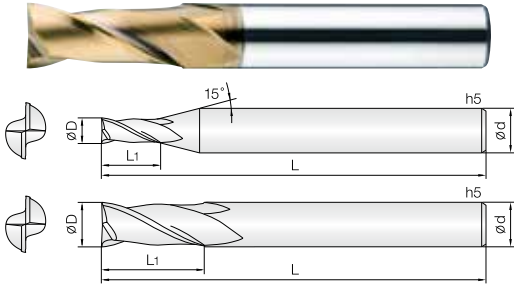


2HCE 2 Flutes High Speed Standard Length End Mills

2날 고속가공용 표준 길이 엔드밀

HARD series



- 고경도강(HRc50~65), 프리하든강 계열의 고속 가공 엔드밀
- 실리콘계 코팅 (Si) 처리하여 내마모성이 우수합니다.
- 고정밀 공차 적용으로 초정밀 가공에 적합합니다.
- 인선부 강성을 보강하여 날부치핑을 최소화 하였습니다.
- 국내최초 날경 0.05mm 제품부터 생산합니다.
- 항절력이 높은 미립자 초경합금(0.5 μ m)을 채택, 엔드밀의 파손을 최소화 하였습니다.
- Endmills for pre-hardened and hardened steels(HRc50~65)
- Good wear resistance by Si-based PVD coating.
- High precise edge tolerance.
- Reinforced edge design for preventing edge chipping.
- Produce down to 0.05mm in diameter endmills at the first time in Korea.
- Minimize fracturing by high TRS fine(0.5 μ m) WC grade.



Shield Edge 429P

Condition	D Size	D Tolerance	Condition	D Size	D Tolerance
$\varnothing D \neq \varnothing d$	$\varnothing 0.05 \sim 0.15$	$+0 \sim -0.005\text{mm}$	$\varnothing D = \varnothing d$	$\varnothing 3 \sim 6$	$-0.005 \sim -0.015\text{mm}$
	$\varnothing 0.2 \sim 6$	$+0 \sim -0.01\text{mm}$		$\varnothing 8 \sim 12$	$-0.01 \sim -0.025\text{mm}$
	$\varnothing 6.1 \sim 20$	$+0 \sim -0.015\text{mm}$		$\varnothing 14 \sim 20$	$-0.015 \sim -0.03\text{mm}$

단위 : mm

Order Number	날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	샙크 Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	샙크 Dia d	비고
2HCE 0005 0008 S04	0.05	0.08	40	4		2HCE 018 045 S04	1.8	4.5	40	4	
2HCE 0006 001 S04	0.06	0.1	40	4		2HCE 0185 045 S04	1.85	4.5	40	4	
2HCE 0007 0012 S04	0.07	0.12	40	4		2HCE 019 050 S04	1.9	5	40	4	
2HCE 0008 0015 S04	0.08	0.15	40	4		2HCE 0195 050 S04	1.95	5	40	4	
2HCE 0009 0017 S04	0.09	0.17	40	4		2HCE 020 060 S03	2	6	40	3	
2HCE 001 002 S04	0.1	0.2	40	4		2HCE 020 060 S04	2	6	40	4	
2HCE 0015 003 S04	0.15	0.3	40	4		2HCE 020 060 S06	2	6	40	6	
2HCE 002 004 S04	0.2	0.4	40	4		2HCE 020 060 060	2	6	60	6	
2HCE 0025 005 S04	0.25	0.5	40	4		2HCE 021 060 S04	2.1	6	40	4	
2HCE 003 006 S04	0.3	0.6	40	4		2HCE 022 060 S04	2.2	6	40	4	
2HCE 0035 007 S04	0.35	0.7	40	4		2HCE 023 060 S04	2.3	6	40	4	
2HCE 004 008 S04	0.4	0.8	40	4		2HCE 024 080 S04	2.4	8	45	4	
2HCE 0045 009 S04	0.45	0.9	40	4		2HCE 025 080 S03	2.5	8	45	3	
2HCE 005 010 S03	0.5	1	40	3		2HCE 025 080 S04	2.5	8	45	4	
2HCE 005 010 S04	0.5	1	40	4		2HCE 025 080 S06	2.5	8	45	6	
2HCE 0055 011 S04	0.55	1.1	40	4		2HCE 025 080 070	2.5	8	70	6	
2HCE 006 012 S03	0.6	1.2	40	3		2HCE 026 080 S04	2.6	8	45	4	
2HCE 006 012 S04	0.6	1.2	40	4		2HCE 027 080 S04	2.7	8	45	4	
2HCE 0065 013 S04	0.65	1.3	40	4		2HCE 028 080 S04	2.8	8	45	4	
2HCE 007 014 S04	0.7	1.4	40	4		2HCE 029 080 S04	2.9	8	45	4	
2HCE 0075 015 S04	0.75	1.5	40	4		2HCE 030 080 S03	3	8	45	3	
2HCE 008 016 S03	0.8	1.6	40	3		2HCE 030 080 S04	3	8	45	4	
2HCE 008 016 S04	0.8	1.6	40	4		2HCE 030 080 S06	3	8	45	6	
2HCE 0085 017 S04	0.85	1.7	40	4		2HCE 030 080 070	3	8	70	6	
2HCE 009 020 S04	0.9	2	40	4		2HCE 031 080 S06	3.1	8	45	6	
2HCE 0095 020 S04	0.95	2	40	4		2HCE 032 080 S06	3.2	8	45	6	
2HCE 010 025 S03	1	2.5	40	3		2HCE 033 080 S06	3.3	8	45	6	
2HCE 010 025 S04	1	2.5	40	4		2HCE 034 080 S06	3.4	8	45	6	
2HCE 010 025 S06	1	2.5	40	6		2HCE 035 100 S06	3.5	10	45	6	
2HCE 010 025 060	1	2.5	60	6		2HCE 036 100 S06	3.6	10	45	6	
2HCE 0105 025 S04	1.05	2.5	40	4		2HCE 037 100 S06	3.7	10	45	6	
2HCE 011 027 S04	1.1	2.7	40	4		2HCE 038 100 S06	3.8	10	45	6	
2HCE 0115 025 S04	1.15	2.5	40	4		2HCE 039 100 S06	3.9	10	45	6	
2HCE 012 030 S03	1.2	3	40	3		2HCE 040 100 S04	4	10	45	4	
2HCE 012 030 S04	1.2	3	40	4		2HCE 040 110 S06	4	11	45	6	
2HCE 012 030 060	1.2	3	60	6		2HCE 040 110 070	4	11	70	6	
2HCE 0125 030 S04	1.25	3	40	4		2HCE 041 110 S06	4.1	11	45	6	
2HCE 013 032 S04	1.3	3.2	40	4		2HCE 042 110 S06	4.2	11	45	6	
2HCE 0135 032 S04	1.35	3.2	40	4		2HCE 043 110 S06	4.3	11	45	6	
2HCE 014 035 S04	1.4	3.5	40	4		2HCE 044 110 S06	4.4	11	45	6	
2HCE 0145 035 S04	1.45	3.5	40	4		2HCE 045 110 S06	4.5	11	45	6	
2HCE 015 040 S03	1.5	4	40	3		2HCE 046 110 S06	4.6	11	45	6	
2HCE 015 040 S04	1.5	4	40	4		2HCE 047 110 S06	4.7	11	45	6	
2HCE 015 040 S06	1.5	4	40	6		2HCE 048 110 S06	4.8	11	45	6	
2HCE 015 040 060	1.5	4	60	6		2HCE 049 110 S06	4.9	11	45	6	
2HCE 0155 040 S04	1.55	4	40	4		2HCE 050 130 S06	5	13	50	6	
2HCE 016 040 S04	1.6	4	40	4		2HCE 050 130 080	5	13	80	6	
2HCE 0165 040 S04	1.65	4	40	4		2HCE 051 130 S06	5.1	13	50	6	
2HCE 017 042 S04	1.7	4.2	40	4		2HCE 052 130 S06	5.2	13	50	6	
2HCE 0175 042 S04	1.75	4.2	40	4		2HCE 053 130 S06	5.3	13	50	6	



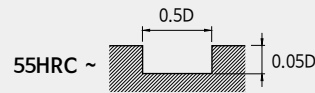
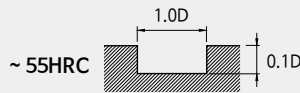
단위 : mm

Order Number	날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	생크 Shank Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	생크 Shank Dia d	비고
2HCE 054 130 S06	5.4	13	50	6							
2HCE 055 130 S06	5.5	13	50	6							
2HCE 056 130 S06	5.6	13	50	6							
2HCE 057 130 S06	5.7	13	50	6							
2HCE 058 130 S06	5.8	13	50	6							
2HCE 059 130 S06	5.9	13	50	6							
2HCE 060 130 S06	6	13	50	6							
2HCE 060 130 O80	6	13	80	6							
2HCE 061 150 S08	6.1	15	70	8							
2HCE 062 150 S08	6.2	15	70	8							
2HCE 063 150 S08	6.3	15	70	8							
2HCE 064 150 S08	6.4	15	70	8							
2HCE 065 160 S08	6.5	16	60	8							
2HCE 070 160 S08	7	16	60	8							
2HCE 075 160 S08	7.5	16	60	8							
2HCE 080 190 S08	8	19	60	8							
2HCE 085 190 S10	8.5	19	70	10							
2HCE 090 190 S10	9	19	70	10							
2HCE 095 190 S10	9.5	19	70	10							
2HCE 100 220 S10	10	22	70	10							
2HCE 105 220 S12	10.5	22	75	12							
2HCE 110 220 S12	11	22	75	12							
2HCE 115 220 S12	11.5	22	75	12							
2HCE 120 260 S12	12	26	75	12							
2HCE 130 260 S14	13	26	80	14							
2HCE 140 260 S14	14	26	80	14							
2HCE 140 260 S16	14	26	90	16							
2HCE 150 350 S16	15	35	100	16							
2HCE 160 350 S16	16	35	100	16							
2HCE 170 350 S18	17	35	100	18							
2HCE 180 350 S18	18	35	100	18							
2HCE 200 400 S20	20	40	100	20							

홈절삭 Slotting

피삭재 Material	공구강 / 금형강 Tool steels / Mold steels SCM/HPM		합금강 / 프리하든강 Alloy Steels / Pre-hardened Steels NAK80 / KP4M		고경도강 Hardened Steels STAVAX / SKD11		열처리 / 고경도강 Heat-treated steels / Hardened Steels SKD11 / SKD61	
	30 ~ 40Hrc		40 ~ 45Hrc		45 ~ 55Hrc		55 ~ 62Hrc	
외경 Outside Diameter	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
∅0.1	50,000	150	45,000	150	40,000	135	33,000	75
∅0.2	50,000	195	45,000	173	40,000	143	33,000	90
∅0.3	50,000	285	45,000	210	40,000	173	33,000	105
∅0.4	50,000	353	45,000	270	40,000	210	33,000	135
∅0.5	50,000	555	45,000	420	40,000	330	33,000	210
∅0.6	50,000	705	45,000	540	40,000	428	30,000	240
∅0.8	50,000	900	40,000	660	30,000	443	25,000	278
∅0.9	49,000	983	39,000	780	27,800	495	22,700	308
∅1	48,000	1,125	38,000	855	25,500	540	20,500	323
∅2	33,300	1,275	26,000	1,020	17,500	630	14,500	390
∅3	21,800	1,275	17,300	1,020	11,500	630	9,500	390
∅4	16,700	1,320	13,200	1,050	8,800	660	7,200	405
∅5	15,700	1,500	12,500	1,208	8,300	750	6,400	428
∅6	13,100	1,425	10,350	1,155	6,900	720	5,300	420
∅8	9,880	1,395	7,800	1,080	5,200	668	4,000	383
∅10	7,800	1,275	6,150	1,020	4,100	623	3,200	360
∅12	6,650	1,275	5,250	1,020	3,500	623	2,650	360
∅16	5,540	1,170	4,340	915	2,600	540	1,840	270
∅18	5,540	1,170	4,340	915	2,600	540	1,840	270
∅20	4,640	1,080	4,340	855	2,100	450	1,460	270

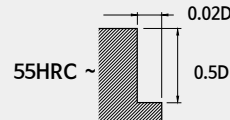
절입량
Depth of Cut



측면절삭 Side Cutting

피삭재 Material	공구강 / 금형강 Tool steels / Mold steels SCM/HPM		합금강 / 프리하든강 Alloy Steels / Pre-hardened Steels NAK80 / KP4M		고경도강 Hardened Steels STAVAX / SKD11		열처리 / 고경도강 Heat-treated steels / Hardened Steels SKD11 / SKD61	
	30 ~ 40Hrc		40 ~ 45Hrc		45 ~ 55Hrc		55 ~ 62Hrc	
외경 Outside Diameter	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
∅1	48,000	788	38,000	615	25,500	383	20,500	233
∅2	33,300	900	26,000	728	17,500	450	14,500	278
∅3	21,800	900	17,300	728	11,500	450	9,500	278
∅4	16,700	938	13,200	750	8,800	469	7,200	289
∅5	15,700	1088	12,500	863	8,300	533	6,400	308
∅6	13,100	1013	10,350	825	6,900	518	5,300	300
∅8	9,880	990	7,800	773	5,200	476	4,000	274
∅10	7,800	900	6,150	728	4,100	443	3,200	255
∅12	6,650	900	5,250	728	3,500	443	2,650	255
∅16	5,540	750	4,340	660	2,600	398	1,840	255
∅18	5,540	750	4,200	660	2,450	398	1,650	225
∅20	4,640	713	3,650	600	2,100	375	1,460	221

절입량
Depth of Cut



- 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(∅1이하 사용시 진동 허용 관리 5μm이내 일것.)
- 에어브로, 절삭유, 오일미스트쿨러를추천하며, 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 (∅1 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.