

- 중저경도강(HRc52이하), 프리하드강 계열, 탄소강, 금형강 등 가공
- JCRO 코팅 처리하여 넓은 영역의 피삭재 가공에 적합합니다.
- 고정밀 공차 적용으로 초정밀 가공에 적합합니다.
- 코너R 형상을 날부치핑이 적도록 설계하였습니다.
- 다양한 코너R과 유효장으로 맞춤 가공이 가능합니다.
- 항절력이 높은 미립자 초경합금(0.5 μ m)을 채택, 엔드밀의 파손을 최소화

Endmills for various work materials(~HRc52), pre-hardened steels, carbon steels, mold steels

- Optimum for various work materials by JCRO coating.
- High precise edge tolerance.
- Designed for minimizing edge chipping by corner R shape.
- Various corner R and flute length for wide range application.
- Minimize fracturing by high TRS fine(0.5 μ m) WC grade.



R0.05 ~ 0.5 R1 ~ 1.5 R2 ~ 4 472P

Condition	D Size	D Tolerance
$\phi D \neq \phi d$	$\phi 1 \sim 16$	$+0 \sim -0.01\text{mm}$

Condition	D Size	D Tolerance
$\phi D = \phi d$	$\phi 4 \sim 12$	$-0.005 \sim -0.015\text{mm}$
	$\phi 12.1 \sim 25$	$-0.01 \sim -0.02\text{mm}$

단위 : mm

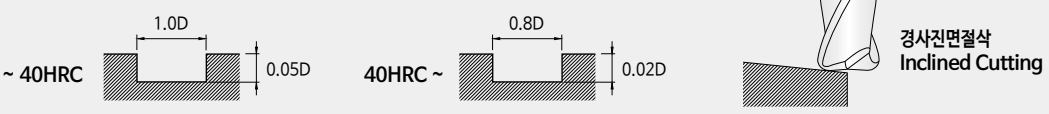
Order Number	날경 Diameter D×R	날장 Length of cut L1	전장 Overall Length L	샙크 Shank Dia d	비고	Order Number	날경 Diameter D×R	날장 Length of cut L1	전장 Overall Length L	샙크 Shank Dia d	비고
4NCRG 010 0005 S04	1 X R0.05	2.5	45	4		4NCRG 060 005 080	6 X R0.5	13	80	6	
4NCRG 010 001 S04	1 X R0.1	2.5	45	4		4NCRG 060 010 060	6 X R1	11	60	6	
4NCRG 010 002 S04	1 X R0.2	2.5	45	4		4NCRG 060 010 080	6 X R1	13	80	6	
4NCRG 010 003 S04	1 X R0.3	2.5	45	4		4NCRG 060 015 060	6 X R1.5	11	60	6	
4NCRG 015 0005 S04	1.5 X R0.05	4	45	4		4NCRG 060 015 080	6 X R1.5	13	80	6	
4NCRG 015 001 S04	1.5 X R0.1	4	45	4		4NCRG 060 020 060	6 X R2	11	60	6	
4NCRG 015 002 S04	1.5 X R0.2	4	45	4		4NCRG 060 020 080	6 X R2	13	80	6	
4NCRG 015 003 S04	1.5 X R0.3	4	45	4		4NCRG 080 001 070	8 X R0.1	16	70	8	
4NCRG 015 005 S04	1.5 X R0.5	4	45	4		4NCRG 080 001 090	8 X R0.1	19	90	8	
4NCRG 020 0005 S04	2 X R0.05	6	45	4		4NCRG 080 002 070	8 X R0.2	16	70	8	
4NCRG 020 001 S04	2 X R0.1	6	45	4		4NCRG 080 002 090	8 X R0.2	19	90	8	
4NCRG 020 002 S04	2 X R0.2	6	45	4		4NCRG 080 003 070	8 X R0.3	16	70	8	
4NCRG 020 003 S04	2 X R0.3	6	45	4		4NCRG 080 003 090	8 X R0.3	19	90	8	
4NCRG 020 005 S04	2 X R0.5	6	45	4		4NCRG 080 005 070	8 X R0.5	16	70	8	
4NCRG 025 001 S04	2.5 X R0.1	6	50	4		4NCRG 080 005 090	8 X R0.5	19	90	8	
4NCRG 025 002 S04	2.5 X R0.2	6	50	4		4NCRG 080 005 110	8 X R0.5	19	110	8	
4NCRG 025 003 S04	2.5 X R0.3	6	50	4		4NCRG 080 010 070	8 X R1	16	70	8	
4NCRG 025 005 S04	2.5 X R0.5	6	50	4		4NCRG 080 010 090	8 X R1	19	90	8	
4NCRG 030 001 S06	3 X R0.1	8	60	6		4NCRG 080 010 110	8 X R1	19	110	8	
4NCRG 030 002 S06	3 X R0.2	8	60	6		4NCRG 080 015 070	8 X R1.5	16	70	8	
4NCRG 030 003 S06	3 X R0.3	8	60	6		4NCRG 080 015 090	8 X R1.5	19	90	8	
4NCRG 030 005 S06	3 X R0.5	8	60	6		4NCRG 080 015 110	8 X R1.5	19	110	8	
4NCRG 030 010 S06	3 X R1	8	60	6		4NCRG 080 020 070	8 X R2	16	70	8	
4NCRG 040 001 060	4 X R0.1	9	60	4		4NCRG 080 020 090	8 X R2	19	90	8	
4NCRG 040 001 080	4 X R0.1	9	80	4		4NCRG 080 020 110	8 X R2	19	110	8	
4NCRG 040 001 S06	4 X R0.1	10	70	6		4NCRG 080 025 090	8 X R2.5	19	90	8	
4NCRG 040 002 060	4 X R0.2	9	60	4		4NCRG 100 001 075	10 X R0.1	19	75	10	
4NCRG 040 002 080	4 X R0.2	9	80	4		4NCRG 100 001 100	10 X R0.1	22	100	10	
4NCRG 040 002 S06	4 X R0.2	10	70	6		4NCRG 100 002 075	10 X R0.2	19	75	10	
4NCRG 040 003 060	4 X R0.3	9	60	4		4NCRG 100 002 100	10 X R0.2	22	100	10	
4NCRG 040 003 080	4 X R0.3	9	80	4		4NCRG 100 003 075	10 X R0.3	19	75	10	
4NCRG 040 003 S06	4 X R0.3	10	70	6		4NCRG 100 003 100	10 X R0.3	22	100	10	
4NCRG 040 005 060	4 X R0.5	9	60	4		4NCRG 100 005 075	10 X R0.5	19	75	10	
4NCRG 040 005 080	4 X R0.5	9	80	4		4NCRG 100 005 100	10 X R0.5	22	100	10	
4NCRG 040 005 S06	4 X R0.5	10	70	6		4NCRG 100 005 120	10 X R0.5	22	120	10	
4NCRG 040 010 060	4 X R1	9	60	4		4NCRG 100 010 075	10 X R1	19	75	10	
4NCRG 040 010 080	4 X R1	9	80	4		4NCRG 100 010 100	10 X R1	22	100	10	
4NCRG 040 010 S06	4 X R1	10	70	6		4NCRG 100 010 120	10 X R1	22	120	10	
4NCRG 050 001 S06	5 X R0.1	13	75	6		4NCRG 100 015 075	10 X R1.5	19	75	10	
4NCRG 050 002 S06	5 X R0.2	13	75	6		4NCRG 100 015 100	10 X R1.5	22	100	10	
4NCRG 050 003 S06	5 X R0.3	13	75	6		4NCRG 100 015 120	10 X R1.5	22	120	10	
4NCRG 050 005 S06	5 X R0.5	13	75	6		4NCRG 100 020 075	10 X R2	19	75	10	
4NCRG 050 010 S06	5 X R1	13	75	6		4NCRG 100 020 100	10 X R2	22	100	10	
4NCRG 060 001 060	6 X R0.1	11	60	6		4NCRG 100 020 120	10 X R2	22	120	10	
4NCRG 060 001 080	6 X R0.1	13	80	6		4NCRG 100 025 075	10 X R2.5	19	75	10	
4NCRG 060 002 060	6 X R0.2	11	60	6		4NCRG 100 025 100	10 X R2.5	22	100	10	
4NCRG 060 002 080	6 X R0.2	13	80	6		4NCRG 100 025 120	10 X R2.5	22	120	10	
4NCRG 060 003 060	6 X R0.3	11	60	6		4NCRG 100 030 100	10 X R3	22	100	10	
4NCRG 060 003 080	6 X R0.3	13	80	6		4NCRG 120 002 080	12 X R0.2	22	80	12	
4NCRG 060 005 060	6 X R0.5	11	60	6		4NCRG 120 002 110	12 X R0.2	26	110	12	

단위 : mm

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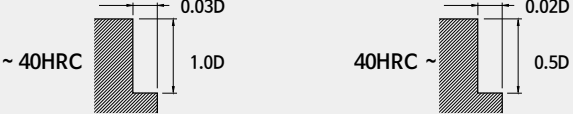
홈절삭 Slotting

파삭재 Material	공구강/ 금형강 Tool steels / Mold steels				프리하든강 Prehardened Steels				고경도강 Hardened Steels			
경도 Hardness	30 ~ 40HRC				40 ~ 50HRC				45 ~ 55HRC			
외경 Outside Diameter	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 0.4	42,500	562	0.020	0.4	38,250	268	0.008	0.32	34,000	107	0.008	0.32
ø 0.5	42,500	643	0.025	0.5	38,250	306	0.01	0.4	34,000	122	0.01	0.4
ø 0.6	42,500	723	0.03	0.6	38,250	344	0.012	0.48	34,000	138	0.012	0.48
ø 0.8	42,500	803	0.04	0.8	38,250	383	0.016	0.64	25,500	153	0.016	0.64
ø 1	40,800	1,992	0.05	1	32,300	949	0.02	0.8	21,675	379	0.02	0.8
ø 2	28,305	2,378	0.1	2	22,100	1,132	0.04	1.6	14,875	453	0.04	1.6
ø 3	18,530	2,410	0.15	3	14,705	1,148	0.06	2.4	9,775	648	0.06	2.4
ø 4	14,195	2,474	0.2	4	11,220	1,178	0.08	3.2	7,480	689	0.08	3.2
ø 5	13,345	2,635	0.25	5	10,625	1,255	0.1	4	7,055	716	0.1	4
ø 6	11,135	2,570	0.3	6	8,798	1,224	0.12	4.8	5,865	743	0.12	4.8
ø 8	8,398	2,345	0.4	8	6,630	1,117	0.16	6.4	4,420	695	0.16	6.4
ø 10	6,630	2,185	0.5	10	5,228	1,040	0.2	8	3,485	662	0.2	8
ø 12	5,653	2,185	0.6	12	4,463	1,040	0.24	9.6	2,975	655	0.24	9.6

절입량 Depth of Cut												
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측면절삭 Side Cutting

파삭재 Material	공구강/ 금형강 Tool steels / Mold steels				프리하든강 Prehardened Steels				고경도강 Hardened Steels			
경도 Hardness	30 ~ 40HRC				40 ~ 45HRC				45 ~ 55HRC			
외경 Outside Diameter	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 0.4	42,500	236	0.4	0.01	38,250	212	0.2	0.01	34,000	127	0.20	0.01
ø 0.5	42,500	261	0.5	0.015	38,250	235	0.25	0.01	34,000	141	0.25	0.01
ø 0.6	42,500	263	0.6	0.018	38,250	236	0.30	0.012	34,000	142	0.30	0.012
ø 0.8	42,500	427	0.8	0.024	34,000	384	0.40	0.016	25,500	231	0.40	0.016
ø 1	40,800	833	1	0.03	32,300	750	0.50	0.02	21,675	450	0.50	0.02
ø 2	28,305	1,224	2	0.06	22,100	1,102	1.00	0.04	14,875	661	1.00	0.04
ø 3	18,530	1,250	3	0.09	14,705	1,125	1.50	0.06	9,775	675	1.50	0.06
ø 4	14,195	1,275	4	0.12	11,220	1,148	2.00	0.08	7,480	689	2.00	0.08
ø 5	13,345	1,479	5	0.15	10,625	1,331	2.50	0.1	7,055	799	2.50	0.1
ø 6	11,135	1,377	6	0.18	8,798	1,239	3.00	0.12	5,865	744	3.00	0.12
ø 8	8,398	1,346	8	0.24	6,630	1,212	4.00	0.16	4,420	727	4.00	0.16
ø 10	6,630	1,224	10	0.3	5,228	1,102	5.00	0.2	3,485	661	5.00	0.2
ø 12	5,653	1,200	12	0.36	4,463	1,100	6.00	0.24	2,975	635	6.00	0.24

절입량 Depth of Cut												
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- HRC52 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜 주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대30% 이하로 줄이십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 상기 절삭조건표는 2날 기준이며, 4날시 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 30%까지 UP 해주십시오.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭조건은 참고 수치이며 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 피 삭재와 절삭 형상을 위한 적절한 쿨런트 사용과 가공시 발열, 발화에 주의 하십시오.

- When milling workpiece is over HRC 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.
- The parameters on the table is based on 2 flutes. For using 4 flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- For groove milling, set up the Ae value by considering of corner radius value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use the adequate coolant for work material and machining geometry and note for heat and ignition.