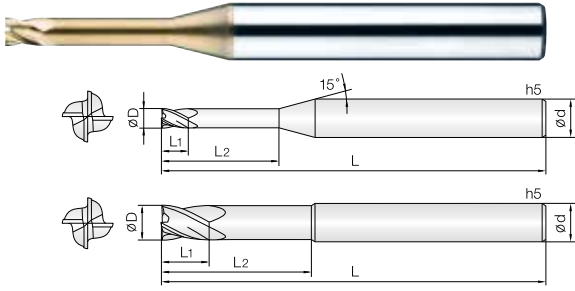


4HRE 4 Flutes High Speed Rib End Mills

4날 고속가공용 리브 엔드밀



- 고경도강 (HRc50~60), 프리하든강 계열의 고정밀 가공 엔드밀
- 실리콘계 코팅 (Si) 처리하여 내마모성이 우수합니다.
- 고정밀 공차 적용으로 초정밀 가공에 적합합니다.
- 인선부 강성을 보강하여 날부치핑을 최소화 하였습니다.
- 초미립자 초경합금 (0.2 μ m)을 채택, 고속절삭시 뛰어난 성능을 발휘합니다.

• Endmills for pre-hardened and hardened steels(HRc50~65)

- Good wear resistance by Si-based PVD coating.
- High precise edge tolerance.
- High speed, feed applicable by 3 flute ball edge.
- Minimize fracturing by high TRS fine(0.5 μ m) WC grade.



Shield Edge 428P

Condition	D Size	D Tolerance	Condition	D Size	D Tolerance
$\phi D \neq \phi d$	$\phi 0.5 \sim 6$	+0 ~ -0.01mm	$\phi D = \phi d$	$\phi 6$	-0.005 ~ -0.015mm
	$\phi 8 \sim 12$	+0 ~ -0.015mm		$\phi 8 \sim 12$	-0.01 ~ -0.025mm

단위 : mm

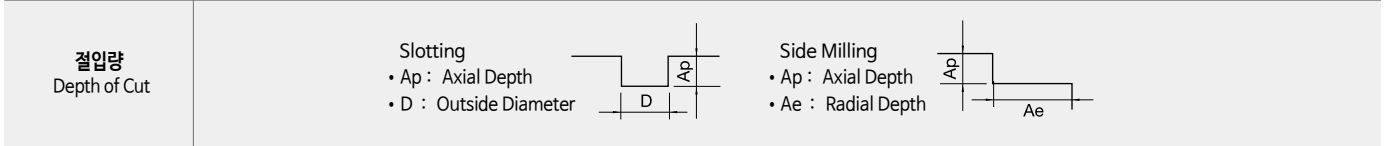
Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고
4HRE 005 010 S04	0.5	0.5	1	45	4		4HRE 015 060 S04	1.5	1.5	6	45	4	
4HRE 005 020 S04	0.5	0.5	2	45	4		4HRE 015 080 S04	1.5	1.5	8	45	4	
4HRE 005 030 S04	0.5	0.5	3	45	4		4HRE 015 100 S04	1.5	1.5	10	45	4	
4HRE 005 040 S04	0.5	0.5	4	45	4		4HRE 015 120 S04	1.5	1.5	12	45	4	
4HRE 005 050 S04	0.5	0.5	5	45	4		4HRE 015 160 S04	1.5	1.5	16	50	4	
4HRE 005 060 S04	0.5	0.5	6	45	4		4HRE 015 200 S04	1.5	1.5	20	50	4	
4HRE 005 080 S04	0.5	0.5	8	45	4		4HRE 015 250 S04	1.5	1.5	25	60	4	
4HRE 005 100 S04	0.5	0.5	10	50	4		4HRE 020 040 S04	2	2	4	45	4	
4HRE 006 010 S04	0.6	0.6	1	45	4		4HRE 020 060 S04	2	2	6	45	4	
4HRE 006 020 S04	0.6	0.6	2	45	4		4HRE 020 080 S04	2	2	8	45	4	
4HRE 006 030 S04	0.6	0.6	3	45	4		4HRE 020 100 S04	2	2	10	45	4	
4HRE 006 040 S04	0.6	0.6	4	45	4		4HRE 020 120 S04	2	2	12	45	4	
4HRE 006 060 S04	0.6	0.6	6	45	4		4HRE 020 140 S04	2	2	14	50	4	
4HRE 006 080 S04	0.6	0.6	8	45	4		4HRE 020 160 S04	2	2	16	50	4	
4HRE 006 100 S04	0.6	0.6	10	50	4		4HRE 020 180 S04	2	2	18	50	4	
4HRE 006 120 S04	0.6	0.6	12	50	4		4HRE 020 200 S04	2	2	20	50	4	
4HRE 007 020 S04	0.7	0.7	2	45	4		4HRE 020 250 S04	2	2	25	60	4	
4HRE 007 040 S04	0.7	0.7	4	45	4		4HRE 020 300 S04	2	2	30	70	4	
4HRE 007 060 S04	0.7	0.7	6	45	4		4HRE 025 100 S04	2.5	2.5	10	45	4	
4HRE 007 080 S04	0.7	0.7	8	45	4		4HRE 025 120 S04	2.5	2.5	12	45	4	
4HRE 007 100 S04	0.7	0.7	10	50	4		4HRE 025 160 S04	2.5	2.5	16	50	4	
4HRE 008 020 S04	0.8	0.8	2	45	4		4HRE 025 200 S04	2.5	2.5	20	50	4	
4HRE 008 040 S04	0.8	0.8	4	45	4		4HRE 025 250 S04	2.5	2.5	25	60	4	
4HRE 008 060 S04	0.8	0.8	6	45	4		4HRE 025 300 S04	2.5	2.5	30	70	4	
4HRE 008 080 S04	0.8	0.8	8	45	4		4HRE 030 060 S06	3	3	6	45	6	
4HRE 008 100 S04	0.8	0.8	10	45	4		4HRE 030 080 S06	3	3	8	45	6	
4HRE 008 120 S04	0.8	0.8	12	45	4		4HRE 030 100 S06	3	3	10	45	6	
4HRE 008 160 S04	0.8	0.8	16	50	4		4HRE 030 120 S06	3	3	12	50	6	
4HRE 009 020 S04	0.9	0.9	2	45	4		4HRE 030 160 S06	3	3	16	55	6	
4HRE 009 060 S04	0.9	0.9	6	45	4		4HRE 030 200 S06	3	3	20	60	6	
4HRE 009 080 S04	0.9	0.9	8	45	4		4HRE 030 250 S06	3	3	25	65	6	
4HRE 009 100 S04	0.9	0.9	10	45	4		4HRE 030 300 S06	3	3	30	70	6	
4HRE 010 020 S04	1	1	2	45	4		4HRE 030 350 S06	3	3	35	75	6	
4HRE 010 030 S04	1	1	3	45	4		4HRE 030 400 S06	3	3	40	80	6	
4HRE 010 040 S04	1	1	4	45	4		4HRE 030 450 S06	3	3	45	90	6	
4HRE 010 060 S04	1	1	6	45	4		4HRE 030 500 S06	3	3	50	100	6	
4HRE 010 080 S04	1	1	8	45	4		4HRE 035 120 S06	3.5	3.5	12	50	6	
4HRE 010 100 S04	1	1	10	45	4		4HRE 035 160 S06	3.5	3.5	16	55	6	
4HRE 010 120 S04	1	1	12	45	4		4HRE 035 200 S06	3.5	3.5	20	60	6	
4HRE 010 140 S04	1	1	14	50	4		4HRE 035 250 S06	3.5	3.5	25	65	6	
4HRE 010 160 S04	1	1	16	50	4		4HRE 035 300 S06	3.5	3.5	30	70	6	
4HRE 010 200 S04	1	1	20	50	4		4HRE 040 060 S06	4	4	6	50	6	
4HRE 010 250 S04	1	1	25	60	4		4HRE 040 080 S06	4	4	8	50	6	
4HRE 012 040 S04	1.2	1.2	4	45	4		4HRE 040 100 S06	4	4	10	50	6	
4HRE 012 060 S04	1.2	1.2	6	45	4		4HRE 040 120 S06	4	4	12	50	6	
4HRE 012 080 S04	1.2	1.2	8	45	4		4HRE 040 160 S06	4	4	16	55	6	
4HRE 012 100 S04	1.2	1.2	10	45	4		4HRE 040 200 S06	4	4	20	60	6	
4HRE 012 120 S04	1.2	1.2	12	45	4		4HRE 040 250 S06	4	4	25	65	6	
4HRE 012 160 S04	1.2	1.2	16	50	4		4HRE 040 300 S06	4	4	30	70	6	
4HRE 015 040 S04	1.5	1.5	4	45	4		4HRE 040 400 S06	4	4	40	80	6	

HARD series

단위 : mm

Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샹크 Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샹크 Dia d	비고
4HRE 040 450 S06	4	4	45	90	6								
4HRE 040 500 S06	4	4	50	100	6								
4HRE 040 600 S06	4	4	60	110	6								
4HRE 045 120 S06	4.5	4.5	12	50	6								
4HRE 045 160 S06	4.5	4.5	16	55	6								
4HRE 045 200 S06	4.5	4.5	20	60	6								
4HRE 045 250 S06	4.5	4.5	25	65	6								
4HRE 045 300 S06	4.5	4.5	30	70	6								
4HRE 050 160 S06	5	5	16	55	6								
4HRE 050 200 S06	5	5	20	60	6								
4HRE 050 250 S06	5	5	25	65	6								
4HRE 050 300 S06	5	5	30	70	6								
4HRE 050 400 S06	5	5	40	80	6								
4HRE 050 500 S06	5	5	50	100	6								
4HRE 050 600 S06	5	5	60	110	6								
4HRE 060 200 S06	6	6	20	60	6								
4HRE 060 300 S06	6	6	30	75	6								
4HRE 060 400 S06	6	6	40	80	6								
4HRE 060 500 S06	6	6	50	90	6								
4HRE 060 600 S06	6	6	60	110	6								
4HRE 080 200 S08	8	10	20	65	8								
4HRE 080 300 S08	8	10	30	80	8								
4HRE 080 400 S08	8	10	40	100	8								
4HRE 100 250 S10	10	15	25	70	10								
4HRE 100 350 S10	10	15	35	90	10								
4HRE 100 450 S10	10	15	45	110	10								
4HRE 120 300 S12	12	18	30	80	12								
4HRE 120 400 S12	12	18	40	100	12								
4HRE 120 500 S12	12	18	50	120	12								

피삭재 Material		구조용강 / 탄소강 / 회주철 Mild steels / Carbon Steels / Gray cast irons SS/SC/FC				공구강 / 금형강 Tool steels / Mold steels SCM/HPM				합금강 / 프리하든강 Alloy Steels / Pre-hardened Steels NAK80 / KP4M				고경도강 Hardened Steels STAVAX / SKD11			
경도 Hardness		~30Hrc				30 ~ 40Hrc				40 ~ 45Hrc				45 ~ 55Hrc			
외경 Outside Diameter	유효장 Effective Length	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
ø 0.8	8	25,000	750	0.009	0.01	21,600	560	0.008	0.01	18,300	450	0.006	0.01	15,900	300	0.004	0.009
"	16	16,800	340	0.002	0.001	15,700	270	0.002	0.001	13,300	240	0.001	0.001	10,400	200	0.001	0.001
ø 1	8	24,000	720	0.014	0.024	20,300	490	0.013	0.024	16,900	390	0.010	0.024	14,200	265	0.007	0.022
"	16	15,800	325	0.004	0.003	14,300	250	0.003	0.003	12,200	220	0.003	0.003	9,200	178	0.002	0.003
"	25	12,600	165	0.003	0.001	11,200	120	0.002	0.001	10,800	105	0.002	0.001	8,300	88	0.001	0.001
ø 1.5	8	21,000	980	0.041	0.124	18,800	740	0.037	0.124	14,600	520	0.029	0.124	12,400	355	0.020	0.112
"	16	13,600	544	0.013	0.015	12,200	410	0.012	0.015	10,500	322	0.009	0.015	8,000	230	0.007	0.014
"	25	11,400	318	0.005	0.004	10,500	240	0.005	0.004	8,600	196	0.004	0.004	6,200	138	0.003	0.004
ø 2	8	19,600	1,197	0.054	0.391	17,000	970	0.048	0.391	12,800	630	0.038	0.391	10,600	470	0.027	0.352
"	16	12,300	740	0.026	0.049	11,600	574	0.024	0.049	9,800	378	0.018	0.049	7,300	268	0.013	0.044
"	25	10,100	456	0.012	0.013	9,700	348	0.011	0.013	7,900	262	0.008	0.013	6,400	184	0.006	0.012
ø 2.5	10	16,600	1,240	0.068	0.488	14,300	1,035	0.061	0.488	10,200	689	0.048	0.488	8,350	510	0.034	0.439
"	16	11,600	890	0.045	0.119	9,800	710	0.040	0.119	7,220	480	0.031	0.119	6,700	326	0.022	0.107
"	25	8,700	630	0.022	0.031	8,300	460	0.019	0.031	6,360	338	0.015	0.031	5,500	273	0.011	0.028
ø 3	8	14,800	1,390	0.092	0.350	12,100	1,100	0.083	0.350	8,800	736	0.064	0.350	6,900	553	0.046	0.315
"	16	10,200	968	0.064	0.247	8,600	816	0.058	0.247	6,300	543	0.045	0.247	5,890	362	0.032	0.222
"	25	7,600	740	0.036	0.038	7,100	518	0.032	0.038	5,880	397	0.025	0.038	3,900	293	0.018	0.034
"	35	6,200	415	0.018	0.024	5,300	374	0.016	0.024	4,730	322	0.013	0.024	3,300	216	0.009	0.022
ø 4	8	12,300	1,830	0.140	0.950	10,200	1,210	0.140	0.950	7,400	848	0.093	0.900	6,300	500	0.070	0.810
"	16	8,600	1,240	0.093	0.580	7,200	860	0.084	0.580	5,100	573	0.065	0.580	5,150	397	0.046	0.522
"	25	6,400	890	0.061	0.205	5,000	590	0.055	0.205	4,180	433	0.042	0.205	3,180	304	0.030	0.185
"	40	4,950	510	0.030	0.050	3,900	385	0.027	0.050	3,300	341	0.021	0.050	2,770	208	0.015	0.045
ø 5	16	7,200	1,280	0.127	1.250	6,400	944	0.114	1.250	4,387	554	0.089	1.250	4,220	378	0.064	1.125
"	25	5,400	955	0.109	0.500	4,600	665	0.099	0.500	3,668	412	0.077	0.500	2,740	280	0.055	0.450
"	40	4,100	660	0.060	0.122	3,300	470	0.054	0.122	3,655	298	0.042	0.122	2,320	180	0.030	0.110
ø 6	20	4,880	1,088	0.126	2.025	4,433	726	0.114	2.025	2,980	528	0.088	2.025	2,640	356	0.063	1.823
"	40	3,800	720	0.083	0.253	2,950	497	0.074	0.253	2,100	326	0.058	0.253	2,078	226	0.041	0.228
ø 8	20	4,460	980	0.180	1.600	3,600	787	0.160	1.600	2,540	487	0.130	1.600	2,430	343	0.090	1.440
"	40	3,400	780	0.120	0.200	2,460	516	0.100	0.200	1,890	297	0.080	0.200	1,770	211	0.060	0.180
ø 10	25	3,400	926	0.200	1.760	3,160	726	0.180	1.760	2,360	467	0.130	1.760	1,650	326	0.080	1.584
"	35	2,170	640	0.140	0.240	2,120	615	0.120	0.240	1,780	412	0.090	0.240	1,180	192	0.070	0.216
ø 12	30	2,500	710	0.220	1.840	2,300	580	0.200	1.840	2,000	400	0.140	1.840	1,400	280	0.080	1.656
"	40	1,880	526	0.120	0.280	1,820	474	0.110	0.280	1,690	345	0.080	0.280	1,020	184	0.060	0.252



- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정하십시오.
- HRC60 이상 고경도강 가공 시 같은 직경의 같은 비율로 20% DOWN 시켜주십시오.
- 상기 절삭조건은 참고 수치이므로 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건 변경 요망합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송속도를 비례하여 조정하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다(ø1이하 사용시 진동 허용 관리 5µm 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 콜러트를 추천하며, 칩을 잘 제거하고 가공시 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece, HRC over 60 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use a machine with low vibration and good rigidity (ø1 or less, the vibration tolerance management should be within 5µm).
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.