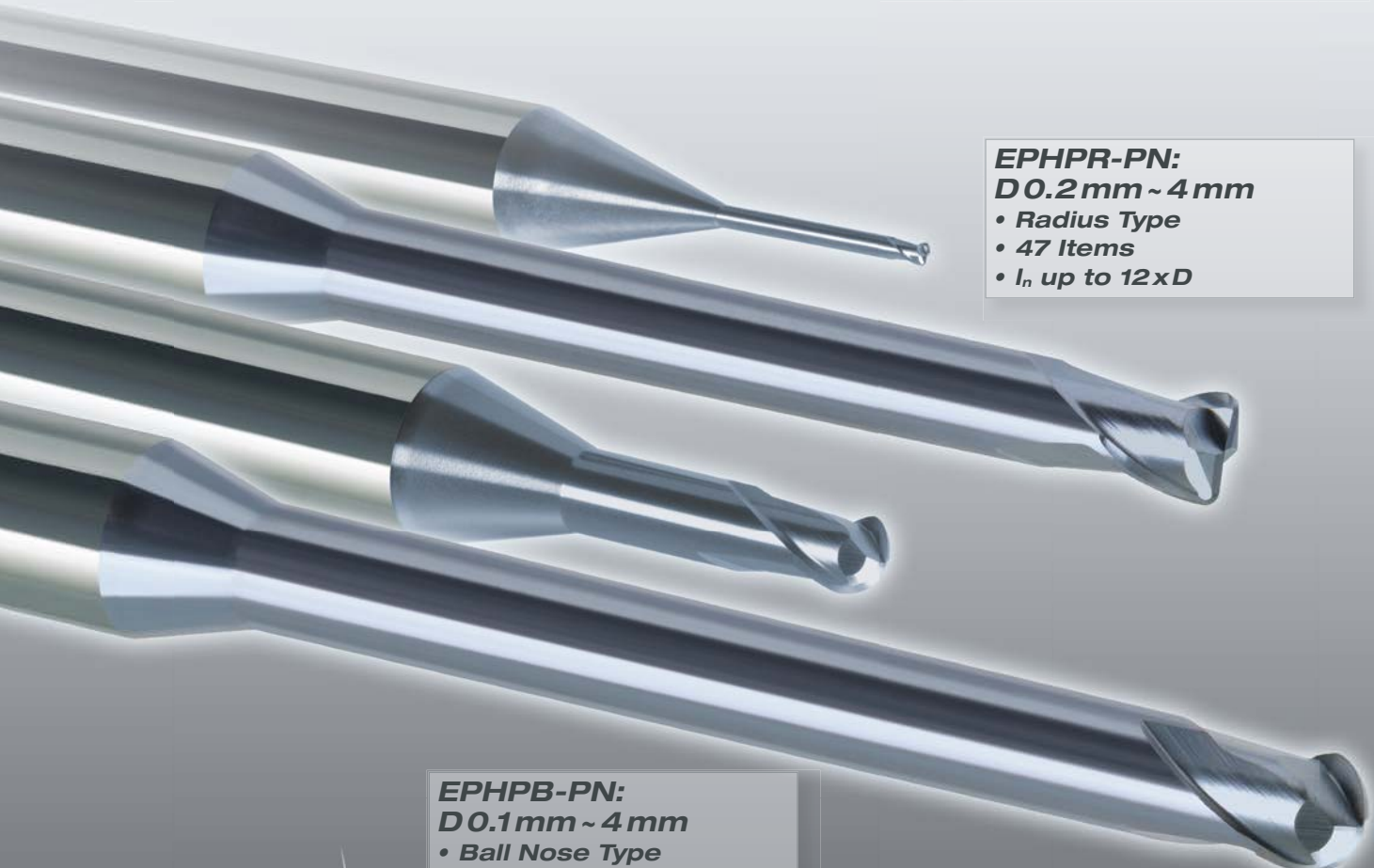



EPHPB/EPHPR-PN

**Epoch High Precision Ball/Radius PaNacea
For Tool Steels & Hardened Steels up to 55HRC**



EPHPR-PN:
D0.2mm ~ 4mm
• Radius Type
• 47 Items
• l_n up to 12xD



EPHPB-PN:
D0.1mm ~ 4mm
• Ball Nose Type
• 54 Items
• l_n up to 13xD

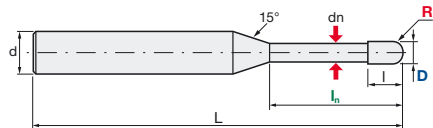


MICRO EPOCH
Micro Grain Carbide End Mills · Nano PVD Coated
 μm

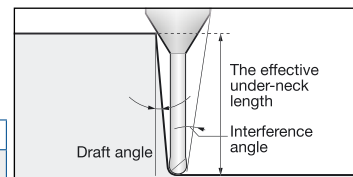
EPHPB-PN | Epoch High Precision Ball PaNacea



A



Helix Angle	R Tol. [mm]	d Tol.
30°	+/-0.003	h4



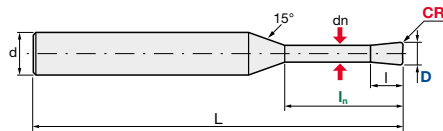
Size											Actual Effective Length in Incline angles				
ID Code	Item Code	Z	D	R	ln	l	dn	L _s	L	d	0.5°	1°	1.5°	2°	3°
EP1462	EPHPB-2001-0.2-PN	2	0.1	0.05	0.2	0.08	0.08	33.8	45	6	0.24	0.25	0.25	0.26	0.28
EP1463	EPHPB-2001-0.3-PN				0.3			33.7			0.34	0.35	0.36	0.38	0.40
EP1464	EPHPB-2001-0.5-PN							33.5			0.55	0.57	0.59	0.61	0.65
EP1465	EPHPB-2002-0.5-PN		0.2	0.1	0.5	0.15	0.17	38.6	0.57		0.58	0.60	0.62	0.66	
EP1466	EPHPB-2002-1-PN				1			38.1	1.08		1.12	1.15	1.19	1.28	
EP1467	EPHPB-2002-1.5-PN				1.5			37.6	1.60		1.65	1.71	1.77	1.91	
EP1468	EPHPB-2003-0.5-PN		0.3	0.15	0.5	0.25	0.27	38.8	0.56		0.58	0.60	0.61	0.65	
EP1469	EPHPB-2003-1-PN							38.3	1.08		1.11	1.15	1.19	1.27	
EP1470	EPHPB-2004-1-PN				1			38.5	1.08		1.11	1.14	1.18	1.26	
EP1471	EPHPB-2004-2-PN		0.4	0.2	2	0.3	0.37	37.5	2.11		2.18	2.25	2.33	2.50	
EP1472	EPHPB-2004-3-PN				3			36.5	3.15		3.25	3.36	3.48	3.75	
EP1473	EPHPB-2005-1-PN				1			38.7	1.08		1.11	1.14	1.17	1.25	
EP1474	EPHPB-2005-2-PN		0.5	0.25	2	0.35	0.47	37.7	2.11		2.18	2.25	2.32	2.49	
EP1475	EPHPB-2005-3-PN				3			36.7	3.15		3.25	3.36	3.47	3.73	
EP1476	EPHPB-2005-4-PN				4			35.7	4.18		4.32	4.46	4.62	4.98	
EP1477	EPHPB-2005-6-PN				6			33.7	6.25		6.46	6.68	6.92	7.46	
EP1478	EPHPB-2006-2-PN				2			37.9	2.11		2.17	2.24	2.31	2.48	
EP1479	EPHPB-2006-3-PN		0.6	0.3	3	0.4	0.57	36.9	3.14		3.24	3.35	3.46	3.72	
EP1480	EPHPB-2006-4-PN				4			35.9	4.18		4.31	4.46	4.61	4.97	
EP1481	EPHPB-2006-6-PN				6			33.9	6.24		6.45	6.67	6.91	7.45	
EP1482	EPHPB-2006-8-PN				8			31.9	8.31		8.59	8.89	9.21	9.94	
EP1483	EPHPB-2008-2-PN				2			38.2	2.11		2.17	2.23	2.30	2.46	
EP1484	EPHPB-2008-4-PN		0.8	0.4	4	0.5	0.77	36.2	4.17		4.31	4.45	4.60	4.94	
EP1485	EPHPB-2008-6-PN				6			34.2	6.24		6.45	6.66	6.90	7.43	
EP1486	EPHPB-2008-8-PN				8			32.2	8.31		8.58	8.88	9.20	9.92	
EP1487	EPHPB-2008-10-PN				10			30.2	10.38		10.72	11.10	11.50	12.40	
EP1488	EPHPB-2010-2-PN				2			38.6	2.12		2.18	2.24	2.31	2.46	
EP1489	EPHPB-2010-4-PN		1	0.5	4	0.8	0.96	36.6	4.19		4.32	4.46	4.61	4.94	
EP1490	EPHPB-2010-6-PN				6			34.6	6.26		6.46	6.67	6.91	7.43	
EP1491	EPHPB-2010-8-PN				8			32.6	8.32		8.60	8.89	9.21	9.91	
EP1492	EPHPB-2010-10-PN				10			30.6	10.39		10.74	11.11	11.51	12.40	
EP1493	EPHPB-2010-12-PN				12			33.6	12.46		12.88	13.32	13.81	14.89	
EP1494	EPHPB-2015-4-PN		1.5	0.75	4	1.35	1.45	37.5	4.20		4.32	4.45	4.59	4.91	
EP1495	EPHPB-2015-8-PN				8			33.5	8.34		8.60	8.88	9.19	9.88	
EP1496	EPHPB-2015-12-PN				12			34.5	12.47		12.88	13.32	13.79	14.85	
EP1497	EPHPB-2015-16-PN				16			30.5	16.60		17.16	17.75	18.39	19.82	
EP1498	EPHPB-2015-20-PN				20			31.5	20.74		21.44	22.18	22.99	24.80	
EP1499	EPHPB-2020-4-PN		2	1	4	1.7	1.95	38.4	4.19		4.30	4.42	4.55	4.85	
EP1500	EPHPB-2020-6-PN				6			36.4	6.26		6.44	6.64	6.85	7.33	
EP1501	EPHPB-2020-8-PN				8			34.4	8.33		8.58	8.86	9.15	9.82	
EP1502	EPHPB-2020-10-PN				10			32.4	10.39		10.72	11.07	11.45	12.31	
EP1503	EPHPB-2020-12-PN				12			35.4	12.46		12.86	13.29	13.75	14.79	
EP1504	EPHPB-2020-16-PN		3	1.5	16	2.5	2.9	31.4	16.60		17.14	17.72	18.35	19.76	
EP1505	EPHPB-2020-20-PN				20			32.4	20.73		21.42	22.16	22.95	24.74	
EP1506	EPHPB-2020-25-PN				25			32.4	25.90		26.77	27.70	28.70	30.95	
EP1507	EPHPB-2030-8-PN				8			41.2	8.41		8.65	8.91	9.19	9.82	
EP1508	EPHPB-2030-12-PN				12			42.2	12.54		12.93	13.34	13.79	14.79	
EP1509	EPHPB-2030-16-PN		4	2	16	3	3.9	38.2	16.68		17.21	17.77	18.39	19.76	
EP1510	EPHPB-2030-20-PN				20			39.2	20.81		21.48	22.21	22.99	24.73	
EP1511	EPHPB-2030-25-PN				25			70	25.98		26.83	27.75	28.74	-	
EP1512	EPHPB-2040-10-PN				10			55	10.46		10.75	11.07	11.41	12.18	
EP1513	EPHPB-2040-20-PN				20			65	20.79		21.45	22.15	22.91	-	
EP1514	EPHPB-2040-30-PN		4	2	30			75	31.13		32.15	33.24	-	-	
EP1515	EPHPB-2040-40-PN				40			80	41.47		42.84	-	-	-	



EPHPR-PN | Epoch High Precision Radius PaNacea

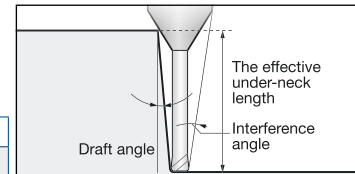


A



Carbide	PN	Rake Angle
Micro Grain	PaNacea Coating	Positive

Helix Angle	R Tol. [mm]	d Tol.
30°	+/-0.003	h4



Size											Actual Effective Length in Incline angles							
ID Code	Item Code	Z	D	CR	In	I	dn	L _s	L	d	0.5°	1°	1.5°	2°	3°			
EP1516	EPHPR-2002-0.5-005-PN	2	0.2	0.05	0.5	0.15	0.17	38.6	50	6	0.57	0.59	0.61	0.63	0.67			
EP1517	EPHPR-2002-1-005-PN				1			38.1			1.08	1.12	1.16	1.20	1.30			
EP1518	EPHPR-2003-1-005-PN		0.3	0.05	1	0.25	0.27	38.3			1.08	1.12	1.16	1.20	1.30			
EP1519	EPHPR-2003-2-005-PN				2			37.3			2.12	2.19	2.27	2.35	2.54			
EP1520	EPHPR-2004-1-01-PN		0.4	0.05	1	0.3	0.37	38.5			1.08	1.12	1.15	1.19	1.28			
EP1521	EPHPR-2004-2-01-PN				2			37.5			2.12	2.19	2.26	2.34	2.53			
EP1522	EPHPR-2005-1-01-PN		0.5	0.05	1	0.35	0.47	38.7			1.08	1.12	1.15	1.19	1.28			
EP1523	EPHPR-2005-2-01-PN				2			37.7			2.12	2.19	2.26	2.34	2.53			
EP1524	EPHPR-2005-3-01-PN		0.6	0.1	3	0.4	0.57	36.7			3.15	3.26	3.37	3.49	3.77			
EP1525	EPHPR-2006-2-01-PN				2			37.9			2.12	2.19	2.26	2.34	2.53			
EP1526	EPHPR-2006-4-01-PN		0.8	0.1	4	0.5	0.77	35.9			4.18	4.33	4.48	4.64	5.01			
EP1527	EPHPR-2006-6-01-PN				6			33.9			6.25	6.47	6.70	6.94	7.50			
EP1528	EPHPR-2008-2-01-PN		1	0.1	2	0.8	0.95	38.2			2.12	2.19	2.26	2.34	2.53			
EP1529	EPHPR-2008-4-01-PN				4			36.2			4.18	4.33	4.48	4.64	5.01			
EP1530	EPHPR-2008-6-01-PN		1.5	0.2	6	1.35	1.45	34.2			6.25	6.47	6.70	6.94	7.50			
EP1531	EPHPR-2010-2-02-PN				2			38.6			2.15	2.22	2.29	2.37	2.55			
EP1532	EPHPR-2010-4-02-PN		2	1	0.1	4	0.8	0.95			36.6	55	6	4.22	4.36	4.51	4.67	5.04
EP1533	EPHPR-2010-6-02-PN					6					34.6			6.29	6.50	6.73	6.97	7.52
EP1534	EPHPR-2010-8-02-PN					8					32.6			8.35	8.64	8.94	9.27	10.01
EP1535	EPHPR-2010-10-02-PN					10					30.6			10.42	10.78	11.16	11.57	12.50
EP1536	EPHPR-2010-12-02-PN					12					33.6			12.49	12.92	13.38	13.87	14.98
EP1537	EPHPR-2015-4-02-PN			1.5	0.2	4	1.35	1.45			37.5			4.22	4.36	4.51	4.67	5.04
EP1538	EPHPR-2015-8-02-PN					8					33.5			8.35	8.64	8.94	9.27	10.01
EP1539	EPHPR-2015-12-02-PN					12					34.5			12.49	12.92	13.38	13.87	14.98
EP1540	EPHPR-2015-16-02-PN					16					30.5			16.62	17.20	17.81	18.47	19.95
EP1541	EPHPR-2020-4-02-PN			2	0.5	4	1.7	1.95			38.4			4.22	4.36	4.51	4.67	5.04
EP1542	EPHPR-2020-8-02-PN					8					34.4			8.35	8.64	8.94	9.27	10.01
EP1543	EPHPR-2020-12-02-PN					12					35.4			12.49	12.92	13.38	13.87	14.98
EP1544	EPHPR-2020-16-02-PN					16					31.4			16.62	17.20	17.81	18.47	19.95
EP1545	EPHPR-2020-20-02-PN					20					32.4			20.76	21.47	22.24	23.07	24.93
EP1546	EPHPR-2020-8-05-PN			3	0.5	8	2.5	2.9			34.4			8.34	8.62	8.91	9.23	9.94
EP1547	EPHPR-2020-12-05-PN					12					35.4			12.48	12.90	13.34	13.83	14.91
EP1548	EPHPR-2020-16-05-PN	16				31.4			16.61	17.18	17.78			18.43	19.88			
EP1549	EPHPR-2020-20-05-PN	20				32.4			20.75	21.45	22.21			23.03	24.86			
EP1550	EPHPR-2030-8-02-PN	4		0.2	8	3.5	3.8	41.2	8.45	8.74	9.05			9.38	10.12			
EP1551	EPHPR-2030-12-02-PN				12			42.2	12.59	13.02	13.48			13.98	15.10			
EP1552	EPHPR-2030-16-02-PN				16			38.2	16.72	17.30	17.91			18.58	20.07			
EP1553	EPHPR-2030-20-02-PN				20			39.2	20.85	21.57	22.35			23.18	25.04			
EP1554	EPHPR-2030-30-02-PN				30			39.2	31.19	32.27	33.43			34.68	-			
EP1555	EPHPR-2030-8-05-PN	4		0.5	8	3.5	3.8	41.2	8.44	8.72	9.01			9.33	10.05			
EP1556	EPHPR-2030-12-05-PN				12			42.2	12.58	13.00	13.45			13.93	15.03			
EP1557	EPHPR-2030-16-05-PN				16			38.2	16.71	17.27	17.88			18.53	20.00			
EP1558	EPHPR-2030-20-05-PN				20			39.2	20.84	21.55	22.31			23.13	24.97			
EP1559	EPHPR-2030-30-05-PN				30			39.2	31.18	32.25	33.40			34.63	-			
EP1560	EPHPR-2040-12-05-PN	4		12	3.5	3.8	43.9	12.77	13.20	13.65	14.15			15.26				
EP1561	EPHPR-2040-24-05-PN			24			41.9	25.17	26.03	26.95	27.95			-				
EP1562	EPHPR-2040-36-05-PN			36			39.9	37.58	38.87	-	-			-				

Cutting Conditions | Schnittwerte | Condizioni di taglio | Condiciones de Corte | Conditions de coupe | Valores de corte:

EPHPB Finishing




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EPHPR Finishing



Page 6-7

EPHPB-PN | Recommended Cutting Conditions

	Workpiece Material		Copper (Cu), Aluminium						I Carbon Steels, Alloy Steels (180-250HB)					
	D	I _n	V _c * m/min	n min ⁻¹	f _t mm/t	V _f mm/min	a _p mm	a _e mm	V _c * m/min	n min ⁻¹	f _t mm/t	V _f mm/min	a _p mm	a _e mm
 Finishing	0.1	0.2	13 (19)	42000	0.014	1731	0.005	0.005	13 (16)	42000	0.012	1200	0.005	0.005
		0.3	13 (19)	42000	0.014	1731	0.005	0.005	13 (16)	42000	0.012	1200	0.005	0.005
		0.5	13 (19)	42000	0.014	1731	0.005	0.005	13 (16)	42000	0.012	1200	0.005	0.005
	0.2	0.5	26 (38)	42000	0.023	2741	0.010	0.010	26 (31)	42000	0.019	1900	0.010	0.010
		1	26 (38)	42000	0.023	2741	0.009	0.009	26 (31)	42000	0.019	1900	0.009	0.009
		1.5	26 (30)	42000	0.019	1848	0.008	0.008	25	40100	0.016	1280	0.008	0.008
	0.3	0.5	40 (57)	42000	0.023	2741	0.015	0.015	40 (47)	42000	0.019	1900	0.015	0.015
		1	40 (57)	42000	0.023	2741	0.015	0.015	40 (47)	42000	0.019	1900	0.015	0.015
		2	53 (60)	42000	0.030	2887	0.020	0.020	50	40100	0.025	2010	0.020	0.020
	0.4	2	53 (60)	42000	0.030	2887	0.018	0.018	50	40100	0.025	2010	0.018	0.018
		3	53 (54)	42000	0.028	2391	0.016	0.016	45	36100	0.023	1660	0.016	0.016
		4	66 (76)	42000	0.030	2887	0.025	0.025	63	40100	0.025	2010	0.025	0.025
	0.5	2	66 (76)	42000	0.030	2887	0.025	0.025	63	40100	0.025	2010	0.025	0.025
		3	66 (68)	42000	0.028	2391	0.023	0.023	57	36100	0.023	1660	0.023	0.023
		4	66 (68)	42000	0.028	2391	0.020	0.020	57	36100	0.023	1660	0.020	0.020
		6	61	38520	0.024	1849	0.020	0.020	50	32100	0.020	1280	0.020	0.020
	0.6	2	79 (91)	42000	0.038	3696	0.030	0.030	76	40100	0.032	2570	0.030	0.030
		3	79 (91)	42000	0.038	3696	0.027	0.027	76	40100	0.032	2570	0.027	0.027
		4	79 (82)	42000	0.035	3015	0.027	0.027	68	36100	0.029	2090	0.027	0.027
		6	73	38520	0.030	2311	0.024	0.024	61	32100	0.025	1610	0.024	0.024
	0.8	8	73	38520	0.030	2311	0.024	0.024	61	32100	0.025	1610	0.024	0.024
		2	106 (121)	42000	0.038	3696	0.040	0.040	101	40100	0.032	2570	0.040	0.040
		4	106 (121)	42000	0.038	3696	0.036	0.036	101	40100	0.032	2570	0.036	0.036
		6	106 (109)	42000	0.035	3015	0.032	0.032	91	36100	0.029	2090	0.032	0.032
	1	8	97	38520	0.030	2311	0.032	0.032	81	32100	0.025	1610	0.032	0.032
		10	97	38520	0.030	2311	0.032	0.032	81	32100	0.025	1610	0.032	0.032
		2	132 (136)	42000	0.046	3951	0.050	0.050	113	36100	0.038	2740	0.050	0.050
		4	132 (136)	42000	0.046	3951	0.050	0.050	113	36100	0.038	2740	0.050	0.050
		6	123	39000	0.041	3182	0.045	0.045	102	32500	0.034	2210	0.045	0.045
		8	123	39000	0.041	3182	0.040	0.040	102	32500	0.034	2210	0.040	0.040
	1.5	10	123	39000	0.041	3182	0.040	0.040	102	32500	0.034	2210	0.040	0.040
		12	109	34560	0.036	2488	0.040	0.040	90	28800	0.030	1730	0.040	0.040
		4	158	33600	0.046	3064	0.060	0.060	132	28000	0.038	2130	0.060	0.060
		8	143	30240	0.041	2468	0.054	0.054	119	25200	0.034	1710	0.054	0.054
		12	143	30240	0.041	2468	0.048	0.048	119	25200	0.034	1710	0.048	0.048
		16	127	26880	0.036	1935	0.048	0.048	106	22400	0.030	1340	0.048	0.048
	2	20	127	26880	0.036	1935	0.048	0.048	106	22400	0.030	1340	0.048	0.048
		4	158	25200	0.076	3810	0.070	0.070	132	21000	0.063	2650	0.070	0.070
		6	158	25200	0.076	3810	0.070	0.070	132	21000	0.063	2650	0.070	0.070
		8	158	25200	0.076	3810	0.070	0.070	132	21000	0.063	2650	0.070	0.070
		10	158	25200	0.076	3810	0.063	0.063	132	21000	0.063	2650	0.063	0.063
		12	143	22680	0.068	3103	0.063	0.063	119	18900	0.057	2150	0.063	0.063
		16	143	22680	0.068	3103	0.056	0.056	119	18900	0.057	2150	0.056	0.056
		25	127	20160	0.060	2419	0.056	0.056	106	16800	0.050	1680	0.056	0.056
	3	8	181	19200	0.076	2903	0.085	0.085	151	16000	0.063	2020	0.085	0.085
		12	181	19200	0.076	2903	0.085	0.085	151	16000	0.063	2020	0.085	0.085
		16	163	17280	0.068	2364	0.077	0.077	136	14400	0.057	1640	0.077	0.077
		20	163	17280	0.068	2364	0.077	0.077	136	14400	0.057	1640	0.077	0.077
	4	25	163	17280	0.068	2364	0.068	0.068	136	14400	0.057	1640	0.068	0.068
		10	173	13800	0.101	2782	0.100	0.100	145	11500	0.084	1930	0.100	0.100
		20	173	13800	0.101	2782	0.090	0.090	145	11500	0.084	1930	0.090	0.090
		30	157	12480	0.090	2246	0.080	0.080	131	10400	0.075	1560	0.080	0.080
		40	139	11040	0.080	1775	0.080	0.080	116	9200	0.067	1230	0.080	0.080



According to circumstances like workpiece geometry / machine limitations, speed and feed can be increased or reduced in equal ratio. Choose an rpm according to material / hardness and the achievable feed in your geometry. The f_t-value should not differ more than 20-30% from the original value.
*Cutting speed in () is recommendation for better performance, and the value out of () is realistic by taking the limitation of machine in consideration.



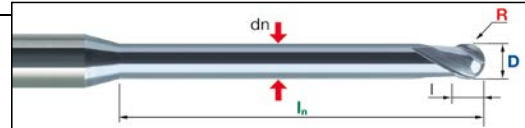
Aufgrund von äußeren Umständen wie Bauteilgeometrie / Maschinen-Limitierungen können Drehzahl und Vorschub im gleichen Maße angehoben oder gesenkt werden. Wählen Sie eine Drehzahl in Abhängigkeit von Material / Härte und dem erreichbaren Vorschub in Ihrer Geometrie. Der f_t-Wert sollte in der Regel nicht weiter als 20-30% vom Originalwert abweichen.
*Schnittgeschwindigkeit in (): Empfehlung für höhere Leistung. Werte außerhalb der Klammern sind realistisch unter Berücksichtigung der Maschinen-Limitationen.



In funzione di varie situazioni quali geometria del pezzo da lavorare o limitazioni della macchina le velocità di taglio e di avanzamento possono essere aumentate o diminuite in egual misura. Selezionare la velocità di taglio in funzione del materiale / durezza e dell'avanzamento effettivamente raggiungibile sul pezzo da lavorare. Il valore dell'avanzamento al dente (f_t) non dovrebbe differire più del 20-30% rispetto al valore originale.
*La velocità di taglio tra () è raccomandata per una migliore prestazione, e il valore fuori da () è realistico considerando le limitazioni dovute alla macchina.



EPHPB-PN | Recommended Cutting Conditions



II						III						IV						D		I _n
Tool Steels (25~35HRC)						Tool Steels (35~45HRC)						Hardened Steels (45~55HRC)								
V _c *	n	f _z	V _f	a _p	a _e	V _c *	n	f _z	V _f	a _p	a _e	V _c *	n	f _z	V _f	a _p	a _e			
m/min	min ⁻¹	mm/t	mm/min	mm	mm	m/min	min ⁻¹	mm/t	mm/min	mm	mm	m/min	min ⁻¹	mm/t	mm/min	mm	mm			
13(14)	42000	0.012	1080	0.005	0.005	13	42000	0.012	1020	0.005	0.005	12	37600	0.010	750	0.004	0.004	0.1	0.2	
13(14)	42000	0.012	1080	0.005	0.005	13	42000	0.012	1020	0.005	0.005	12	37600	0.010	750	0.004	0.004		0.3	
13(14)	42000	0.012	1080	0.004	0.004	13	42000	0.012	1020	0.004	0.004	12	37600	0.010	750	0.004	0.004		0.5	
26(28)	42000	0.019	1710	0.010	0.010	26(27)	42000	0.019	1620	0.010	0.010	24	37600	0.016	1200	0.009	0.009	0.2	1	
26(28)	42000	0.019	1710	0.009	0.009	26(27)	42000	0.019	1620	0.009	0.009	24	37600	0.016	1200	0.008	0.008		1.5	
23	36100	0.016	1160	0.008	0.008	21	34100	0.016	1090	0.008	0.008	19	30100	0.014	840	0.007	0.007		0.5	
40(43)	42000	0.019	1710	0.014	0.014	40	42000	0.019	1620	0.014	0.014	35	37600	0.016	1200	0.013	0.013	0.3	1	
40(43)	42000	0.019	1710	0.014	0.014	40	42000	0.019	1620	0.014	0.014	35	37600	0.016	1200	0.013	0.013		2	
45	36100	0.025	1810	0.019	0.019	43	34100	0.025	1710	0.019	0.019	38	30100	0.021	1260	0.017	0.017		3	
45	36100	0.025	1810	0.017	0.017	43	34100	0.025	1710	0.017	0.017	38	30100	0.021	1260	0.015	0.015	0.4	2	
41	32500	0.023	1500	0.015	0.015	39	30700	0.023	1410	0.015	0.015	34	27000	0.020	1080	0.014	0.014		3	
57	36100	0.025	1810	0.024	0.024	54	34100	0.025	1710	0.024	0.024	47	30100	0.021	1260	0.021	0.021		1	
57	36100	0.025	1810	0.024	0.024	54	34100	0.025	1710	0.024	0.024	47	30100	0.021	1260	0.021	0.021	0.5	2	
51	32500	0.023	1500	0.021	0.021	48	30700	0.023	1410	0.021	0.021	42	27000	0.020	1080	0.019	0.019		3	
51	32500	0.023	1500	0.019	0.019	48	30700	0.023	1410	0.019	0.019	42	27000	0.020	1080	0.017	0.017		4	
45	28800	0.020	1150	0.019	0.019	43	27200	0.020	1090	0.019	0.019	38	24000	0.017	820	0.017	0.017	0.6	6	
68	36100	0.032	2310	0.029	0.029	64	34100	0.032	2180	0.029	0.029	57	30100	0.027	1630	0.026	0.026		2	
68	36100	0.032	2310	0.026	0.026	64	34100	0.032	2180	0.026	0.026	57	30100	0.027	1630	0.023	0.023		3	
61	32500	0.029	1890	0.026	0.026	58	30700	0.029	1780	0.026	0.026	51	27000	0.025	1350	0.023	0.023	0.8	4	
54	28800	0.025	1440	0.023	0.023	51	27200	0.025	1360	0.023	0.023	45	24000	0.021	1010	0.020	0.020		6	
54	28800	0.025	1440	0.023	0.023	51	27200	0.025	1360	0.023	0.023	45	24000	0.021	1010	0.020	0.020		8	
91	36100	0.032	2310	0.038	0.038	86	34100	0.032	2180	0.038	0.038	76	30100	0.027	1630	0.034	0.034	0.8	2	
91	36100	0.032	2310	0.034	0.034	86	34100	0.032	2180	0.034	0.034	76	30100	0.027	1630	0.031	0.031		4	
82	32500	0.029	1890	0.030	0.030	77	30700	0.029	1780	0.030	0.030	68	27000	0.025	1350	0.027	0.027		6	
72	28800	0.025	1440	0.030	0.030	68	27200	0.025	1360	0.030	0.030	60	24000	0.021	1010	0.027	0.027	1	8	
72	28800	0.025	1440	0.030	0.030	68	27200	0.025	1360	0.030	0.030	60	24000	0.021	1010	0.027	0.027		10	
102	32500	0.038	2470	0.048	0.048	96	30700	0.038	2330	0.048	0.048	85	27000	0.032	1730	0.043	0.043		2	
102	32500	0.038	2470	0.048	0.048	96	30700	0.038	2330	0.048	0.048	85	27000	0.032	1730	0.043	0.043	1	4	
92	29200	0.034	1990	0.043	0.043	87	27600	0.034	1880	0.043	0.043	76	24300	0.029	1410	0.038	0.038		6	
92	29200	0.034	1990	0.038	0.038	87	27600	0.034	1880	0.038	0.038	76	24300	0.029	1410	0.034	0.034		8	
92	29200	0.034	1990	0.038	0.038	87	27600	0.034	1880	0.038	0.038	76	24300	0.029	1410	0.034	0.034	2	10	
82	26000	0.030	1560	0.038	0.038	77	24500	0.030	1470	0.038	0.038	68	21600	0.026	1120	0.034	0.034		12	
119	25200	0.038	1920	0.057	0.057	112	23800	0.038	1810	0.057	0.057	99	21000	0.032	1340	0.051	0.051		4	
107	22700	0.034	1540	0.051	0.051	101	21500	0.034	1460	0.051	0.051	89	18900	0.029	1100	0.046	0.046	1.5	8	
107	22700	0.034	1540	0.046	0.046	101	21500	0.034	1460	0.046	0.046	89	18900	0.029	1100	0.041	0.041		12	
95	20200	0.030	1210	0.046	0.046	90	19100	0.030	1150	0.046	0.046	79	16800	0.026	870	0.041	0.041		16	
95	20200	0.030	1210	0.046	0.046	90	19100	0.030	1150	0.046	0.046	79	16800	0.026	870	0.041	0.041	2	20	
119	18900	0.063	2380	0.067	0.067	112	17900	0.063	2260	0.067	0.067	99	15800	0.054	1710	0.060	0.060		4	
119	18900	0.063	2380	0.067	0.067	112	17900	0.063	2260	0.067	0.067	99	15800	0.054	1710	0.060	0.060		6	
119	18900	0.063	2380	0.067	0.067	112	17900	0.063	2260	0.067	0.067	99	15800	0.054	1710	0.060	0.060	3	8	
119	18900	0.063	2380	0.060	0.060	112	17900	0.063	2260	0.060	0.060	99	15800	0.054	1710	0.054	0.054		10	
107	17000	0.057	1940	0.060	0.060	101	16100	0.057	1840	0.060	0.060	89	14200	0.048	1360	0.054	0.054		12	
107	17000	0.057	1940	0.053	0.053	101	16100	0.057	1840	0.053	0.053	89	14200	0.048	1360	0.048	0.048	4	16	
107	17000	0.057	1940	0.053	0.053	101	16100	0.057	1840	0.053	0.053	89	14200	0.048	1360	0.048	0.048		20	
95	15100	0.050	1510	0.053	0.053	90	14300	0.050	1430	0.053	0.053	79	12600	0.043	1080	0.048	0.048		25	
136	14400	0.063	1810	0.081	0.081	128	13600	0.063	1710	0.081	0.081	113	12000	0.054	1300	0.072	0.072	3	8	
136	14400	0.063	1810	0.081	0.081	128	13600	0.063	1710	0.081	0.081	113	12000	0.054	1300	0.072	0.072		12	
123	13000	0.057	1480	0.073	0.073	116	12300	0.057	1400	0.073	0.073	102	10800	0.048	1040	0.065	0.065		16	
123	13000	0.057	1480	0.073	0.073	116	12300	0.057	1400	0.073	0.073	102	10800	0.048	1040	0.065	0.065	4	20	
123	13000	0.057	1480	0.065	0.065	116	12300	0.057	1400	0.065	0.065	102	10800	0.048	1040	0.058	0.058		25	
131	10400	0.084	1750	0.095	0.095	123	9800	0.084	1650	0.095	0.095	108	8600	0.071	1220	0.085	0.085		10	
131	10400	0.084	1750	0.086	0.086	123	9800	0.084	1650	0.086	0.086	108	8600	0.071	1220	0.077	0.077	4	20	
117	9300	0.075	1400	0.076	0.076	111	8800	0.075	1320	0.076	0.076	98	7800	0.064	1000	0.068	0.068		30	
104	8300	0.067	1110	0.076	0.076	98	7800	0.067	1050	0.076	0.076	87	6900	0.057	790	0.068	0.068		40	

Debido a circunstancias externas como la geometría de la pieza / limitaciones de la máquina, la velocidad y el avance se pueden incrementar o reducir en una misma proporción. Elegir las rpm en función del material / dureza y el avance que pueda alcanzar con su geometría. El valor f_z no debe variar más del 20-30% de su valor original.

*La velocidad de corte entre () es la recomendada para un mayor rendimiento, y el valor fuera de () es el real tomando en cuenta las limitaciones de la máquina.


En fonction du contexte d'usinage, des données comme la géométrie de la forme à usiner ou des caractéristiques machines, les vitesses de coupe et d'avance peuvent être ajustées (+/-) en conservant le même ratio vitesse/avance. Choisissez une rotation adaptée à la dureté de la matière, et l'avance atteignable dans votre géométrie. La valeur f_z ne doit pas diverger de plus de 20-30% de la valeur recommandée.


*La vitesse de coupe en () est recommandée pour des performances optimales, et la valeur hors () est réaliste si on prend en considération les limitations de la machine.


De acordo com as circunstâncias da geometria da peça ou limitações da máquina, a velocidade de corte e avanço podem ser aumentados ou reduzidos em igual proporção. Escolher uma rpm de acordo com o material / dureza e o avanço por aresta consoante a sua geometria. O valor f_z não deve diferir em mais de 20-30% do valor original.


*Velocidade de corte () é a recomendação para um melhor desempenho, e o valor fora () é realista tendo em conta a limitação da máquina.

EPHPR-PN | Recommended Cutting Conditions

	Workpiece Material			Copper (Cu), Al					I Carbon Steels, Alloy Steels (180~250HB)				
	D	CR	I _n	V _c * m/min	n min ⁻¹	f _t mm/t	V _f mm/min	a _p mm	V _c * m/min	n min ⁻¹	f _t mm/t	V _f mm/min	a _p mm
 Finishing	0.2	0.05	0.5	26 (39)	42000	0.008	672	0.020	26 (32)	42000	0.008	672	0.020
			1	26 (39)	42000	0.008	672	0.018	26 (32)	42000	0.008	672	0.018
	0.3			40 (58)	42000	0.010	840	0.020	40 (48)	42000	0.011	924	0.020
			2	36 (52)	42000	0.009	756	0.018	36 (43)	42000	0.009	756	0.018
	0.4		1	53 (71)	42000	0.011	924	0.028	53 (59)	42000	0.011	924	0.028
			2	53 (71)	42000	0.011	924	0.025	53 (59)	42000	0.011	924	0.025
	0.5		1	66 (89)	42000	0.011	924	0.028	66 (74)	42000	0.011	924	0.028
			2	66 (89)	42000	0.011	924	0.028	66 (74)	42000	0.011	924	0.028
	0.6		3	66 (72)	42000	0.011	924	0.025	60	38064	0.011	837	0.025
			2	79 (107)	42000	0.016	1344	0.028	79 (89)	42000	0.016	1344	0.028
	0.8		4	79 (87)	42000	0.015	1260	0.025	72	38328	0.015	1150	0.025
			6	73	35563	0.015	1067	0.022	56	29517	0.015	886	0.022
	1		2	106	42000	0.015	1260	0.028	88	35024	0.015	1051	0.028
			4	106	42000	0.015	1260	0.025	88	35024	0.015	1051	0.025
	1.5		6	106	42000	0.014	1176	0.022	88	35024	0.014	981	0.022
			2	132	42000	0.025	2100	0.040	110	34892	0.025	1745	0.040
	2		4	132	42000	0.025	2100	0.040	110	34892	0.025	1745	0.040
			6	123	39172	0.022	1724	0.036	102	32513	0.022	1431	0.036
	3		8	123	39172	0.022	1724	0.032	102	32513	0.022	1431	0.032
			10	123	39172	0.022	1724	0.032	102	32513	0.022	1431	0.032
	4		12	109	34713	0.020	1389	0.032	91	28812	0.020	1152	0.032
			4	158	33546	0.027	1811	0.040	131	27843	0.027	1504	0.040
	1.5		8	143	30361	0.027	1639	0.036	119	25200	0.027	1361	0.036
			12	140	29724	0.027	1605	0.032	116	24671	0.027	1332	0.032
	2		16	127	26964	0.025	1348	0.032	105	22380	0.025	1119	0.032
			4	158	25159	0.047	2365	0.040	131	20882	0.047	1963	0.040
	3		8	158	25159	0.047	2365	0.040	131	20882	0.047	1963	0.040
			12	158	25159	0.043	2164	0.036	131	20882	0.043	1796	0.036
	4		16	140	22293	0.043	1917	0.032	116	18503	0.043	1591	0.032
			20	140	22293	0.043	1917	0.032	116	18503	0.043	1591	0.032
	1.5		8	158	25159	0.047	2365	0.060	131	20882	0.047	1963	0.060
			12	158	25159	0.043	2164	0.054	131	20882	0.043	1796	0.054
	2		16	140	22293	0.043	1917	0.048	116	18503	0.043	1591	0.048
			20	140	22293	0.043	1917	0.048	116	18503	0.043	1591	0.048
	3		8	181	19214	0.059	2267	0.040	150	15948	0.059	1882	0.040
			12	181	19214	0.059	2267	0.040	150	15948	0.059	1882	0.040
	4		16	163	17304	0.059	2042	0.036	135	14362	0.059	1695	0.036
			20	163	17304	0.059	2042	0.036	135	14362	0.059	1695	0.036
	1.5		30	140	14862	0.053	1575	0.032	116	12335	0.053	1308	0.032
			8	181	19214	0.059	2267	0.060	150	15948	0.059	1882	0.060
	2		12	181	19214	0.059	2267	0.060	150	15948	0.059	1882	0.060
			16	163	17304	0.059	2042	0.054	135	14362	0.059	1695	0.054
	3		20	163	17304	0.059	2042	0.054	135	14362	0.059	1695	0.054
			30	140	14862	0.053	1575	0.048	116	12335	0.053	1308	0.048
	4		12	173	13774	0.073	2011	0.060	144	11432	0.073	1669	0.060
			24	157	12500	0.073	1825	0.054	130	10375	0.073	1515	0.054
	1.5		36	139	11067	0.066	1461	0.048	115	9186	0.066	1212	0.048

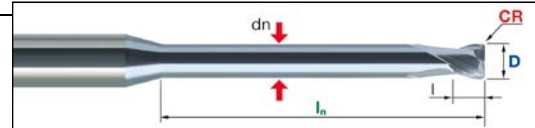
 According to circumstances like workpiece geometry / machine limitations, speed and feed can be increased or reduced in equal ratio. Choose an rpm according to material / hardness and the achievable feed in your geometry. The f_t-value should not differ more than 20–30% from the original value.
*Cutting speed in () is recommendation for better performance, and the value out of () is realistic by taking the limitation of machine in consideration.

 Aufgrund von äußeren Umständen wie Bauteilgeometrie / Maschinen-Limitierungen können Drehzahl und Vorschub im gleichen Maße angehoben oder gesenkt werden. Wählen Sie eine Drehzahl in Abhängigkeit von Material / Härte und dem erreichbaren Vorschub in Ihrer Geometrie. Der f_t-Wert sollte in der Regel nicht weiter als 20–30% vom Originalwert abweichen.
*Schnittgeschwindigkeit in (): Empfehlung für höhere Leistung. Werte außerhalb der Klammern sind realistisch unter Berücksichtigung der Maschinen-Limitationen.

 In funzione di varie situazioni quali geometria del pezzo da lavorare o limitazioni della macchina le velocità di taglio e di avanzamento possono essere aumentate o diminuite in egual misura. Selezionare la velocità di taglio in funzione del materiale / durezza e dell'avanzamento effettivamente raggiungibile sul pezzo da lavorare. Il valore dell'avanzamento al dente (f_t) non dovrebbe differire più del 20–30% rispetto al valore originale.
*La velocità di taglio tra () è raccomandata per una migliore prestazione, e il valore fuori da () è realistico considerando le limitazioni dovute alla macchina.



EPHPR-PN | Recommended Cutting Conditions



II Tool Steels (25~35HRC)					III Tool Steels (35~45HRC)					IV Hardened Steels (45~55HRC)					D	CR	I _n
V _c *	n	f _z	V _f	a _p	V _c *	n	f _z	V _f	a _p	V _c *	n	f _z	V _f	a _p			
m/min	min ⁻¹	mm/t	mm/min	mm	m/min	min ⁻¹	mm/t	mm/min	mm	m/min	min ⁻¹	mm/t	mm/min	mm			
26(29)	42000	0.008	672	0.019	26	42000	0.007	588	0.019	24	38503	0.006	462	0.017	0.2	0.05	0.5
26(29)	42000	0.008	672	0.017	26	42000	0.007	588	0.017	24	38503	0.006	462	0.015			1
40(44)	42000	0.011	924	0.019	40	42000	0.008	672	0.019	36	38174	0.006	458	0.017	0.3	0.1	2
39	41401	0.009	745	0.017	36	38641	0.008	618	0.017	32	34225	0.006	411	0.015			2
53	42000	0.011	924	0.027	50	39570	0.011	871	0.027	44	35048	0.009	631	0.024	0.4	0.1	1
53	42000	0.011	924	0.024	50	39570	0.009	712	0.024	44	35048	0.008	561	0.021			2
66	42000	0.011	924	0.027	62	39682	0.011	873	0.027	55	35146	0.009	633	0.024	0.5	0.1	1
66	42000	0.011	924	0.027	62	39682	0.011	873	0.027	55	35146	0.009	633	0.024			2
54	34395	0.011	757	0.024	50	32102	0.010	642	0.024	45	28433	0.008	455	0.021	0.6	0.1	3
79	42000	0.016	1344	0.027	75	39756	0.013	1034	0.027	66	35212	0.011	775	0.024			2
65	34634	0.015	1039	0.024	61	32325	0.013	840	0.024	54	28631	0.011	630	0.021	0.8	0.1	4
50	26672	0.015	800	0.021	47	24894	0.013	647	0.021	42	22049	0.011	485	0.019			6
80	31648	0.015	949	0.027	74	29538	0.014	827	0.027	66	26162	0.013	680	0.024	0.8	0.1	2
80	31648	0.015	949	0.024	74	29538	0.014	827	0.024	66	26162	0.013	680	0.021			4
80	31648	0.014	886	0.021	74	29538	0.014	827	0.021	66	26162	0.013	680	0.019	1	0.2	6
99	31529	0.025	1576	0.038	92	29427	0.022	1295	0.038	82	26064	0.02	1043	0.034			2
99	31529	0.025	1576	0.038	92	29427	0.022	1295	0.038	82	26064	0.02	1043	0.034	1.5	0.2	4
92	29379	0.022	1293	0.034	86	27420	0.022	1206	0.034	76	24287	0.02	971	0.031			6
92	29379	0.022	1293	0.030	86	27420	0.022	1206	0.030	76	24287	0.02	971	0.027	2	0.5	8
92	29379	0.022	1293	0.030	86	27420	0.022	1206	0.030	76	24287	0.02	971	0.027			10
82	26035	0.020	1041	0.030	76	24299	0.018	875	0.030	68	21522	0.018	775	0.027	2	0.5	12
119	25159	0.027	1359	0.038	111	23482	0.025	1174	0.038	98	20798	0.022	915	0.034			4
107	22771	0.027	1230	0.034	100	21253	0.025	1063	0.034	89	18824	0.022	828	0.031	1.5	0.2	8
105	22293	0.027	1204	0.030	98	20807	0.025	1040	0.030	87	18429	0.022	811	0.027			12
95	20223	0.025	1011	0.030	89	18875	0.021	793	0.030	79	16718	0.021	702	0.027	2	0.5	16
119	18869	0.047	1774	0.038	111	17611	0.047	1655	0.038	98	15599	0.038	1186	0.034			4
119	18869	0.047	1774	0.038	111	17611	0.047	1655	0.038	98	15599	0.038	1186	0.034	2	0.5	8
119	18869	0.043	1623	0.034	111	17611	0.043	1515	0.034	98	15599	0.038	1186	0.031			12
105	16720	0.043	1438	0.030	98	15605	0.043	1342	0.030	87	13822	0.038	1050	0.027	3	0.2	16
105	16720	0.043	1438	0.030	98	15605	0.043	1342	0.030	87	13822	0.034	940	0.027			20
119	18869	0.047	1774	0.057	111	17611	0.047	1655	0.057	98	15599	0.038	1186	0.051	3	0.5	8
119	18869	0.043	1623	0.051	111	17611	0.043	1515	0.051	98	15599	0.038	1186	0.046			12
105	16720	0.043	1438	0.046	98	15605	0.043	1342	0.046	87	13822	0.038	1050	0.041	3	0.2	16
105	16720	0.043	1438	0.046	98	15605	0.043	1342	0.046	87	13822	0.034	940	0.041			20
136	14411	0.059	1700	0.038	127	13450	0.059	1587	0.038	112	11913	0.047	1120	0.034	3	0.5	8
136	14411	0.059	1700	0.038	127	13450	0.059	1587	0.038	112	11913	0.047	1120	0.034			12
122	12978	0.059	1531	0.034	114	12113	0.059	1429	0.034	101	10728	0.047	1008	0.031	3	0.2	16
122	12978	0.059	1531	0.034	114	12113	0.059	1429	0.034	101	10728	0.047	1008	0.031			20
105	11146	0.053	1182	0.030	98	10403	0.053	1103	0.030	87	9214	0.043	792	0.027	3	0.5	30
136	14411	0.059	1700	0.057	127	13450	0.059	1587	0.057	112	11913	0.047	1120	0.051			8
136	14411	0.059	1700	0.057	127	13450	0.059	1587	0.057	112	11913	0.047	1120	0.051	3	0.5	12
122	12978	0.059	1531	0.051	114	12113	0.059	1429	0.051	101	10728	0.047	1008	0.046			16
122	12978	0.059	1531	0.051	114	12113	0.059	1429	0.051	101	10728	0.047	1008	0.046	4	0.5	20
105	11146	0.053	1182	0.046	98	10403	0.053	1103	0.046	87	9214	0.043	792	0.041			30
130	10330	0.073	1508	0.057	121	9642	0.073	1408	0.057	107	8540	0.058	991	0.051	4	0.5	12
118	9375	0.073	1369	0.051	110	8750	0.073	1278	0.051	97	7750	0.058	899	0.046			24
104	8300	0.066	1096	0.046	97	7747	0.066	1023	0.046	86	6861	0.053	727	0.041	4	0.5	36

Debido a circunstancias externas como la geometría de la pieza / limitaciones de la máquina, la velocidad y el avance se pueden incrementar o reducir en una misma proporción. Elegir las rpm en función del material / dureza y el avance que pueda alcanzar con su geometría. El valor f_z no debe variar más del 20-30% de su valor original.

*La velocidad de corte entre () es la recomendada para un mayor rendimiento, y el valor fuera de () es el real tomando en cuenta las limitaciones de la máquina.

En fonction du contexte d'usinage, des données comme la géométrie de la forme à usiner ou des caractéristiques machines, les vitesses de coupe et d'avance peuvent être ajustées (+/-) en conservant le même ratio vitesse/avance. Choisissez une rotation adaptée à la dureté de la matière, et l'avance atteignable dans votre géométrie. La valeur f_z ne doit pas diverger de plus de 20-30% de la valeur recommandée.

*La vitesse de coupe en () est recommandée pour des performances optimales, et la valeur hors () est réaliste si on prend en considération les limitations de la machine.

De acordo com as circunstâncias da geometria da peça ou limitações da máquina, a velocidade de corte e avanço podem ser aumentados ou reduzidos em igual proporção. Escolher uma rpm de acordo com o material / dureza e o avanço por aresta consoante a sua geometria. O valor f_z não deve diferir em mais de 20-30% do valor original.

*Velocidade de corte () é a recomendação para um melhor desempenho, e o valor fora () é realista tendo em conta a limitação da máquina.

Always up to date: Please check our P50 QuickFinder



Attentions 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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Specifications for the products listed in this catalog are subject to change without notice due to replacement or modification.

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