

## 標準切削条件表 Recommended cutting conditions

## EPDBP-TH

被削材 Work material					1		2		3		4		5	
					炭素鋼・合金鋼 Carbon Steels, Alloy Steels (180~250HB)		ステンレス鋼・工具鋼 Stainless Steels, Tool Steels (25~35HRC)		プリハードン鋼 Pre-hardened Steels (35~45HRC)		焼入れ鋼 Hardened Steels (45~55HRC)		焼入れ鋼 Hardened Steels (55~65HRC)	
切込み比率 Ratio to standard depth of cut					100%		90%		80%		65%		60%	
ボール半径 Ball Radius (mm)	外径 Tool Dia. (mm)	首下長 Under neck Length (mm)	首角度 Neck Angle (°)	基本切込み Standard depth of Cut (mm)	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min
0.1	0.2	1	0.4	0.017	40,000	800	34,000	680	28,000	504	26,000	416	26,000	364
		1.5	0.4	0.009	40,000	800	34,000	680	28,000	504	26,000	416	26,000	364
		2	0.9	0.007	32,000	461	27,200	392	22,400	323	20,800	266	20,800	233
		2.5	0.9	0.004	26,000	333	22,100	283	18,200	204	16,900	189	16,900	162
0.15	0.3	2	0.4	0.025	40,000	1,200	34,000	1,020	28,000	756	26,000	624	26,000	546
		3	0.9	0.013	32,000	691	27,200	588	22,400	484	20,800	399	20,800	349
		4	0.9	0.010	26,000	499	22,100	424	18,200	306	16,900	284	16,900	243
0.2	0.4	2	0.4	0.035	40,000	1,600	34,000	1,360	28,000	1,008	26,000	832	26,000	728
		3	0.4	0.020	40,000	1,600	34,000	1,360	28,000	1,008	26,000	832	26,000	728
		4	0.4	0.007	32,000	922	27,200	783	22,400	645	20,800	532	20,800	466
		4	0.9	0.009	32,000	922	27,200	783	22,400	645	20,800	532	20,800	466
		5	0.4	0.006	26,000	666	22,100	566	18,200	408	16,900	379	16,900	324
		5	0.9	0.007	26,000	666	22,100	566	18,200	408	16,900	379	16,900	324
0.25	0.5	4	0.4	0.040	40,000	2,000	34,000	1,700	28,000	1,260	26,000	1,040	26,000	910
		8	0.9	0.010	26,000	728	22,100	619	18,200	446	16,900	414	16,900	355
		12	0.9	0.005	22,400	627	19,040	533	15,680	384	14,560	357	14,560	306
0.27	0.54	2	0.4	0.050	40,000	2,160	34,000	1,836	28,000	1,361	26,000	1,123	26,000	983
		4	0.4	0.037	40,000	2,160	34,000	1,836	28,000	1,361	26,000	1,123	26,000	983
		5	0.4	0.031	40,000	1,512	34,000	1,428	28,000	1,176	26,000	1,040	26,000	832
		6	0.4	0.025	26,000	1,244	22,100	1,058	18,200	871	16,900	676	16,900	629
		6.5	0.4	0.020	26,000	1,011	22,100	859	18,200	619	16,900	575	16,900	493
		7	0.4	0.015	26,000	899	22,100	812	18,200	585	16,900	543	16,900	465
0.3	0.6	2	0.4	0.055	40,000	2,400	34,000	2,040	28,000	1,512	26,000	1,248	26,000	1,092
		4	0.4	0.035	40,000	2,400	34,000	2,040	28,000	1,512	26,000	1,248	26,000	1,092
		6	0.4	0.018	32,000	1,382	27,200	1,175	22,400	968	20,800	799	20,800	699
		6	0.9	0.020	32,000	1,382	27,200	1,175	22,400	968	20,800	799	20,800	699
		8	0.9	0.020	26,000	998	22,100	849	18,200	612	16,900	568	16,900	487
		10	0.4	0.013	26,000	874	22,100	743	18,200	535	16,900	497	16,900	426
		10	0.9	0.015	26,000	874	22,100	743	18,200	535	16,900	497	16,900	426
		12	0.9	0.010	26,000	874	22,100	743	18,200	535	16,900	497	16,900	426
		15	0.4	0.005	22,400	753	19,040	640	15,680	461	14,560	367	14,560	367
		15	0.9	0.006	22,400	753	19,040	640	15,680	461	14,560	367	14,560	367
0.4	0.8	4	0.4	0.062	32,000	2,560	27,200	2,176	22,400	1,613	20,800	1,331	20,800	1,165
		6	0.4	0.045	32,000	2,560	27,200	2,176	22,400	1,613	20,800	1,331	20,800	1,165
		8	0.9	0.026	25,600	1,475	21,760	1,253	17,920	1,032	16,640	852	16,640	745
		12	0.9	0.020	20,800	1,065	17,680	905	14,560	699	13,520	606	13,520	519
		16	0.9	0.018	20,800	932	17,680	792	14,560	612	13,520	530	13,520	454
0.45	0.9	4	0.4	0.063	28,300	2,547	24,055	2,165	19,810	1,605	18,395	1,324	18,395	1,159
		8	0.4	0.050	28,300	2,547	24,055	2,165	19,810	1,605	18,395	1,324	18,395	1,159
		12	0.4	0.037	18,400	1,325	15,640	1,126	12,880	811	11,960	753	11,960	646
		16	0.4	0.024	18,400	1,325	15,640	1,126	12,880	811	11,960	753	11,960	646
		18	0.4	0.018	18,400	1,325	15,640	1,126	12,880	811	11,960	753	11,960	646
		20	0.4	0.015	15,850	1,141	13,473	970	11,095	699	10,303	649	10,303	556
		22	0.4	0.012	15,850	1,141	13,473	970	11,095	699	10,303	649	10,303	556
24	0.4	0.009	14,150	1,019	12,028	866	9,905	624	9,198	579	9,198	497		

【注意】ご使用にあたっては、A103ページの表下の項目と注意を参照してください。【Note】 Upon usage, please refer to comments and notes below table on page A103.

# Epoch Pencil Deep Ball エポックペンシルディープボール

## 標準切削条件表 Recommended cutting conditions

### EPDBP-TH

被削材 Work material				1		2		3		4		5		
				炭素鋼・合金鋼 Carbon Steels, Alloy Steels (180~250HB)		ステンレス鋼・工具鋼 Stainless Steels, Tool Steels (25~35HRC)		プリハードン鋼 Pre-hardened Steels (35~45HRC)		焼入れ鋼 Hardened Steels (45~55HRC)		焼入れ鋼 Hardened Steels (55~65HRC)		
切込み比率 Ratio to standard depth of cut				100%		90%		80%		65%		60%		
ボール半径 Ball Radius (mm)	外径 Tool Dia. (mm)	首下長 Under neck Length (mm)	首角度 Neck Angle (°)	基本切込み Standard depth of Cut (mm)	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min
0.5	1	6	0.4	0.055	25,600	2,560	21,760	2,176	17,920	1,613	16,640	1,331	16,640	1,165
		8	0.4	0.055	25,600	2,560	21,760	2,176	17,920	1,613	16,640	1,331	16,640	1,165
		10	0.4	0.032	20,800	1,872	17,680	1,591	14,560	1,310	13,520	1,082	13,520	946
		10	0.9	0.035	20,800	1,872	17,680	1,591	14,560	1,310	13,520	1,082	13,520	946
		15	0.9	0.028	16,640	1,331	14,144	1,132	11,648	874	10,816	757	10,816	649
		20	0.4	0.018	16,640	1,331	14,144	1,132	11,648	874	10,816	757	10,816	649
		20	0.9	0.020	16,640	1,331	14,144	1,132	11,648	874	10,816	757	10,816	649
		25	0.9	0.017	14,560	1,165	12,376	990	10,192	764	9,464	662	9,464	568
		30	0.4	0.015	12,480	874	10,608	743	8,736	568	8,112	487	8,112	406
		30	0.9	0.017	12,480	874	10,608	743	8,736	568	8,112	487	8,112	406
		35	0.9	0.010	10,400	728	8,840	619	7,280	473	6,760	406	6,760	338
		40	0.9	0.009	10,000	700	8,500	595	7,000	455	6,500	390	6,500	325
		50	0.9	0.007	9,500	665	8,075	565	6,650	432	6,175	371	6,175	309
		60	0.9	0.005	9,000	630	7,650	536	6,300	410	5,850	351	5,850	293
		70	0.9	0.003	8,500	595	7,225	506	5,950	387	5,525	332	5,525	276
0.75	1.5	8	0.4	0.070	16,960	2,544	14,416	2,162	11,872	1,603	11,024	1,323	11,024	1,158
		10	0.4	0.070	16,960	2,544	14,416	2,162	11,872	1,603	11,024	1,323	11,024	1,158
		12	0.4	0.070	16,960	2,544	14,416	2,162	11,872	1,603	11,024	1,323	11,024	1,158
		15	0.9	0.045	13,568	1,832	11,533	1,557	9,498	1,282	8,819	1,058	8,819	926
		20	0.9	0.040	11,024	1,323	9,370	1,124	7,717	810	7,166	752	7,166	645
		30	0.9	0.028	11,024	1,323	9,370	1,124	7,717	810	7,166	752	7,166	645
0.9	1.8	4	0.4	0.120	14,200	2,556	12,070	2,173	9,940	1,610	9,230	1,329	9,230	1,163
		8	0.4	0.100	14,200	2,556	12,070	2,173	9,940	1,610	9,230	1,329	9,230	1,163
		12	0.4	0.080	14,200	2,556	12,070	2,173	9,940	1,610	9,230	1,329	9,230	1,163
		16	0.4	0.071	14,200	2,556	12,070	2,173	9,940	1,610	9,230	1,329	9,230	1,163
		20	0.4	0.062	9,230	1,329	7,846	1,130	6,461	814	6,000	756	6,000	648
		24	0.4	0.053	9,230	1,329	7,846	1,130	6,461	814	6,000	756	6,000	648
		28	0.4	0.044	9,230	1,329	7,846	1,130	6,461	814	6,000	756	6,000	648
		32	0.4	0.036	9,230	1,329	7,846	1,130	6,461	814	6,000	756	6,000	648
		36	0.4	0.028	9,230	1,329	7,846	1,130	6,461	814	6,000	756	6,000	648
		40	0.4	0.020	8,000	1,152	6,800	979	5,600	706	5,200	655	5,200	562
		40	0.4	0.015	8,000	1,152	6,800	979	5,600	706	5,200	655	5,200	562
1	2	8	0.4	0.150	15,200	3,040	12,920	2,584	10,640	1,915	9,880	1,581	9,880	1,383
		12	0.4	0.090	15,200	3,040	12,920	2,584	10,640	1,915	9,880	1,581	9,880	1,383
		16	0.4	0.090	15,200	3,040	12,920	2,584	10,640	1,915	9,880	1,581	9,880	1,383
		20	0.4	0.060	12,160	2,189	10,336	1,860	8,512	1,532	7,904	1,265	7,904	1,107
		20	0.9	0.070	12,160	2,189	10,336	1,860	8,512	1,532	7,904	1,265	7,904	1,107
		25	0.9	0.070	9,880	1,581	8,398	1,344	6,916	968	6,422	899	6,422	771
		30	0.4	0.040	9,880	1,581	8,398	1,344	6,916	968	6,422	899	6,422	771
		30	0.9	0.045	9,880	1,581	8,398	1,344	6,916	968	6,422	899	6,422	771
		35	0.9	0.045	9,880	1,581	8,398	1,344	6,916	968	6,422	899	6,422	771
		40	0.4	0.030	9,880	1,581	8,398	1,344	6,916	968	6,422	899	6,422	771
		40	0.9	0.035	9,880	1,581	8,398	1,344	6,916	968	6,422	899	6,422	771

被削材 Work material				1		2		3		4		5		
				炭素鋼・合金鋼 Carbon Steels, Alloy Steels (180~250HB)		ステンレス鋼・工具鋼 Stainless Steels, Tool Steels (25~35HRC)		プリハードン鋼 Pre-hardened Steels (35~45HRC)		焼入れ鋼 Hardened Steels (45~55HRC)		焼入れ鋼 Hardened Steels (55~65HRC)		
切込み比率 Ratio to standard depth of cut				100%		90%		80%		65%		60%		
ボール半径 Ball Radius (mm)	外径 Tool Dia. (mm)	首下長 Under neck Length (mm)	首角度 Neck Angle (°)	基本切込み Standard depth of Cut (mm)	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min	回転数 n min <sup>-1</sup>	送り速度 vf mm/min
1	2	50	0.9	0.017	8,512	1,192	7,235	1,013	5,958	775	5,533	664	5,533	553
		60	0.9	0.009	7,235	1,013	6,150	861	5,065	658	4,703	564	4,703	470
		70	0.9	0.005	6,150	861	5,227	732	4,305	560	3,997	480	3,997	400
1.5	3	8	0.4	0.320	12,720	3,816	10,812	3,244	8,904	2,404	8,268	1,984	8,268	1,736
		16	0.4	0.220	12,720	3,816	10,812	3,244	8,904	2,404	8,268	1,984	8,268	1,736
		20	0.4	0.150	12,720	3,434	10,812	2,919	8,904	2,137	8,268	1,736	8,268	1,488
		30	0.4	0.080	10,176	2,748	8,650	2,335	7,123	1,496	6,614	1,389	6,614	1,191
		30	0.9	0.090	10,176	2,748	8,650	2,335	7,123	1,496	6,614	1,389	6,614	1,191
		40	0.4	0.060	8,268	1,984	7,028	1,687	5,788	1,215	5,374	1,129	5,374	967
		40	0.9	0.070	8,268	1,984	7,028	1,687	5,788	1,215	5,374	1,129	5,374	967
		50	0.9	0.050	8,268	1,984	7,028	1,687	5,788	1,215	5,374	1,129	5,374	967
		60	0.9	0.030	7,123	1,710	6,055	1,453	4,986	1,047	4,630	972	4,630	833
70	0.9	0.020	6,233	1,496	5,298	1,271	4,363	916	4,051	851	4,051	729		
2	4	20	1	0.320	11,900	2,860	10,100	2,420	9,000	2,050	7,800	1,680	7,800	1,590
		30	1	0.230	11,900	2,570	10,100	2,180	9,000	1,850	7,800	1,520	7,800	1,430
		40	1	0.140	9,500	1,940	8,100	1,650	7,200	1,400	6,200	1,140	6,200	1,080
		50	1	0.110	7,800	1,590	6,600	1,350	5,800	1,120	5,000	920	5,000	870
		60	1	0.070	7,800	1,590	6,600	1,350	5,800	1,120	5,000	920	5,000	870
2.5	5	30	1	0.340	9,500	2,140	8,100	1,820	7,200	1,540	6,200	1,260	6,200	1,190
		40	1	0.250	9,500	2,140	8,100	1,820	7,200	1,540	6,200	1,260	6,200	1,190
		60	1	0.150	6,200	1,320	5,300	1,130	4,700	950	4,000	770	4,000	720
3	6	30	1	0.450	8,000	2,000	6,800	1,700	6,000	1,430	5,200	1,170	5,200	1,110
		40	1	0.400	8,000	1,800	6,800	1,530	6,000	1,280	5,200	1,050	5,200	990
		50	1	0.320	8,000	1,800	6,800	1,530	6,000	1,280	5,200	1,050	5,200	990
		60	1	0.220	6,400	1,360	5,400	1,150	4,800	970	4,100	780	4,100	740
		70	1	0.180	5,200	1,110	4,400	940	3,900	790	3,400	650	3,400	610
		80	1	0.140	5,200	1,110	4,400	940	3,900	790	3,400	650	3,400	610
4	8	50	1	0.500	6,000	1,460	5,100	1,240	4,500	1,040	3,900	850	3,900	810
		60	1	0.430	6,000	1,460	5,100	1,240	4,500	1,040	3,900	850	3,900	810
		70	1	0.330	6,000	1,460	5,100	1,240	4,500	1,040	3,900	850	3,900	810
		80	1	0.250	4,800	1,100	4,100	940	3,600	780	3,100	640	3,100	600
5	10	60	1	0.700	4,800	1,300	4,100	1,110	3,600	920	3,100	750	3,100	710
		75	1	0.500	4,800	1,300	4,100	1,110	3,600	920	3,100	750	3,100	710

※(1) 基本切込みは被削材グループ1での目安を示しています。その他のグループの場合は、上表の切込み比率を目安に調整して下さい。

※(2) リブ加工や止まり溝など、切りくずがつまりやすい切削の場合、切込み設定は基本切込みに切込み比率をかけて算出した切込み量を、さらにその80%まで小さくして使用してください。

※(1) Standard cutting depth is shown as the criteria for Group 1 workpieces. For other groups, adjust the cutting depth according to the cutting depth factors in the above table.

※(2) When performing cutting where cutting chips may cause clogging, such as for rib cutting, blind grooves, etc., cutting depth setting should be set by multiplying a cutting depth factor to calculate the cutting depth amount, and this amount should then be reduced to 80% of the calculated value.

**【切込み設定例】** EPDBP2020-25-09-THの工具で焼き入れ鋼(50HRC)をリブ溝等高線切削する場合、  
切込み=0.07(基本切込み)×0.65(焼き入れ鋼グループ4の切込み比率)×0.8(閉鎖域の切削)=0.036mm

Cutting depth setting example: When cutting rib groove contours in quenched steel (50HRC) using an EPDBP2020-25-09-TH tool:

Cutting depth = 0.07 (standard cutting depth) × 0.65 (cutting depth factor for Group 4 quenched steel) × 0.8 (for closed-area cutting) = 0.036mm

- 【注意】**
- ① 被削材、加工形状に合わせて、適切なクーラントを使用してください。
  - ② この標準切削条件表は切削条件の目安を示すものです。実際の加工では加工形状、目的、使用機械等により条件を調整してください。
  - ③ 機械の回転数が足りない場合は、回転数と送り速度を同じ比率で下げてください。

- 【Note】**
- ① Use the appropriate coolant for the work material and machining shape.
  - ② These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
  - ③ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.