

Your specials are our standards.

Carbide endmill, drill, router for composite material

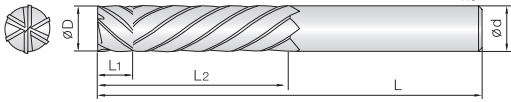
Advanced nano diamond coated of
tool for CFRP, GFRP, glass/carbon fiber, graphite, etc.



3&4&6CPR

3~6Flutes Compression Router for Composite

3~6날 복합소재 가공용 라우터



- 강화플라스틱(CFRP, GFRP), 유리/탄소섬유, 그래파이트(흑연) 등 비철 비금속 계열의 다양한 복합소재 전용 라우터
- 측벽가공시 공작물의 떠올림 현상이 없습니다.
- 피삭재에 버가 발생하지 않습니다.
- 코팅피막의 경도가 높아 내마모성이 우수합니다.
- 마찰계수가 낮은 다이아몬드 코팅을 적용하여 흡착현상을 최소화하였습니다.
- Router for CFRP, GFRP, glass/carbon fiber, graphite, nonferrous and non-metallic materials.**
- No up-moving work material at wall cutting.
- No burr in work materials.
- Excellent wear resistance by applying high hardness coating layer.
- Minimize built up edge by low friction diamond coating technology.

3 4 6 WC 미립자 GTAC Coating NANO DIA. Coating DI -0.01-0.025 30° Helix Angle Shield Edge CUTTING DATA 41P

D Size	D Tolerance
Ø 6 ~ 12	-0.01 ~ -0.025mm

Order Number GTAC코팅 GTAC Coating	날경 Diameter D	날장 Length of cut L1	날장 Length of cut L2	전장 Overall Length L	생크 Shank Dia d	비고	Order Number 다이아코팅 DIA Coating	날경 Diameter D	날장 Length of cut L1	날장 Length of cut L2	전장 Overall Length L	생크 Shank Dia d	비고
3CPR 060 200 S06	6	5	20	70	6		4CPR 060 200 S06	6	5	20	70	6	
3CPR 080 250 S08	8	5	25	80	8		6CPR 080 250 S08	8	5	25	80	8	
3CPR 100 270 S10	10	6	27	80	10		6CPR 100 270 S10	10	6	27	80	10	
3CPR 120 300 S12	12	6	30	80	12		6CPR 120 300 S12	12	6	30	80	12	

FOR COMPOSITE

6~16CPO

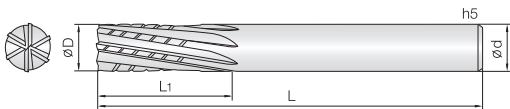
6~16Flutes Router for Composite

6~16날 복합소재 가공용 라우터

A Type



B Type

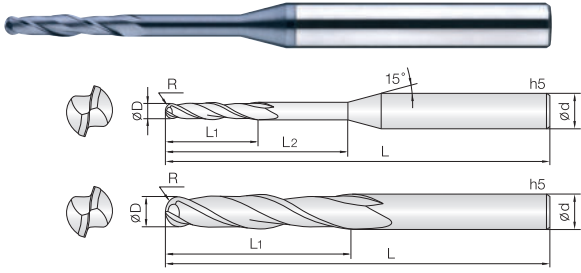


- 강화플라스틱(CFRP, GFRP), 유리/탄소섬유, 그래파이트(흑연) 등 비철비금속계열의 다양한 복합소재 전용 라우터
- 다양한 복합소재의 황삭가공시 뛰어난 성능을 발휘합니다
- A type은 밑날의 수가 많아 슬로팅 작업에 최적입니다.
- B type은 밑날이 2날로서 수직 및 수평가공시 탁월한 성능을 발휘합니다.
- 코팅피막의 경도가 높아 내마모성이 우수합니다.
- 마찰계수가 낮은 다이아몬드 코팅을 적용하여 흡착현상을 최소화하였습니다.
- Router for CFRP, GFRP, glass/carbon fiber, graphite, nonferrous and non-metallic materials.**
- Outstanding performance in roughing of various composite materials.
- A type has many bottom edges and optimized for slotting.
- B type has two bottom edges and excellent performance in vertical, horizontal machining.
- Excellent wear resistance by applying high hardness coating layer.
- Minimize built up edge by low friction diamond coating technology.

6 16 WC 미립자 NANO DIA. Coating DI +0-0.01 DI -0.01-0.025 30° Helix Angle Shield Edge CUTTING DATA 41P

D Size	D Tolerance
Ø 2 ~ 5	+0 ~ -0.01mm
Ø 6 ~ 12	-0.005 ~ -0.02mm

Order Number	날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	타입 Type	생크 Shank Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	타입 Type	생크 Shank Dia d	비고
6CPOA 020 070 S04	2	7	40	A	4		12CPOA 080 250 S08	8	25	80	A	8	
6CPOB 020 070 S04	2	7	40	B	4		12CPOB 080 250 S08	8	25	80	B	8	
6CPOA 030 120 S04	3	12	50	A	4		14CPOA 100 270 S10	10	27	80	A	10	
6CPOB 030 120 S04	3	12	50	B	4		14CPOB 100 270 S10	10	27	80	B	10	
8CPOA 040 160 S04	4	16	60	A	4		16CPOA 120 300 S12	12	30	80	A	12	
8CPOB 040 160 S04	4	16	60	B	4		16CPOB 120 300 S12	12	30	80	B	12	
10CPOA 050 200 S06	5	20	60	A	6								
10CPOB 050 200 S06	5	20	60	B	6								
10CPOA 060 200 S06	6	20	70	A	6								
10CPOB 060 200 S06	6	20	70	B	6								



- 그래파이트(흑연), HRC48 이하의 고경도강, 프리하든강, 공구강, 주철등 다양한 피삭재 가공
- ALTiN 코팅을 적용하여 절삭저항이 적으며, 내마모성이 우수합니다.
- 긴날장으로 설계하여, 깊은 측벽가공이 많은 흑연 가공에 가장 적합합니다.
- 미립자 초경합금을 채택하여 다양한 비철합금 및 목업의 피삭재 영역에 적용이 가능합니다.
- Endmill for various work materials, graphite, hardened steel (HRC~48), pre-hardened steel, tool steel and cast iron.
- Excellent performance with low cutting force by ALTiN coating.
- Long flute length optimized for deep-side wall machining of graphite.
- Applied fine WC grade optimized for various non-ferrous and non-metallic work materials.



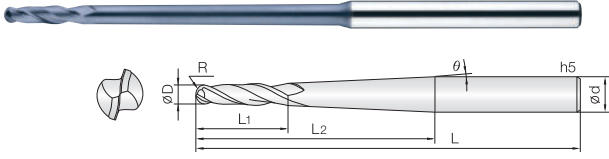
0.25 ~ 2.5R 3R ~ 6R 8R ~ 12.5R

42P

D Size	D Tolerance
Ø 0.5 ~ 5	+0 ~ -0.01mm
Ø 6 ~ 12	-0.005 ~ -0.015mm
Ø 16 ~ 25	-0.01 ~ -0.02mm

단위: mm

Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고	Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고
2GBE 005 020 S04	0.25R X 0.5	2	-	50	4		2GBE 050 250 S06	2.5R X 5	25	-	90	6	
2GBE 005 050 S04	0.25R X 0.5	2	5	50	4		2GBE 050 500 S06	2.5R X 5	25	50	110	6	
2GBE 010 050 S04	0.5R X 1	5	-	60	4		2GBE 060 250 110	3R X 6	25	-	110	6	
2GBE 010 050 S06	0.5R X 1	5	-	60	6		2GBE 060 300 150	3R X 6	30	-	150	6	
2GBE 010 100 S04	0.5R X 1	5	10	60	4		2GBE 060 300 200	3R X 6	30	-	200	6	
2GBE 010 100 S06	0.5R X 1	5	10	60	6		2GBE 060 300 220	3R X 6	30	-	220	6	
2GBE 010 150 S04	0.5R X 1	5	15	60	4		2GBE 080 350 110	4R X 8	35	-	110	8	
2GBE 010 200 S04	0.5R X 1	5	20	60	4		2GBE 080 400 150	4R X 8	40	-	150	8	
2GBE 010 250 S04	0.5R X 1	5	25	70	4		2GBE 080 400 200	4R X 8	40	-	200	8	
2GBE 010 300 S04	0.5R X 1	5	30	80	4		2GBE 080 400 220	4R X 8	40	-	220	8	
2GBE 010 350 S04	0.5R X 1	5	35	80	4		2GBE 100 400 120	5R X 10	40	-	120	10	
2GBE 010 400 S04	0.5R X 1	5	40	90	4		2GBE 100 450 150	5R X 10	45	-	150	10	
2GBE 015 080 S06	0.75R X 1.5	8	-	60	6		2GBE 100 450 200	5R X 10	45	-	200	10	
2GBE 015 100 S04	0.75R X 1.5	8	10	60	4		2GBE 100 450 230	5R X 10	45	-	230	10	
2GBE 015 150 S04	0.75R X 1.5	8	15	60	4		2GBE 120 500 130	6R X 12	50	-	130	12	
2GBE 015 150 S06	0.75R X 1.5	8	15	60	6		2GBE 120 500 150	6R X 12	50	-	150	12	
2GBE 015 200 S04	0.75R X 1.5	8	20	60	4		2GBE 120 550 200	6R X 12	55	-	200	12	
2GBE 015 250 S04	0.75R X 1.5	8	25	70	4		2GBE 120 550 250	6R X 12	55	-	250	12	
2GBE 015 300 S04	0.75R X 1.5	8	30	80	4		2GBE 160 600 160	8R X 16	60	-	160	16	
2GBE 015 350 S04	0.75R X 1.5	8	35	80	4		2GBE 160 650 200	8R X 16	65	-	200	16	
2GBE 015 400 S04	0.75R X 1.5	8	40	90	4		2GBE 160 650 250	8R X 16	65	-	250	16	
2GBE 020 100 S04	1R X 2	10	-	60	4		2GBE 160 700 320	8R X 16	70	-	320	16	
2GBE 020 100 S06	1R X 2	10	-	70	6		2GBE 200 700 160	10R X 20	70	-	160	20	
2GBE 020 150 S04	1R X 2	10	15	60	4		2GBE 200 750 200	10R X 20	75	-	200	20	
2GBE 020 200 S04	1R X 2	10	20	60	4		2GBE 200 750 250	10R X 20	75	-	250	20	
2GBE 020 200 S06	1R X 2	10	20	70	6		2GBE 200 900 320	10R X 20	90	-	320	20	
2GBE 020 250 S04	1R X 2	10	25	70	4		2GBE 250 1000 250	12.5R X 25	100	-	250	25	
2GBE 020 300 S04	1R X 2	10	30	80	4								
2GBE 020 350 S04	1R X 2	10	35	80	4								
2GBE 020 400 S04	1R X 2	10	40	90	4								
2GBE 020 500 S04	1R X 2	10	50	100	4								
2GBE 020 600 S04	1R X 2	10	60	100	4								
2GBE 025 200 S04	1.25R X 2.5	10	20	70	4								
2GBE 030 150 100	1.5R X 3	15	-	100	3								
2GBE 030 150 S06	1.5R X 3	15	-	70	6								
2GBE 030 200 S04	1.5R X 3	15	20	70	4								
2GBE 030 300 S04	1.5R X 3	15	30	80	4								
2GBE 030 300 S06	1.5R X 3	15	30	75	6								
2GBE 030 400 S04	1.5R X 3	15	40	90	4								
2GBE 030 400 S06	1.5R X 3	15	40	90	6								
2GBE 030 500 S04	1.5R X 3	15	50	100	4								
2GBE 030 600 S04	1.5R X 3	15	60	100	4								
2GBE 040 200 080	2R X 4	20	-	80	4								
2GBE 040 200 100	2R X 4	20	-	100	4								
2GBE 040 200 130	2R X 4	20	-	130	4								
2GBE 040 200 S06	2R X 4	20	-	75	6								
2GBE 040 350 S06	2R X 4	20	35	90	6								
2GBE 040 450 S06	2R X 4	20	45	100	6								
2GBE 050 250 100	2.5R X 5	25	-	100	5								
2GBE 050 250 130	2.5R X 5	25	-	130	5								



- 그래파이트(흑연), HRC48 이하의 고경도강, 프리하든강, 공구강, 주철등 다양한 피삭재 가공
- ALTIN 코팅을 적용하여 절삭저항이 적으며, 내마모성이 우수합니다.
- 긴날장으로 설계하여, 깊은 측벽가공이 많은 흑연 가공에 가장 적합합니다.
- 미립자 초경합금을 채택하여 다양한 비철합금 및 목업의 피삭재 영역에 적용이 가능합니다.
- Endmill for various work materials, graphite, hardened steel(HRC~48), pre-hardened steel, tool steel and cast iron.
- Excellent performance with low cutting force by ALTIN coating.
- Long flute length optimized for deep-side wall machining of graphite.
- Applied fine WC grade optimized for various non-ferrous and non-metallic work materials.

2

WC
마립자

ALTIN
Coating

R
± 0.005

R
± 0.01

30°
Helix Angle

CUTTING
DATA

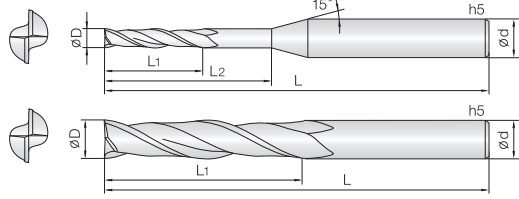
0.5R~2.5R 3R~6R 43P

D Size	D Tolerance
Ø 1 ~ 5	+0 ~ -0.01mm
Ø 6 ~ 12	-0.005 ~ -0.015mm

단위: mm

Order Number	날경 Diameter R × D	각도 Angle θ	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샤희크 Shank Dia d	비고	Order Number	날경 Diameter R × D	각도 Angle θ	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샤희크 Shank Dia d	비고
2TGB 010 003 200	0.5R X 1	0°30	4	20	60	4									
2TGB 010 003 300	0.5R X 1	0°30	4	30	75	4									
2TGB 010 003 400	0.5R X 1	0°30	4	40	90	4									
2TGB 010 010 250	0.5R X 1	1°	4	25	60	4									
2TGB 010 010 350	0.5R X 1	1°	4	35	75	4									
2TGB 010 010 500	0.5R X 1	1°	4	50	100	4									
2TGB 015 003 300	0.75R X 1.5	0°30	6	30	75	4									
2TGB 015 003 400	0.75R X 1.5	0°30	6	40	80	4									
2TGB 015 003 500	0.75R X 1.5	0°30	6	50	100	4									
2TGB 015 010 300	0.75R X 1.5	1°	6	30	75	4									
2TGB 015 010 500	0.75R X 1.5	1°	6	50	100	4									
2TGB 015 010 600	0.75R X 1.5	1°	6	60	100	4									
2TGB 020 003 400	1R X 2	0°30	8	40	90	4									
2TGB 020 003 500	1R X 2	0°30	8	50	100	4									
2TGB 020 003 700	1R X 2	0°30	8	70	130	4									
2TGB 020 010 600	1R X 2	1°	8	60	110	6									
2TGB 020 010 900	1R X 2	1°	8	90	150	6									
2TGB 030 003 700	1.5R X 3	0°30	10	70	120	6									
2TGB 030 010 900	1.5R X 3	1°	10	90	150	6									
2TGB 040 003 700	2R X 4	0°30	14	70	120	6									
2TGB 040 010 800	2R X 4	1°	14	80	150	6									
2TGB 050 003 800	2.5R X 5	0°30	16	80	130	6									
2TGB 060 003 1000	3R X 6	0°30	16	100	150	8									
2TGB 060 010 1000	3R X 6	1°	16	100	150	10									
2TGB 080 010 1000	4R X 8	1°	20	100	150	12									
2TGB 100 010 830	5R X 10	1°	25	83	200	12									
2TGB 120 010 1100	6R X 12	1°	30	110	200	16									

FOR GRAPHITE



- 그래파이트(흑연), HRC48 이하의고경도강, 프리하든강, 공구강, 주철등 다양한 피삭재 가공
- ALTiN 코팅을 적용하여 절삭저항이 적으며, 내마모성이 우수합니다.
- 긴날장으로 설계하여, 깊은 측벽가공이 많은 흑연 가공에 가장 적합합니다.
- 미립자 초경합금을 채택하여 HRC48 이하의 다양한 합금강의 피삭재 영역에 적용이 가능합니다.

Endmill for various work materials, graphite, hardened steel (HRC~48), pre-hardened steel, tool steel and cast iron.

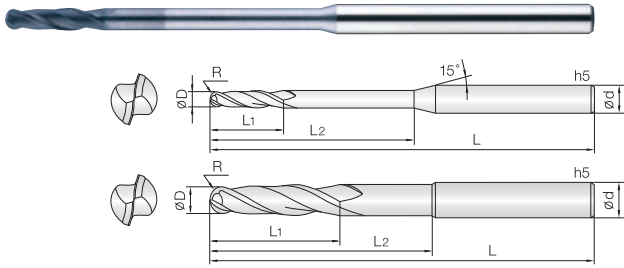
- Excellent performance with low cutting force by ALTiN coating.
- Long flute length optimized for deep-side wall machining of graphite.
- Applied fine WC grade optimized for various alloy steels applications, below HRC48.

D Size	D Tolerance
Ø 0.5 ~ 5	+0 ~ -0.01mm
Ø 6 ~ 12	-0.01 ~ -0.025mm
Ø 16 ~ 20	-0.015 ~ -0.03mm

단위: mm

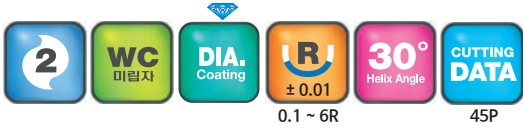
Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고
2GEM 005 020 S04	0.5	2	-	50	4								
2GEM 010 050 S04	1	5	-	60	4								
2GEM 010 100 S04	1	5	10	60	4								
2GEM 010 100 S06	1	5	10	60	6								
2GEM 010 150 S04	1	5	15	60	4								
2GEM 010 200 S04	1	5	20	60	4								
2GEM 010 250 S04	1	5	25	70	4								
2GEM 015 100 S04	1.5	10	-	60	4								
2GEM 015 150 S04	1.5	8	15	60	4								
2GEM 015 200 S04	1.5	8	20	60	4								
2GEM 015 200 S06	1.5	8	20	60	6								
2GEM 015 250 S04	1.5	8	25	70	4								
2GEM 020 100 S04	2	10	-	60	4								
2GEM 020 150 S04	2	10	15	60	4								
2GEM 020 200 S04	2	10	20	60	4								
2GEM 020 200 S06	2	10	20	60	6								
2GEM 020 250 S04	2	10	25	70	4								
2GEM 020 300 S04	2	10	30	80	4								
2GEM 030 150 S04	3	15	-	70	4								
2GEM 030 250 S04	3	15	25	75	4								
2GEM 030 300 S06	3	15	30	75	6								
2GEM 040 200 100	4	20	-	100	4								
2GEM 040 400 S06	4	20	40	100	6								
2GEM 050 250 100	5	25	-	100	5								
2GEM 060 300 110	6	30	-	110	6								
2GEM 060 300 150	6	30	-	150	6								
2GEM 080 400 150	8	40	-	150	8								
2GEM 100 450 150	10	45	-	150	10								
2GEM 100 500 200	10	50	-	200	10								
2GEM 120 600 150	12	60	-	150	12								
2GEM 120 600 200	12	60	-	200	12								
2GEM 160 600 130	16	60	-	130	16								
2GEM 160 700 160	16	70	-	160	16								
2GEM 160 700 200	16	70	-	200	16								
2GEM 200 800 160	20	80	-	160	20								
2GEM 200 900 200	20	90	-	200	20								
2GEM 200 1200 320	20	120	-	320	20								

FOR GRAPHITE



- 그래파이트(흑연), 강화플라스틱, 탄소섬유 등 비철, 비금속 계열의 다양한 피삭재 전용 엔드밀
- CVD 순수다이아몬드코팅을적용하여내마모성이우수합니다.
- 다양한피삭재의형상에적용하도록규격을다양화하여, 넓은가공 영역에뛰어난수명과성능을발휘합니다.

- Endmills for Graphite, reinforced plastic, carbon fiber, Non-ferrous and non-metallic materials.
- Excellent wear resistance by applying qualified CVD diamond coating.
- Wide range products prepared for various work shape and excellent performance.

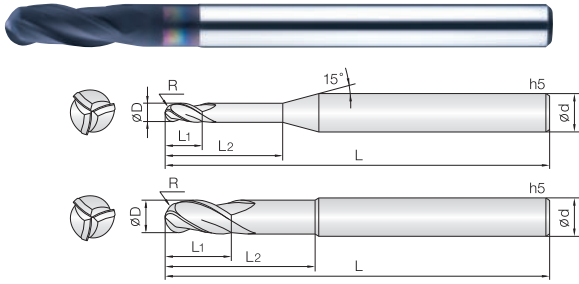


D Size	D Tolerance
ø 0.2 ~ 12	+0 ~ -0.02mm

단위: mm

Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고	Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고
2DBE 002 010 S04	0.1R X 0.2	1	-	45	4		2DBE 010 500 S04	0.5R X 1	3	50	80	4	
2DBE 003 012 S04	0.15R X 0.3	1.2	-	45	4		2DBE 015 045 S04	0.75R X 1.5	4.5	-	60	4	
2DBE 003 020 S04	0.15R X 0.3	1.2	2	45	4		2DBE 015 080 S04	0.75R X 1.5	4.5	8	80	4	
2DBE 004 015 S04	0.2R X 0.4	1.5	-	45	4		2DBE 015 100 S04	0.75R X 1.5	4.5	10	80	4	
2DBE 004 020 S04	0.2R X 0.4	1.5	2	45	4		2DBE 015 120 S04	0.75R X 1.5	4.5	12	80	4	
2DBE 004 030 S04	0.2R X 0.4	1.5	3	45	4		2DBE 015 150 S04	0.75R X 1.5	4.5	15	80	4	
2DBE 004 040 S04	0.2R X 0.4	1.5	4	45	4		2DBE 015 180 S04	0.75R X 1.5	4.5	18	80	4	
2DBE 004 050 S04	0.2R X 0.4	1.5	5	45	4		2DBE 015 200 S04	0.75R X 1.5	4.5	20	80	4	
2DBE 004 080 S04	0.2R X 0.4	1.5	8	45	4		2DBE 015 250 S04	0.75R X 1.5	4.5	25	80	4	
2DBE 004 100 S04	0.2R X 0.4	1.5	10	45	4		2DBE 015 300 S04	0.75R X 1.5	4.5	30	80	4	
2DBE 005 020 S04	0.25R X 0.5	2	-	45	4		2DBE 015 350 S04	0.75R X 1.5	4.5	35	80	4	
2DBE 005 030 S04	0.25R X 0.5	2	3	45	4		2DBE 015 400 S04	0.75R X 1.5	4.5	40	80	4	
2DBE 005 040 S04	0.25R X 0.5	2	4	45	4		2DBE 020 060 S04	1R X 2	6	-	60	4	
2DBE 005 050 S04	0.25R X 0.5	2	5	45	4		2DBE 020 100 S04	1R X 2	6	10	80	4	
2DBE 005 060 S04	0.25R X 0.5	2	6	45	4		2DBE 020 150 S04	1R X 2	6	15	80	4	
2DBE 005 080 S04	0.25R X 0.5	2	8	45	4		2DBE 020 200 S04	1R X 2	6	20	80	4	
2DBE 005 100 S04	0.25R X 0.5	2	10	45	4		2DBE 020 250 S04	1R X 2	6	25	80	4	
2DBE 005 120 S04	0.25R X 0.5	2	12	45	4		2DBE 020 300 S04	1R X 2	6	30	80	4	
2DBE 006 020 S04	0.3R X 0.6	2	-	45	4		2DBE 020 350 S04	1R X 2	6	35	80	4	
2DBE 006 030 S04	0.3R X 0.6	2	3	45	4		2DBE 020 400 S04	1R X 2	6	40	100	4	
2DBE 006 040 S04	0.3R X 0.6	2	4	45	4		2DBE 020 450 S04	1R X 2	6	45	100	4	
2DBE 006 050 S04	0.3R X 0.6	2	5	45	4		2DBE 020 500 S04	1R X 2	6	50	100	4	
2DBE 006 060 S04	0.3R X 0.6	2	6	45	4		2DBE 020 600 S04	1R X 2	6	60	100	4	
2DBE 006 080 S04	0.3R X 0.6	2	8	45	4		2DBE 020 700 S04	1R X 2	6	70	100	4	
2DBE 006 100 S04	0.3R X 0.6	2	10	45	4		2DBE 030 150 100	1.5R X 3	8	15	100	3	
2DBE 006 120 S04	0.3R X 0.6	2	12	45	4		2DBE 030 080 S04	1.5R X 3	8	-	60	4	
2DBE 006 150 S04	0.3R X 0.6	2	15	45	4		New 2DBE 030 080 S06	1.5R X 3	3	8	60	6	
2DBE 006 200 S04	0.3R X 0.6	2	20	45	4		2DBE 030 150 S04	1.5R X 3	8	15	100	4	
2DBE 008 030 S04	0.4R X 0.8	3	-	45	4		2DBE 030 200 S04	1.5R X 3	8	20	100	4	
2DBE 008 040 S04	0.4R X 0.8	3	4	45	4		2DBE 030 250 S04	1.5R X 3	8	25	100	4	
2DBE 008 050 S04	0.4R X 0.8	3	5	45	4		2DBE 030 300 S04	1.5R X 3	8	30	100	4	
2DBE 008 060 S04	0.4R X 0.8	3	6	45	4		2DBE 030 350 S04	1.5R X 3	8	35	100	4	
2DBE 008 080 S04	0.4R X 0.8	3	8	45	4		2DBE 030 400 S04	1.5R X 3	8	40	100	4	
2DBE 008 100 S04	0.4R X 0.8	3	10	45	4		2DBE 030 500 S04	1.5R X 3	8	50	100	4	
2DBE 008 150 S04	0.4R X 0.8	3	15	45	4		2DBE 030 600 S04	1.5R X 3	8	60	100	4	
2DBE 008 200 S04	0.4R X 0.8	3	20	45	4		2DBE 030 700 S04	1.5R X 3	8	70	100	4	
2DBE 010 030 S04	0.5R X 1	3	-	60	4		2DBE 040 040 060	2R X 4	4	-	60	4	
2DBE 010 040 S04	0.5R X 1	3	4	60	4		2DBE 040 160 060	2R X 4	16	-	60	4	
2DBE 010 050 S04	0.5R X 1	3	5	60	4		2DBE 040 160 080	2R X 4	16	-	80	4	
2DBE 010 060 S04	0.5R X 1	3	6	60	4		2DBE 040 300 080	2R X 4	16	30	80	4	
2DBE 010 080 S04	0.5R X 1	3	8	60	4		2DBE 040 160 100	2R X 4	16	-	100	4	
2DBE 010 100 S04	0.5R X 1	3	10	60	4		2DBE 040 400 100	2R X 4	16	40	100	4	
2DBE 010 120 S04	0.5R X 1	3	12	60	4		2DBE 040 160 130	2R X 4	16	-	130	4	
2DBE 010 150 S04	0.5R X 1	3	15	60	4		2DBE 040 400 130	2R X 4	16	40	130	4	
2DBE 010 200 S04	0.5R X 1	3	20	60	4		2DBE 040 160 150	2R X 4	16	-	150	4	
2DBE 010 250 S04	0.5R X 1	3	25	80	4		2DBE 040 500 150	2R X 4	16	50	150	4	
2DBE 010 300 S04	0.5R X 1	3	30	80	4		2DBE 050 160 110	2.5R X 5	16	-	110	5	
2DBE 010 350 S04	0.5R X 1	3	35	80	4		2DBE 050 400 110	2.5R X 5	16	40	110	5	
2DBE 010 400 S04	0.5R X 1	3	40	80	4		2DBE 050 200 S06	2.5R X 5	16	20	110	6	
2DBE 010 450 S04	0.5R X 1	3	45	80	4		2DBE 050 400 S06	2.5R X 5	16	40	110	6	

FOR GRAPHITE



- 그라파이트(흑연), 강화플라스틱, 탄소섬유 등 비철,비금속 계열의 다양한 피삭재 전용 엔드밀
- CVD 순수 다이아몬드 코팅을 적용하여 내마모성이 우수합니다.
- 다양한 피삭재의 형상에 적용하도록 규격을 다양화하여, 넓은 가공 영역에 뛰어난 수명과 성능을 발휘합니다.
- Endmills for Graphite, reinforced plastic, carbon fiber, Non-ferrous and non-metallic materials.
- Excellent wear resistance by applying qualified CVD diamond coating.
- Wide range products prepared for various work shape and excellent performance.

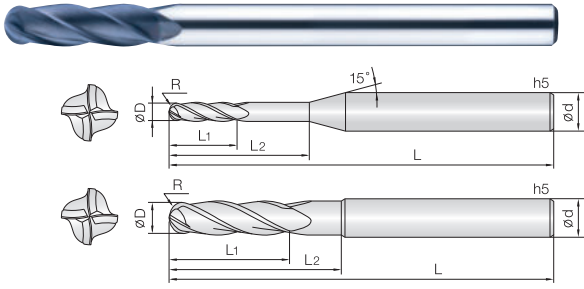


D Size	D Tolerance
ø 1 ~ 12	+0 ~ -0.02mm

단위: mm

Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고	Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고
3DBE 010 030 S04	0.5R X 1	3	-	60	4		3DBE 060 500 150	3R X 6	16	50	150	6	
3DBE 010 050 S04	0.5R X 1	3	5	60	4		3DBE 060 500 180	3R X 6	16	50	180	6	
3DBE 010 100 S04	0.5R X 1	3	10	60	4		3DBE 080 400 110	4R X 8	20	40	110	8	
3DBE 010 150 S04	0.5R X 1	3	15	60	4		3DBE 080 500 150	4R X 8	20	50	150	8	
3DBE 010 200 S04	0.5R X 1	3	20	60	4		3DBE 100 400 110	5R X 10	22	40	110	10	
3DBE 010 250 S04	0.5R X 1	3	25	80	4		3DBE 100 600 160	5R X 10	22	60	160	10	
3DBE 010 300 S04	0.5R X 1	3	30	80	4		3DBE 120 500 110	6R X 12	25	50	110	12	
3DBE 010 350 S04	0.5R X 1	3	35	80	4		3DBE 120 500 160	6R X 12	25	50	160	12	
3DBE 010 400 S04	0.5R X 1	3	40	80	4		3DBE 120 600 200	6R X 12	25	60	200	12	
3DBE 010 450 S04	0.5R X 1	3	45	80	4								
3DBE 010 500 S04	0.5R X 1	3	50	80	4								
3DBE 015 045 S04	0.75R X 1.5	4.5	-	60	4								
3DBE 015 100 S04	0.75R X 1.5	4.5	10	80	4								
3DBE 015 150 S04	0.75R X 1.5	4.5	15	80	4								
3DBE 015 200 S04	0.75R X 1.5	4.5	20	80	4								
3DBE 015 250 S04	0.75R X 1.5	4.5	25	80	4								
3DBE 015 300 S04	0.75R X 1.5	4.5	30	80	4								
3DBE 015 350 S04	0.75R X 1.5	4.5	35	80	4								
3DBE 015 400 S04	0.75R X 1.5	4.5	40	80	4								
3DBE 015 450 S04	0.75R X 1.5	4.5	45	80	4								
3DBE 015 500 S04	0.75R X 1.5	4.5	50	80	4								
3DBE 020 060 S04	1R X 2	6	-	60	4								
3DBE 020 100 S04	1R X 2	6	10	80	4								
3DBE 020 150 S04	1R X 2	6	15	80	4								
3DBE 020 200 S04	1R X 2	6	20	80	4								
3DBE 020 250 S04	1R X 2	6	25	80	4								
3DBE 020 300 S04	1R X 2	6	30	80	4								
3DBE 020 350 S04	1R X 2	6	35	80	4								
3DBE 020 400 S04	1R X 2	6	40	100	4								
3DBE 020 500 S04	1R X 2	6	50	100	4								
3DBE 020 600 S04	1R X 2	6	60	100	4								
3DBE 020 700 S04	1R X 2	6	70	100	4								
3DBE 030 150 100	1.5R X 3	8	15	100	3								
3DBE 030 080 S04	1.5R X 3	8	-	60	4								
3DBE 030 150 S04	1.5R X 3	8	15	100	4								
3DBE 030 200 S04	1.5R X 3	8	20	100	4								
3DBE 030 300 S04	1.5R X 3	8	30	100	4								
3DBE 030 400 S04	1.5R X 3	8	40	100	4								
3DBE 030 500 S04	1.5R X 3	8	50	100	4								
3DBE 040 160 080	2R X 4	16	-	80	4								
3DBE 040 300 080	2R X 4	16	30	80	4								
3DBE 040 160 100	2R X 4	16	-	100	4								
3DBE 040 400 100	2R X 4	16	40	100	4								
3DBE 040 160 130	2R X 4	16	-	130	4								
3DBE 040 400 130	2R X 4	16	40	130	4								
3DBE 050 160 110	2.5R X 5	16	-	110	5								
3DBE 050 400 110	2.5R X 5	16	40	110	5								
3DBE 060 250 110	3R X 6	16	25	110	6								
3DBE 060 400 110	3R X 6	16	40	110	6								
3DBE 060 300 150	3R X 6	16	30	150	6								

FOR GRAPHITE



- 그라파이트(흑연), 강화플라스틱, 탄소섬유 등 비철, 비금속 계열의 다양한 피삭재 전용 엔드밀
- CVD 순수다이아몬드 코팅을 적용하여 내마모성이 우수합니다.
- 다양한 피삭재의 형상에 적용하도록 규격을 다양화하여, 넓은 가공 영역에 뛰어난 수명과 성능을 발휘합니다.

- Endmills for Graphite, reinforced plastic, carbon fiber, Non-ferrous and non-metallic materials.
- Excellent wear resistance by applying qualified CVD diamond coating.
- Wide range products prepared for various work shape and excellent performance.

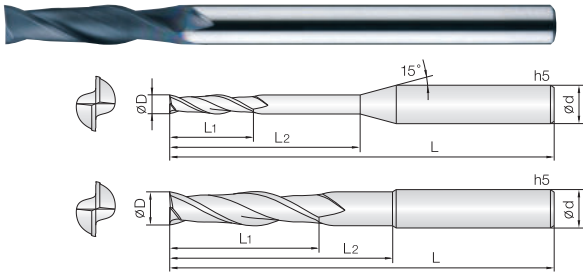


D Size	D Tolerance
ø1 ~ 12	+0 ~ -0.02mm

단위: mm

Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고	Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	생크 Shank Dia d	비고
4DBE 010 030 S04	0.5R X 1	3	-	60	4		4DBE 100 400 160	5R X 10	22	40	160	10	
4DBE 010 050 S04	0.5R X 1	3	5	60	4		4DBE 100 500 200	5R X 10	22	50	200	10	
4DBE 010 100 S04	0.5R X 1	3	10	60	4		4DBE 120 500 110	6R X 12	25	50	110	12	
4DBE 010 150 S04	0.5R X 1	3	15	60	4		4DBE 120 500 160	6R X 12	25	50	160	12	
4DBE 010 200 S04	0.5R X 1	3	20	60	4		4DBE 120 600 200	6R X 12	25	60	200	12	
4DBE 010 250 S04	0.5R X 1	3	25	60	4								
4DBE 010 300 S04	0.5R X 1	3	30	80	4								
4DBE 010 350 S04	0.5R X 1	3	35	80	4								
4DBE 010 400 S04	0.5R X 1	3	40	80	4								
4DBE 010 450 S04	0.5R X 1	3	45	80	4								
4DBE 010 500 S04	0.5R X 1	3	50	80	4								
4DBE 015 045 S04	0.75R X 1.5	4.5	-	60	4								
4DBE 015 100 S04	0.75R X 1.5	4.5	10	60	4								
4DBE 015 150 S04	0.75R X 1.5	4.5	15	60	4								
4DBE 015 200 S04	0.75R X 1.5	4.5	20	60	4								
4DBE 015 250 S04	0.75R X 1.5	4.5	25	60	4								
4DBE 015 300 S04	0.75R X 1.5	4.5	30	80	4								
4DBE 015 350 S04	0.75R X 1.5	4.5	35	80	4								
4DBE 015 400 S04	0.75R X 1.5	4.5	40	80	4								
4DBE 015 450 S04	0.75R X 1.5	4.5	45	80	4								
4DBE 015 500 S04	0.75R X 1.5	4.5	50	80	4								
4DBE 020 060 S04	1R X 2	6	-	60	4								
4DBE 020 100 S04	1R X 2	6	10	80	4								
4DBE 020 200 S04	1R X 2	6	20	80	4								
4DBE 020 300 S04	1R X 2	6	30	80	4								
4DBE 020 400 S04	1R X 2	6	40	80	4								
4DBE 020 500 S04	1R X 2	6	50	100	4								
4DBE 020 600 S04	1R X 2	6	60	100	4								
4DBE 020 700 S04	1R X 2	6	70	100	4								
4DBE 030 080 S04	1.5R X 3	8	-	60	4								
4DBE 030 150 S04	1.5R X 3	8	15	100	4								
4DBE 030 200 S04	1.5R X 3	8	20	100	4								
4DBE 030 300 S04	1.5R X 3	8	30	100	4								
4DBE 030 400 S04	1.5R X 3	8	40	100	4								
4DBE 030 500 S04	1.5R X 3	8	50	100	4								
4DBE 030 600 S04	1.5R X 3	8	60	100	4								
4DBE 030 700 S04	1.5R X 3	8	70	100	4								
4DBE 040 160 060	2R X 4	16	-	60	4								
4DBE 040 160 080	2R X 4	16	-	80	4								
4DBE 040 160 100	2R X 4	16	-	100	4								
4DBE 040 160 130	2R X 4	16	-	130	4								
4DBE 060 250 080	3R X 6	16	25	80	6								
4DBE 060 250 110	3R X 6	16	25	110	6								
4DBE 060 300 150	3R X 6	16	30	150	6								
4DBE 080 300 080	4R X 8	20	30	80	8								
4DBE 080 300 110	4R X 8	20	30	110	8								
4DBE 080 350 150	4R X 8	20	35	150	8								
4DBE 080 400 200	4R X 8	20	40	200	8								
4DBE 100 350 080	5R X 10	22	35	80	10								
4DBE 100 350 110	5R X 10	22	35	110	10								

FOR GRAPHITE



- 그래파이트(흑연), 강화플라스틱, 탄소섬유 등 비철,비금속 계열의 다양한 피삭재 전용 엔드밀
- CVD 순수다이아몬드 코팅을 적용하여 내마모성이 우수합니다.
- 다양한 피삭재의 형상에 적용하도록 규격을 다양화하여, 넓은 가공 영역에 뛰어난 수명과 성능을 발휘합니다.
- Endmills for Graphite, reinforced plastic, carbon fiber, Non-ferrous and non-metallic materials.
- Excellent wear resistance by applying qualified CVD diamond coating.
- Wide range products prepared for various work shape and excellent performance.



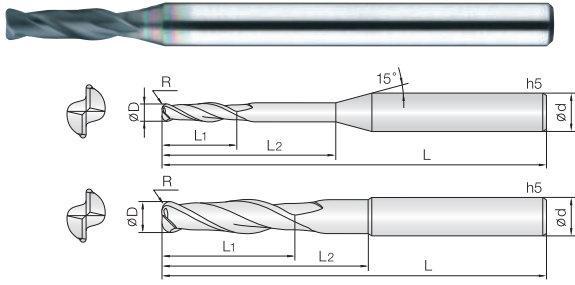
D Size	D Tolerance
ø 0.2 ~ 12	+0 ~ -0.02mm

단위: mm

Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샤크 Dia d	비고
2DEM 002 004 S04	0.2	0.4	-	45	4	
2DEM 003 006 S04	0.3	0.6	-	45	4	
2DEM 003 020 S04	0.3	0.6	2	45	4	
2DEM 003 040 S04	0.3	0.6	4	45	4	
2DEM 004 008 S04	0.4	0.8	-	45	4	
2DEM 004 020 S04	0.4	0.8	2	45	4	
2DEM 004 040 S04	0.4	0.8	4	45	4	
2DEM 005 010 S04	0.5	1	-	45	4	
2DEM 005 030 S04	0.5	1	3	45	4	
2DEM 005 050 S04	0.5	1	5	45	4	
2DEM 006 012 S04	0.6	1.2	-	45	4	
2DEM 006 030 S04	0.6	1.2	3	45	4	
2DEM 006 050 S04	0.6	1.2	5	45	4	
2DEM 007 015 S04	0.7	1.5	-	45	4	
2DEM 007 040 S04	0.7	1.5	4	45	4	
2DEM 007 060 S04	0.7	1.5	6	45	4	
2DEM 007 080 S04	0.7	1.5	8	45	4	
2DEM 008 020 S04	0.8	2	-	45	4	
2DEM 009 025 S04	0.9	2.5	-	45	4	
2DEM 010 030 S04	1	3	-	60	4	
2DEM 010 030 045	1	3	-	45	4	
2DEM 010 050 S04	1	3	5	60	4	
2DEM 010 100 S04	1	3	10	60	4	
2DEM 010 150 S04	1	3	15	60	4	
2DEM 010 200 S04	1	3	20	60	4	
2DEM 010 250 S04	1	3	25	60	4	
2DEM 010 300 S04	1	3	30	60	4	
2DEM 015 060 S04	1.5	6	-	60	4	
2DEM 015 100 S04	1.5	6	10	60	4	
2DEM 015 150 S04	1.5	6	15	60	4	
2DEM 015 200 S04	1.5	6	20	60	4	
2DEM 015 250 S04	1.5	6	25	60	4	
2DEM 015 300 S04	1.5	6	30	60	4	
2DEM 020 060 S04	2	6	-	45	4	
2DEM 020 080 S04	2	8	-	80	4	
2DEM 020 120 S04	2	8	12	80	4	
2DEM 020 150 S04	2	8	15	80	4	
2DEM 020 200 S04	2	8	20	80	4	
2DEM 020 250 S04	2	8	25	80	4	
2DEM 020 300 S04	2	8	30	80	4	
2DEM 020 400 S04	2	8	40	80	4	
2DEM 020 450 S04	2	8	45	80	4	
2DEM 020 500 S04	2	8	50	80	4	
2DEM 030 090 S06	3	9	-	50	6	
2DEM 030 120 S04	3	12	-	80	4	
2DEM 030 200 S04	3	12	20	80	4	
2DEM 030 250 S04	3	12	25	80	4	
2DEM 030 300 S04	3	12	30	80	4	
2DEM 030 400 S04	3	12	40	80	4	
2DEM 030 500 S04	3	12	50	80	4	

Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샤크 Dia d	비고
2DEM 040 120 S06	4	12	-	50	6	
2DEM 040 160 080	4	16	-	80	4	
2DEM 050 150 S06	5	15	-	60	6	
2DEM 050 200 S06	5	20	-	110	6	
2DEM 060 180 S06	6	18	-	60	6	
2DEM 060 250 110	6	25	-	110	6	
2DEM 060 250 150	6	25	-	150	6	
2DEM 080 240 S08	8	24	-	70	8	
2DEM 080 400 150	8	25	40	150	8	
2DEM 100 250 S10	10	25	-	80	10	
2DEM 100 500 160	10	25	50	160	10	
2DEM 120 250 S12	12	25	-	80	12	
2DEM 120 600 160	12	25	60	160	12	

FOR GRAPHITE



- 그라파이트(흑연), 강화플라스틱, 탄소섬유 등 비철, 비금속 계열의 다양한 피삭재 전용 엔드밀
- CVD 순수 다이아몬드 코팅을 적용하여 내마모성이 우수합니다.
- 다양한 피삭재의 형상에 적용하도록 규격을 다양화하여, 넓은 가공 영역에 뛰어난 수명과 성능을 발휘합니다.
- Endmills for Graphite, reinforced plastic, carbon fiber, Non-ferrous and non-metallic materials.
- Excellent wear resistance by applying qualified CVD diamond coating.
- Wide range products prepared for various work shape and excellent performance.



R0.02 ~ 1

44P

D Size	D Tolerance
Ø 0.2 ~ 6	+0 ~ -0.02mm

단위: mm

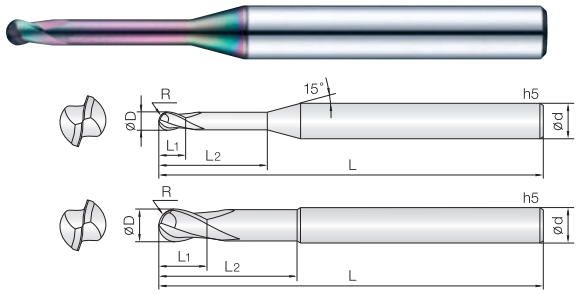
Order Number	날경 Diameter D×R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고	Order Number	날경 Diameter D×R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고
2DCR 002 0002 015	0.2 X R0.02	0.5	1.5	60	4		2DCR 015 0015 030	1.5 X R0.15	3	-	60	4	
2DCR 003 0002 015	0.3 X R0.02	0.6	1.5	60	4		2DCR 015 0015 050	1.5 X R0.15	3	5	60	4	
2DCR 003 0002 030	0.3 X R0.02	0.6	3	60	4		2DCR 015 0015 100	1.5 X R0.15	3	10	60	4	
2DCR 003 0002 045	0.3 X R0.02	0.6	4.5	60	4		2DCR 015 0015 150	1.5 X R0.15	3	15	60	4	
2DCR 003 0002 060	0.3 X R0.02	0.6	6	60	4		2DCR 015 0015 200	1.5 X R0.15	3	20	60	4	
2DCR 004 0002 020	0.4 X R0.02	0.8	2	60	4		2DCR 015 002 030	1.5 X R0.2	3	-	60	4	
2DCR 004 0002 040	0.4 X R0.02	0.8	4	60	4		2DCR 015 002 050	1.5 X R0.2	3	5	60	4	
2DCR 004 0002 060	0.4 X R0.02	0.8	6	60	4		2DCR 015 002 100	1.5 X R0.2	3	10	60	4	
2DCR 004 0002 080	0.4 X R0.02	0.8	8	60	4		2DCR 015 002 150	1.5 X R0.2	3	15	60	4	
2DCR 005 0005 010	0.5 X R0.05	1	-	60	4		2DCR 015 002 200	1.5 X R0.2	3	20	60	4	
2DCR 005 0005 025	0.5 X R0.05	1	2.5	60	4		2DCR 015 003 030	1.5 X R0.3	3	-	60	4	
2DCR 005 0005 035	0.5 X R0.05	1	3.5	60	4		2DCR 015 003 050	1.5 X R0.3	3	5	60	4	
2DCR 005 0005 050	0.5 X R0.05	1	5	60	4		2DCR 015 003 100	1.5 X R0.3	3	10	60	4	
2DCR 005 0005 075	0.5 X R0.05	1	7.5	60	4		2DCR 015 003 150	1.5 X R0.3	3	15	60	4	
2DCR 005 0005 100	0.5 X R0.05	1	10	60	4		2DCR 015 003 200	1.5 X R0.3	3	20	60	4	
2DCR 006 0005 012	0.6 X R0.05	1.2	-	60	4		2DCR 020 0005 035	2 X R0.05	3.5	-	60	4	
2DCR 006 0005 030	0.6 X R0.05	1.2	3	60	4		2DCR 020 0005 060	2 X R0.05	3.5	6	60	4	
2DCR 006 0005 060	0.6 X R0.05	1.2	6	60	4		2DCR 020 0005 120	2 X R0.05	3.5	12	60	4	
2DCR 006 0005 090	0.6 X R0.05	1.2	9	60	4		2DCR 020 0005 180	2 X R0.05	3.5	18	60	4	
2DCR 006 0005 120	0.6 X R0.05	1.2	12	60	4		2DCR 020 0005 250	2 X R0.05	3.5	25	60	4	
2DCR 008 0005 016	0.8 X R0.05	1.6	-	60	4		2DCR 020 0005 300	2 X R0.05	3.5	30	60	4	
2DCR 008 0005 040	0.8 X R0.05	1.6	4	60	4		2DCR 020 002 035	2 X R0.2	3.5	-	60	4	
2DCR 008 0005 080	0.8 X R0.05	1.6	8	60	4		2DCR 020 002 060	2 X R0.2	3.5	6	60	4	
2DCR 008 0005 100	0.8 X R0.05	1.6	10	60	4		2DCR 020 002 120	2 X R0.2	3.5	12	60	4	
2DCR 008 0005 160	0.8 X R0.05	1.6	16	60	4		2DCR 020 002 180	2 X R0.2	3.5	18	60	4	
2DCR 010 0005 020	1 X R0.05	2	-	60	4		2DCR 020 002 250	2 X R0.2	3.5	25	60	4	
2DCR 010 0005 050	1 X R0.05	2	5	60	4		2DCR 020 002 300	2 X R0.2	3.5	30	60	4	
2DCR 010 0005 100	1 X R0.05	2	10	60	4		2DCR 020 003 035	2 X R0.3	3.5	-	60	4	
2DCR 010 0005 150	1 X R0.05	2	15	60	4		2DCR 020 003 060	2 X R0.3	3.5	6	60	4	
2DCR 010 0005 200	1 X R0.05	2	20	60	4		2DCR 020 003 120	2 X R0.3	3.5	12	60	4	
2DCR 010 001 020	1 X R0.1	2	-	60	4		2DCR 020 003 180	2 X R0.3	3.5	18	60	4	
2DCR 010 001 050	1 X R0.1	2	5	60	4		2DCR 020 003 250	2 X R0.3	3.5	25	60	4	
2DCR 010 001 100	1 X R0.1	2	10	60	4		2DCR 020 003 300	2 X R0.3	3.5	30	60	4	
2DCR 010 001 150	1 X R0.1	2	15	60	4		2DCR 020 005 035	2 X R0.5	3.5	-	60	4	
2DCR 010 001 200	1 X R0.1	2	20	60	4		2DCR 020 005 060	2 X R0.5	3.5	6	60	4	
2DCR 010 002 020	1 X R0.2	2	-	60	4		2DCR 020 005 120	2 X R0.5	3.5	12	60	4	
2DCR 010 002 050	1 X R0.2	2	5	60	4		2DCR 020 005 180	2 X R0.5	3.5	18	60	4	
2DCR 010 002 100	1 X R0.2	2	10	60	4		2DCR 020 005 250	2 X R0.5	3.5	25	60	4	
2DCR 010 002 150	1 X R0.2	2	15	60	4		2DCR 020 005 300	2 X R0.5	3.5	30	60	4	
2DCR 010 002 200	1 X R0.2	2	20	60	4		2DCR 030 0005 040	3 X R0.05	4	-	80	4	
2DCR 015 0005 030	1.5 X R0.05	3	-	60	4		2DCR 030 0005 100	3 X R0.05	4	10	80	4	
2DCR 015 0005 050	1.5 X R0.05	3	5	60	4		2DCR 030 0005 200	3 X R0.05	4	20	80	4	
2DCR 015 0005 100	1.5 X R0.05	3	10	60	4		2DCR 030 0005 300	3 X R0.05	4	30	80	4	
2DCR 015 0005 150	1.5 X R0.05	3	15	60	4		2DCR 030 0005 400	3 X R0.05	4	40	80	4	
2DCR 015 0005 200	1.5 X R0.05	3	20	60	4		2DCR 030 002 040	3 X R0.2	4	-	80	4	
2DCR 015 001 030	1.5 X R0.1	3	-	60	4		2DCR 030 002 100	3 X R0.2	4	10	80	4	
2DCR 015 001 050	1.5 X R0.1	3	5	60	4		2DCR 030 002 200	3 X R0.2	4	20	80	4	
2DCR 015 001 100	1.5 X R0.1	3	10	60	4		2DCR 030 002 300	3 X R0.2	4	30	80	4	
2DCR 015 001 150	1.5 X R0.1	3	15	60	4		2DCR 030 002 400	3 X R0.2	4	40	80	4	
2DCR 015 001 200	1.5 X R0.1	3	20	60	4		2DCR 030 003 040	3 X R0.3	4	-	80	4	

FOR GRAPHITE

단위: mm

Order Number	날경 Diameter D×R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Dia d	비고	Order Number	날경 Diameter D×R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Dia d	비고
2DCR 030 003 100	3 X R0.3	4	10	80	4		2DCR 060 005 070	6 X R0.5	7	-	110	6	
2DCR 030 003 200	3 X R0.3	4	20	80	4		2DCR 060 005 200	6 X R0.5	7	20	110	6	
2DCR 030 003 300	3 X R0.3	4	30	80	4		2DCR 060 005 300	6 X R0.5	7	30	110	6	
2DCR 030 003 400	3 X R0.3	4	40	80	4		2DCR 060 005 500	6 X R0.5	7	50	110	6	
2DCR 030 005 040	3 X R0.5	4	-	80	4		2DCR 060 010 070	6 X R1	7	-	110	6	
2DCR 030 005 100	3 X R0.5	4	10	80	4		2DCR 060 010 200	6 X R1	7	20	110	6	
2DCR 030 005 200	3 X R0.5	4	20	80	4		2DCR 060 010 300	6 X R1	7	30	110	6	
2DCR 030 005 300	3 X R0.5	4	30	80	4		2DCR 060 010 500	6 X R1	7	50	110	6	
2DCR 030 005 400	3 X R0.5	4	40	80	4								
2DCR 030 010 040	3 X R1	4	-	80	4								
2DCR 030 010 100	3 X R1	4	10	80	4								
2DCR 030 010 200	3 X R1	4	20	80	4								
2DCR 030 010 300	3 X R1	4	30	80	4								
2DCR 030 010 400	3 X R1	4	40	80	4								
2DCR 040 0005 050	4 X R0.05	5	-	80	4								
2DCR 040 0005 150	4 X R0.05	5	15	80	4								
2DCR 040 0005 250	4 X R0.05	5	25	80	4								
2DCR 040 0005 400	4 X R0.05	5	40	80	4								
2DCR 040 002 050	4 X R0.2	5	-	80	4								
2DCR 040 002 150	4 X R0.2	5	15	80	4								
2DCR 040 002 250	4 X R0.2	5	25	80	4								
2DCR 040 002 400	4 X R0.2	5	40	80	4								
2DCR 040 005 050	4 X R0.5	5	-	80	4								
2DCR 040 005 150	4 X R0.5	5	15	80	4								
2DCR 040 005 250	4 X R0.5	5	25	80	4								
2DCR 040 005 400	4 X R0.5	5	40	80	4								
2DCR 040 010 050	4 X R1	5	-	80	4								
2DCR 040 010 150	4 X R1	5	15	80	4								
2DCR 040 010 250	4 X R1	5	25	80	4								
2DCR 040 010 400	4 X R1	5	40	80	4								
2DCR 050 0005 060	5 X R0.05	6	-	110	6								
2DCR 050 0005 150	5 X R0.05	6	15	110	6								
2DCR 050 0005 300	5 X R0.05	6	30	110	6								
2DCR 050 0005 500	5 X R0.05	6	50	110	6								
2DCR 050 002 060	5 X R0.2	6	-	110	6								
2DCR 050 002 150	5 X R0.2	6	15	110	6								
2DCR 050 002 300	5 X R0.2	6	30	110	6								
2DCR 050 002 500	5 X R0.2	6	50	110	6								
2DCR 050 005 060	5 X R0.5	6	-	110	6								
2DCR 050 005 150	5 X R0.5	6	15	110	6								
2DCR 050 005 300	5 X R0.5	6	30	110	6								
2DCR 050 005 500	5 X R0.5	6	50	110	6								
2DCR 060 0005 070	6 X R0.05	7	-	110	6								
2DCR 060 0005 200	6 X R0.05	7	20	110	6								
2DCR 060 0005 300	6 X R0.05	7	30	110	6								
2DCR 060 0005 500	6 X R0.05	7	50	110	6								
2DCR 060 002 070	6 X R0.2	7	-	110	6								
2DCR 060 002 200	6 X R0.2	7	20	110	6								
2DCR 060 002 300	6 X R0.2	7	30	110	6								
2DCR 060 002 500	6 X R0.2	7	50	110	6								

FOR GRAPHITE



- 알루미늄 및 알루미늄 합금, 동 및 동합금, 강화플라스틱 (CFRP), 유리/탄소섬유 등 비철 비금속 계열의 다양한 피삭재 전용 엔드밀
- 코팅피막에 경도가 높고 마찰계수가 낮은 Tetrabond TAC코팅을 적용하여 내마모성이 우수하며, 피삭재의 표면조도가 월등히 우수합니다.
- 고정밀 공차 적용으로 초정밀가공에 적합합니다.
- 항절력이 높은 미립자 초경합금 (0.5 μ m)을 채택, 엔드밀의 파손을 최소화.
- Endmills for Aluminum, Aluminum alloy, copper, copper alloy, CFRP, glass/carbon fiber, nonferrous and non-metallic materials.**
- Tetrabond TAC coating provides excellent work surface finish by high hardness and low friction.
- Minimize fracturing by high TRS fine (0.5 μ m) WC grade.
- High precise edge tolerance.



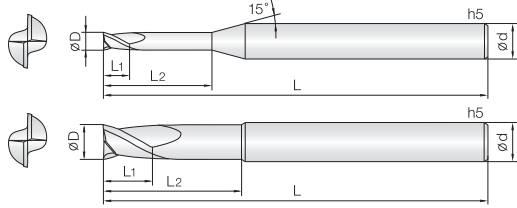
0.05 ~ 2.5R 3 ~ 6R 46P

D Size	D Tolerance
Ø 0.1 ~ 5	+0 ~ -0.01mm
Ø 6 ~ 12	-0.005 ~ -0.015mm

단위: mm

Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고	Order Number	날경 Diameter R × D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고
2DRB 001 003 S04	0.05R X 0.1	0.3	-	45	4		2DRB 030 160 S06	1.5R X 3	4	16	60	6	
2DRB 002 005 S04	0.1R X 0.2	0.5	-	45	4		2DRB 030 200 S06	1.5R X 3	4	20	60	6	
2DRB 002 010 S04	0.1R X 0.2	0.2	1	45	4		2DRB 030 250 S06	1.5R X 3	4	25	65	6	
2DRB 002 015 S04	0.1R X 0.2	0.2	1.5	45	4		2DRB 030 300 S06	1.5R X 3	4	30	70	6	
2DRB 002 020 S04	0.1R X 0.2	0.2	2	45	4		2DRB 030 400 S06	1.5R X 3	4	40	80	6	
2DRB 003 010 S04	0.15R X 0.3	0.3	1	45	4		2DRB 040 120 S06	2R X 4	5	12	50	6	
2DRB 003 015 S04	0.15R X 0.3	0.3	1.5	45	4		2DRB 040 160 S06	2R X 4	5	16	60	6	
2DRB 003 020 S04	0.15R X 0.3	0.3	2	45	4		2DRB 040 200 S06	2R X 4	5	20	60	6	
2DRB 004 010 S04	0.2R X 0.4	0.4	1	45	4		2DRB 040 250 S06	2R X 4	5	25	65	6	
2DRB 004 020 S04	0.2R X 0.4	0.4	2	45	4		2DRB 040 300 S06	2R X 4	5	30	70	6	
2DRB 004 030 S04	0.2R X 0.4	0.4	3	45	4		2DRB 050 200 S06	2.5R X 5	6	20	60	6	
2DRB 004 040 S04	0.2R X 0.4	0.4	4	45	4		2DRB 050 400 S06	2.5R X 5	6	40	80	6	
2DRB 004 050 S04	0.2R X 0.4	0.4	5	45	4		2DRB 060 200 S06	3R X 6	8	20	60	6	
2DRB 005 020 S04	0.25R X 0.5	0.5	2	45	4		2DRB 060 300 S06	3R X 6	8	30	90	6	
2DRB 005 040 S04	0.25R X 0.5	0.5	4	45	4		2DRB 080 200 S08	4R X 8	10	20	70	8	
2DRB 005 060 S04	0.25R X 0.5	0.5	6	45	4		2DRB 100 250 S10	5R X 10	12	25	80	10	
2DRB 005 080 S04	0.25R X 0.5	0.5	8	45	4		2DRB 120 250 S12	6R X 12	14	25	80	12	
2DRB 005 100 S04	0.25R X 0.5	0.5	10	45	4								
2DRB 006 020 S04	0.3R X 0.6	0.6	2	45	4								
2DRB 006 040 S04	0.3R X 0.6	0.6	4	45	4								
2DRB 006 060 S04	0.3R X 0.6	0.6	6	45	4								
2DRB 006 080 S04	0.3R X 0.6	0.6	8	45	4								
2DRB 006 100 S04	0.3R X 0.6	0.6	10	45	4								
2DRB 008 020 S04	0.4R X 0.8	0.8	2	45	4								
2DRB 008 040 S04	0.4R X 0.8	0.8	4	45	4								
2DRB 008 060 S04	0.4R X 0.8	0.8	6	45	4								
2DRB 008 080 S04	0.4R X 0.8	0.8	8	45	4								
2DRB 008 100 S04	0.4R X 0.8	0.8	10	45	4								
2DRB 008 120 S04	0.4R X 0.8	0.8	12	45	4								
2DRB 010 040 S04	0.5R X 1	1	4	45	4								
2DRB 010 060 S04	0.5R X 1	1	6	45	4								
2DRB 010 080 S04	0.5R X 1	1	8	45	4								
2DRB 010 100 S04	0.5R X 1	1	10	45	4								
2DRB 010 120 S04	0.5R X 1	1	12	45	4								
2DRB 010 160 S04	0.5R X 1	1	16	50	4								
2DRB 015 060 S04	0.75R X 1.5	1.5	6	45	4								
2DRB 015 080 S04	0.75R X 1.5	1.5	8	45	4								
2DRB 015 100 S04	0.75R X 1.5	1.5	10	45	4								
2DRB 015 120 S04	0.75R X 1.5	1.5	12	45	4								
2DRB 015 160 S04	0.75R X 1.5	1.5	16	50	4								
2DRB 015 200 S04	0.75R X 1.5	1.5	20	50	4								
2DRB 020 060 S04	1R X 2	3	6	45	4								
2DRB 020 080 S04	1R X 2	3	8	45	4								
2DRB 020 100 S04	1R X 2	3	10	45	4								
2DRB 020 120 S04	1R X 2	3	12	45	4								
2DRB 020 160 S04	1R X 2	3	16	50	4								
2DRB 020 200 S04	1R X 2	3	20	50	4								
2DRB 020 250 S04	1R X 2	3	25	60	4								
2DRB 020 300 S04	1R X 2	3	30	70	4								
2DRB 030 120 S06	1.5R X 3	4	12	50	6								

G-TAC



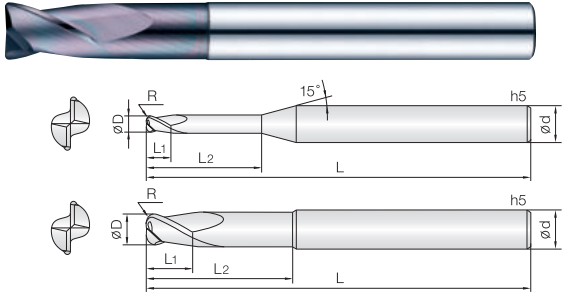
- 알루미늄 및 알루미늄 합금, 동 및 동합금, 강화플라스틱(CFRP), 유리/탄소섬유 등 비철 비금속 계열의 다양한 피삭재 전용 엔드밀
- 코팅피막에 경도가 높고 마찰계수가 낮은 Tetrabond TAC코팅을 적용하여 내마모성이 우수하며, 피삭재의 표면조도가 월등히 우수합니다.
- 인선부 강성을 보강하여 날부치핑을 최소화 하였습니다.
- 고정밀 공차 적용으로 초정밀가공에 적합합니다.
- Endmills for Aluminum, Aluminum alloy, copper, copper alloy, CFRP, glass/carbon fiber, nonferrous and non-metallic materials.
- Tetrabond TAC coating provides excellent work surface finish by high hardness and low friction.
- Reinforced edge design for preventing edge chipping.
- High precise edge tolerance.

D Size	D Tolerance
ø 0.1	+0 ~ -0.005mm
ø 0.2 ~ 5	+0 ~ -0.01mm
ø 6 ~ 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	샤크 Shank Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샤크 Shank Dia d	비고
2DRE 001 003 S04	0.1	0.3	-	45	4		2DRE 030 200 S06	3	4.5	20	60	6	
2DRE 001 005 S04	0.1	0.5	-	45	4		2DRE 030 250 S06	3	4.5	25	65	6	
2DRE 002 005 S04	0.2	0.5	-	45	4		2DRE 030 300 S06	3	4.5	30	70	6	
2DRE 002 010 S04	0.2	0.3	1	45	4		2DRE 030 400 S06	3	4.5	40	80	6	
2DRE 002 015 S04	0.2	0.3	1.5	45	4		2DRE 040 120 S06	4	6	12	50	6	
2DRE 002 020 S04	0.2	0.3	2	45	4		2DRE 040 160 S06	4	6	16	60	6	
2DRE 003 010 S04	0.3	0.5	1	45	4		2DRE 040 200 S06	4	6	20	60	6	
2DRE 003 015 S04	0.3	0.5	1.5	45	4		2DRE 040 250 S06	4	6	25	65	6	
2DRE 003 020 S04	0.3	0.5	2	45	4		2DRE 040 300 S06	4	6	30	70	6	
2DRE 004 010 S04	0.4	0.6	1	45	4		2DRE 040 400 S06	4	6	40	80	6	
2DRE 004 020 S04	0.4	0.6	2	45	4		2DRE 050 200 S06	5	6	20	60	6	
2DRE 004 030 S04	0.4	0.6	3	45	4		2DRE 050 400 S06	5	6	40	80	6	
2DRE 004 040 S04	0.4	0.6	4	45	4		2DRE 060 200 S06	6	8	20	60	6	
2DRE 004 050 S04	0.4	0.6	5	45	4		2DRE 060 300 S06	6	8	30	90	6	
2DRE 005 020 S04	0.5	0.7	2	45	4		2DRE 080 200 S08	8	12	20	70	8	
2DRE 005 040 S04	0.5	0.7	4	45	4		2DRE 100 250 S10	10	15	25	80	10	
2DRE 005 060 S04	0.5	0.7	6	45	4		2DRE 120 300 S12	12	18	30	80	12	
2DRE 005 080 S04	0.5	0.7	8	45	4								
2DRE 005 100 S04	0.5	0.7	10	45	4								
2DRE 006 020 S04	0.6	0.9	2	45	4								
2DRE 006 040 S04	0.6	0.9	4	45	4								
2DRE 006 060 S04	0.6	0.9	6	45	4								
2DRE 006 080 S04	0.6	0.9	8	45	4								
2DRE 006 100 S04	0.6	0.9	10	45	4								
2DRE 008 020 S04	0.8	1.2	2	45	4								
2DRE 008 040 S04	0.8	1.2	4	45	4								
2DRE 008 060 S04	0.8	1.2	6	45	4								
2DRE 008 080 S04	0.8	1.2	8	45	4								
2DRE 008 100 S04	0.8	1.2	10	45	4								
2DRE 008 120 S04	0.8	1.2	12	45	4								
2DRE 010 040 S04	1	1.5	4	45	4								
2DRE 010 060 S04	1	1.5	6	45	4								
2DRE 010 080 S04	1	1.5	8	45	4								
2DRE 010 100 S04	1	1.5	10	45	4								
2DRE 010 120 S04	1	1.5	12	45	4								
2DRE 010 160 S04	1	1.5	16	50	4								
2DRE 015 060 S04	1.5	2.3	6	45	4								
2DRE 015 080 S04	1.5	2.3	8	45	4								
2DRE 015 100 S04	1.5	2.3	10	45	4								
2DRE 015 120 S04	1.5	2.3	12	45	4								
2DRE 015 160 S04	1.5	2.3	16	50	4								
2DRE 015 200 S04	1.5	2.3	20	50	4								
2DRE 020 060 S04	2	3	6	45	4								
2DRE 020 080 S04	2	3	8	45	4								
2DRE 020 100 S04	2	3	10	45	4								
2DRE 020 120 S04	2	3	12	45	4								
2DRE 020 160 S04	2	3	16	50	4								
2DRE 020 200 S04	2	3	20	50	4								
2DRE 030 120 S06	3	4.5	12	50	6								
2DRE 030 160 S06	3	4.5	16	60	6								

G-TAC



- 알루미늄 및 알루미늄 합금, 동 및 동합금, 강화플라스틱 (CFRP), 유리/탄소섬유 등 비철 비금속 계열의 다양한 피삭재 전용 엔드밀
- 코팅피막에 경도가 높고 마찰계수가 낮은 Tetrabond TAC코팅을 적용하여 내마모성이 우수하며, 피삭재의 표면조도가 월등히 우수합니다.
- 인선부 강성을 보강하여 날부지평을 최소화 하였습니다.
- 안정적인 고정밀 공차 적용으로 초정밀가공에 적합합니다.
- Endmills for Aluminum, Aluminum alloy, copper, copper alloy, CFRP, glass/carbon fiber, nonferrous and non-metallic materials.
- Tetrabond TAC coating provides excellent work surface finish by high hardness and low friction.
- Reinforced edge design for preventing edge chipping.
- High precise edge tolerance.

2

WC
마립자

GTAC
Coating

R
± 0.005

R
± 0.01

30°
Helix Angle

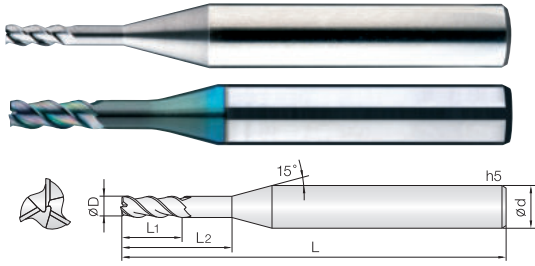
CUTTING
DATA

R0.1 ~ 0.5 R1 48P

D Size	D Tolerance
ø 1 ~ 4	+0 ~ -0.01mm
ø 6 ~ 12	-0.005 ~ -0.015mm

단위: mm

Order Number	날경 Diameter D × R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고	Order Number	날경 Diameter D × R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고
2DLC 010 001 040	1 X R0.1	1.5	4	45	4		2DLC 040 010 120	4 X R1	6	12	50	6	
2DLC 010 001 060	1 X R0.1	1.5	6	45	4		2DLC 040 010 160	4 X R1	6	16	60	6	
2DLC 010 001 080	1 X R0.1	1.5	8	45	4		2DLC 040 010 200	4 X R1	6	20	60	6	
2DLC 010 001 100	1 X R0.1	1.5	10	45	4		2DLC 040 010 250	4 X R1	6	25	65	6	
2DLC 010 002 040	1 X R0.2	1.5	4	45	4		2DLC 040 010 300	4 X R1	6	30	70	6	
2DLC 010 002 060	1 X R0.2	1.5	6	45	4		2DLC 060 003 200	6 X R0.3	9	20	60	6	
2DLC 010 002 080	1 X R0.2	1.5	8	45	4		2DLC 060 005 200	6 X R0.5	9	20	60	6	
2DLC 010 002 100	1 X R0.2	1.5	10	45	4		2DLC 060 010 200	6 X R1	9	20	60	6	
2DLC 015 001 060	1.5 X R0.1	2.3	6	45	4		2DLC 080 003 250	8 X R0.3	12	25	65	8	
2DLC 015 001 080	1.5 X R0.1	2.3	8	45	4		2DLC 080 005 250	8 X R0.5	12	25	65	8	
2DLC 015 001 100	1.5 X R0.1	2.3	10	45	4		2DLC 080 010 250	8 X R1	12	25	65	8	
2DLC 015 001 120	1.5 X R0.1	2.3	12	50	4		2DLC 100 005 300	10 X R0.5	15	30	70	10	
2DLC 015 002 060	1.5 X R0.2	2.3	6	45	4		2DLC 100 010 300	10 X R1	15	30	70	10	
2DLC 015 002 080	1.5 X R0.2	2.3	8	45	4		2DLC 120 005 320	12 X R0.5	18	32	80	12	
2DLC 015 002 100	1.5 X R0.2	2.3	10	45	4		2DLC 120 010 320	12 X R1	18	32	80	12	
2DLC 015 002 120	1.5 X R0.2	2.3	12	50	4								
2DLC 020 002 080	2 X R0.2	3	8	45	4								
2DLC 020 002 100	2 X R0.2	3	10	45	4								
2DLC 020 002 120	2 X R0.2	3	12	50	4								
2DLC 020 002 160	2 X R0.2	3	16	50	4								
2DLC 020 005 080	2 X R0.5	3	8	45	4								
2DLC 020 005 100	2 X R0.5	3	10	45	4								
2DLC 020 005 120	2 X R0.5	3	12	50	4								
2DLC 020 005 160	2 X R0.5	3	16	50	4								
2DLC 030 002 100	3 X R0.2	4.5	10	50	6								
2DLC 030 002 120	3 X R0.2	4.5	12	50	6								
2DLC 030 002 160	3 X R0.2	4.5	16	60	6								
2DLC 030 002 200	3 X R0.2	4.5	20	60	6								
2DLC 030 002 250	3 X R0.2	4.5	25	65	6								
2DLC 030 002 300	3 X R0.2	4.5	30	70	6								
2DLC 030 003 100	3 X R0.3	4.5	10	50	6								
2DLC 030 003 120	3 X R0.3	4.5	12	50	6								
2DLC 030 003 160	3 X R0.3	4.5	16	60	6								
2DLC 030 003 200	3 X R0.3	4.5	20	60	6								
2DLC 030 003 250	3 X R0.3	4.5	25	65	6								
2DLC 030 003 300	3 X R0.3	4.5	30	70	6								
2DLC 030 005 100	3 X R0.5	4.5	10	50	6								
2DLC 030 005 120	3 X R0.5	4.5	12	50	6								
2DLC 030 005 160	3 X R0.5	4.5	16	60	6								
2DLC 030 005 200	3 X R0.5	4.5	20	60	6								
2DLC 030 005 250	3 X R0.5	4.5	25	65	6								
2DLC 030 005 300	3 X R0.5	4.5	30	70	6								
2DLC 040 002 120	4 X R0.2	6	12	50	6								
2DLC 040 002 160	4 X R0.2	6	16	60	6								
2DLC 040 002 200	4 X R0.2	6	20	60	6								
2DLC 040 005 120	4 X R0.5	6	12	50	6								
2DLC 040 005 160	4 X R0.5	6	16	60	6								
2DLC 040 005 200	4 X R0.5	6	20	60	6								
2DLC 040 005 250	4 X R0.5	6	25	65	6								
2DLC 040 005 300	4 X R0.5	6	30	70	6								



- 알루미늄, 알루미늄 합금 등 비철 비금속 계열 전용 엔드밀
- 날부인선을 고광면 설계하여 절삭시 피삭재의 표면조도가 우수합니다.
- 다양한 작업에 맞추어 짧은 날장에 유효장을 적용하였습니다.
- 코팅피막에 경도가 높고 마찰계수가 낮은 Tetrabond TAC코팅을 적용하여 내마모성이 우수하며, 피삭재의 표면조도가 월등히 우수합니다.
- 2중 인선과 홈포켓을 깊게 설계하여 칩착현상을 최소화 하였습니다.
- Endmills for Aluminum, AL alloy, non-ferrous and non-metallic materials.
- Applied fine WC grade for excellent surface finish.
- Applied short flute length for various applications.
- Tetrabond TAC coating provides excellent work surface finish by high hardness and low friction.
- Minimize built up edge by double edge and deep pocket design.



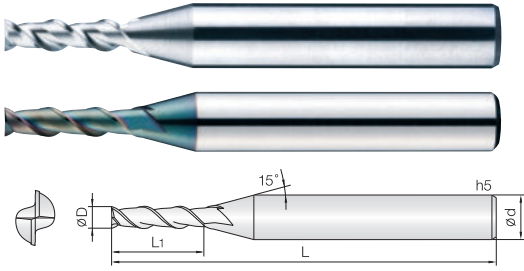
D Size	D Tolerance
Ø 0.8 ~ 20	+0 ~ -0.01mm

단위: mm

Order Number		날경	날장	유효장	전장	샙크	비고	
비코팅 Un coated	RTAC 코팅 RTAC Coated	Diameter D	Length of cut L1	Effective Length L2	Overall Length L	Shank Dia d	비코팅 Un coated	코팅 Coated
3ALR 008 016 S04	3ALRC 008 016 S04	0.8	1.6	-	50	4		
3ALR 008 030 S04	3ALRC 008 030 S04	0.8	1.6	3	50	4		
3ALR 008 040 S04	3ALRC 008 040 S04	0.8	1.6	4	50	4		
3ALR 008 050 S04	3ALRC 008 050 S04	0.8	1.6	5	50	4		
3ALR 008 060 S04	3ALRC 008 060 S04	0.8	1.6	6	50	4		
3ALR 008 080 S04	3ALRC 008 080 S04	0.8	1.6	8	50	4		
3ALR 008 100 S04	3ALRC 008 010 S04	0.8	1.6	10	50	4		
3ALR 008 120 S04	3ALRC 008 012 S04	0.8	1.6	12	50	4		
3ALR 010 020 S06	3ALRC 010 020 S06	1	2	-	60	6		
3ALR 010 040 S06	3ALRC 010 040 S06	1	2	4	60	6		
3ALR 010 060 S06	3ALRC 010 060 S06	1	2	6	60	6		
3ALR 010 080 S06	3ALRC 010 080 S06	1	2	8	60	6		
3ALR 010 100 S06	3ALRC 010 100 S06	1	2	10	60	6		
3ALR 010 120 S06	3ALRC 010 120 S06	1	2	12	60	6		
3ALR 010 140 S06	3ALRC 010 140 S06	1	2	14	60	6		
3ALR 010 160 S06	3ALRC 010 160 S06	1	2	16	60	6		
New 3ALR 010 180 S06		1	2	18	60	6		
New 3ALR 010 200 S06		1	2	20	60	6		
3ALR 015 030 S06	3ALRC 015 030 S06	1.5	3	-	60	6		
3ALR 015 060 S06	3ALRC 015 060 S06	1.5	3	6	60	6		
3ALR 015 080 S06	3ALRC 015 080 S06	1.5	3	8	60	6		
3ALR 015 100 S06	3ALRC 015 100 S06	1.5	3	10	60	6		
3ALR 015 120 S06	3ALRC 015 120 S06	1.5	3	12	60	6		
3ALR 015 140 S06	3ALRC 015 140 S06	1.5	3	14	60	6		
3ALR 015 160 S06	3ALRC 015 160 S06	1.5	3	16	60	6		
3ALR 015 180 S06	3ALRC 015 180 S06	1.5	3	18	60	6		
3ALR 015 200 S06	3ALRC 015 200 S06	1.5	3	20	60	6		
New 3ALR 015 220 S06		1.5	3	22	65	6		
New 3ALR 015 250 S06		1.5	3	25	65	6		
3ALR 020 040 S06	3ALRC 020 040 S06	2	4	-	60	6		
3ALR 020 080 S06	3ALRC 020 080 S06	2	4	8	60	6		
3ALR 020 100 S06	3ALRC 020 100 S06	2	4	10	60	6		
3ALR 020 120 S06	3ALRC 020 120 S06	2	4	12	60	6		
3ALR 020 140 S06	3ALRC 020 140 S06	2	4	14	60	6		
3ALR 020 160 S06	3ALRC 020 160 S06	2	4	16	60	6		
3ALR 020 200 S06	3ALRC 020 200 S06	2	4	20	60	6		
3ALR 020 220 S06	3ALRC 020 220 S06	2	4	22	60	6		
3ALR 020 250 S06	3ALRC 020 250 S06	2	4	25	65	6		
New 3ALR 020 280 S06		2	4	28	70	6		
New 3ALR 020 300 S06		2	4	30	70	6		
3ALR 025 050 S06	3ALRC 025 050 S06	2.5	5	-	60	6		
3ALR 025 100 S06	3ALRC 025 100 S06	2.5	5	10	60	6		
3ALR 025 150 S06	3ALRC 025 150 S06	2.5	5	15	60	6		
3ALR 025 200 S06	3ALRC 025 200 S06	2.5	5	20	60	6		
3ALR 025 250 S06	3ALRC 025 250 S06	2.5	5	25	65	6		
3ALR 025 300 S06	3ALRC 025 300 S06	2.5	5	30	70	6		
New 3ALR 025 350 S06		2.5	5	35	80	6		
New 3ALR 025 400 S06		2.5	5	40	90	6		
3ALR 030 060 S06	3ALRC 030 060 S06	3	6	-	60	6		
3ALR 030 100 S06	3ALRC 030 100 S06	3	6	10	60	6		

단위: mm

Order Number		날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고	
비코팅 Un coated	RTAC 코팅 RTAC Coated						비코팅 Un coated	코팅 Coated
3ALR 030 150 S06	3ALRC 030 150 S06	3	6	15	60	6		
3ALR 030 200 S06	3ALRC 030 200 S06	3	6	20	70	6		
3ALR 030 250 S06	3ALRC 030 250 S06	3	6	25	70	6		
3ALR 030 300 S06	3ALRC 030 300 S06	3	6	30	80	6		
3ALR 030 350 S06	3ALRC 030 350 S06	3	6	35	80	6		
3ALR 030 400 S06	3ALRC 030 400 S06	3	6	40	90	6		
New 3ALR 030 450 S06		3	6	45	90	6		
New 3ALR 030 500 S06		3	6	50	100	6		
3ALR 040 080 S06	3ALRC 040 080 S06	4	8	-	70	6		
3ALR 040 100 S06	3ALRC 040 100 S06	4	8	10	70	6		
3ALR 040 150 S06	3ALRC 040 150 S06	4	8	15	70	6		
3ALR 040 200 S06	3ALRC 040 200 S06	4	8	20	70	6		
3ALR 040 250 S06	3ALRC 040 250 S06	4	8	25	70	6		
3ALR 040 300 S06	3ALRC 040 300 S06	4	8	30	80	6		
3ALR 040 350 S06	3ALRC 040 350 S06	4	8	35	80	6		
3ALR 040 400 S06	3ALRC 040 400 S06	4	8	40	90	6		
New 3ALR 040 450 S06		4	8	45	90	6		
New 3ALR 040 500 S06		4	8	50	100	6		
3ALR 050 100 S06	3ALRC 050 100 S06	5	10	-	80	6		
3ALR 050 200 S06	3ALRC 050 200 S06	5	10	20	80	6		
3ALR 050 300 S06	3ALRC 050 300 S06	5	10	30	80	6		
3ALR 050 400 S06	3ALRC 050 400 S06	5	10	40	90	6		
3ALR 050 500 S06	3ALRC 050 500 S06	5	10	50	100	6		
New 3ALR 050 600 S06		5	10	60	110	6		
3ALR 060 200 S06	3ALRC 060 200 S06	6	12	20	80	6		
3ALR 060 400 S06	3ALRC 060 400 S06	6	12	40	80	6		
3ALR 060 600 110	3ALRC 060 600 110	6	12	60	110	6		
New 3ALR 060 800 120		6	12	80	120	6		
3ALR 080 400 S08	3ALRC 080 400 S08	8	16	40	100	8		
3ALR 080 600 110	3ALRC 080 600 110	8	16	60	110	8		
New 3ALR 080 800 120		8	16	80	120	8		
3ALR 100 500 S10	3ALRC 100 500 S10	10	20	50	110	10		
3ALR 100 700 120	3ALRC 100 700 120	10	20	70	120	10		
New 3ALR 100 900 150		10	20	90	150	10		
3ALR 120 500 S12	3ALRC 120 500 S12	12	24	50	110	12		
3ALR 120 700 130	3ALRC 120 700 130	12	24	70	130	12		
New 3ALR 120 900 150		12	24	90	150	12		
New 3ALR 140 600 110		14	28	60	110	14		
New 3ALR 140 800 120		14	28	80	120	14		
New 3ALR 160 800 130		16	32	80	130	16		
New 3ALR 160 1000 160		16	32	100	160	16		
New 3ALR 200 800 130		20	40	80	130	20		
New 3ALR 200 1200 160		20	40	120	160	20		
New 3ALR 200 1500 200		20	40	150	200	20		



- 알루미늄, 알루미늄 합금 등 비철 비금속 계열 전용 엔드밀
- 날부 인선을 고품면 설계하여 절삭시 피삭재의 표면조도가 우수합니다.
- 다양한 날장 (S, L, Exl, Etc) 선택으로 맞춤 가공이 가능합니다.
- 코팅피막에 경도가 높고 마찰계수가 낮은 Tetrabond TAC코팅을 적용하여 내마모성이 우수하며, 피삭재의 표면조도가 월등히 우수합니다.
- 2중 인선과 홈포켓을 깊게 설계하여 흡착현상을 최소화 하였습니다.
- Endmills for Aluminum, AL alloy, non-ferrous and non-metallic materials.
- Applied fine WC grade for excellent surface finish.
- Various flute length design for covering wide range application.
- Tetrabond TAC coating provides excellent work surface finish by high hardness and low friction.
- Minimize built up edge by double edge and deep pocket design.



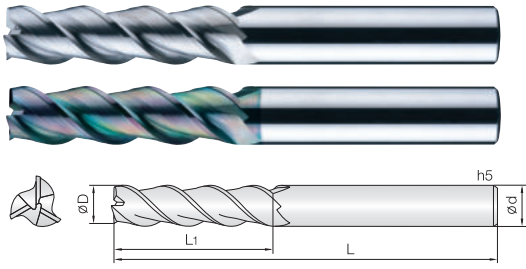
D Size	D Tolerance
ø0.5 ~ 20	+0 ~ -0.01mm

단위: mm

Order Number		날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	샙크 Shank Dia d	비고	
비코팅 Un coated	RTAC 코팅 RTAC Coated					비코팅 Un coated	코팅 Coated
2ALE 005 005 S04	2ALEC 005 005 S04	0.5	0.5	40	4		
2ALE 005 010 S04	2ALEC 005 010 S04	0.5	1	40	4		
2ALE 005 015 S04	2ALEC 005 015 S04	0.5	1.5	40	4		
2ALE 005 020 S04	2ALEC 005 020 S04	0.5	2	40	4		
New 2ALE 005 025 S04		0.5	2.5	40	4		
New 2ALE 005 030 S04		0.5	3	40	4		
2ALE 006 006 S04	2ALEC 006 006 S04	0.6	0.6	40	4		
2ALE 006 012 S04	2ALEC 006 012 S04	0.6	1.2	40	4		
2ALE 006 020 S04	2ALEC 006 020 S04	0.6	2	40	4		
New 2ALE 006 030 S04		0.6	3	40	4		
New 2ALE 006 040 S04		0.6	4	40	4		
2ALE 007 007 S04	2ALEC 007 007 S04	0.7	0.7	40	4		
2ALE 007 014 S04	2ALEC 007 014 S04	0.7	1.4	40	4		
2ALE 007 020 S04	2ALEC 007 020 S04	0.7	2	40	4		
New 2ALE 007 030 S04		0.7	3	40	4		
New 2ALE 007 040 S04		0.7	4	40	4		
2ALE 008 008 S04	2ALEC 008 008 S04	0.8	0.8	40	4		
2ALE 008 016 S04	2ALEC 008 016 S04	0.8	1.6	40	4		
2ALE 008 020 S04	2ALEC 008 020 S04	0.8	2	40	4		
New 2ALE 008 030 S04		0.8	3	40	4		
New 2ALE 008 040 S04		0.8	4	40	4		
2ALE 009 009 S04	2ALEC 009 009 S04	0.9	0.9	40	4		
2ALE 009 018 S04	2ALEC 009 018 S04	0.9	1.8	40	4		
2ALE 009 025 S04	2ALEC 009 025 S04	0.9	2.5	40	4		
New 2ALE 009 040 S04		0.9	4	40	4		
2ALE 010 015 S04	2ALEC 010 015 S04	1	1.5	40	4		
2ALE 010 015 S06	2ALEC 010 015 S06	1	1.5	40	6		
2ALE 010 025 S04	2ALEC 010 025 S04	1	2.5	40	4		
2ALE 010 025 S06	2ALEC 010 025 S06	1	2.5	40	6		
2ALE 010 035 S04	2ALEC 010 035 S04	1	3.5	40	4		
2ALE 010 035 S06	2ALEC 010 035 S06	1	3.5	40	6		
2ALE 010 050 S06	2ALEC 010 050 S06	1	5	45	6		
2ALE 010 060 S06	2ALEC 010 060 S06	1	6	45	6		
2ALE 010 080 S06	2ALEC 010 080 S06	1	8	45	6		
2ALE 010 100 S06	2ALEC 010 100 S06	1	10	45	6		
New 2ALE 010 120 S06		1	12	45	6		
2ALE 012 030 S06	2ALEC 012 030 S06	1.2	3	40	6		
2ALE 012 040 S06	2ALEC 012 040 S06	1.2	4	40	6		
2ALE 012 060 S06	2ALEC 012 060 S06	1.2	6	40	6		
New 2ALE 012 080 S06		1.2	8	45	6		
New 2ALE 012 100 S06		1.2	10	45	6		
2ALE 015 040 S06	2ALEC 015 040 S06	1.5	4	40	6		
2ALE 015 060 S06	2ALEC 015 060 S06	1.5	6	40	6		
2ALE 015 080 S06	2ALEC 015 080 S06	1.5	8	45	6		
2ALE 015 100 S06	2ALEC 015 100 S06	1.5	10	50	6		
2ALE 015 120 S06	2ALEC 015 120 S06	1.5	12	50	6		
2ALE 015 150 S06	2ALEC 015 150 S06	1.5	15	55	6		
New 2ALE 015 180 S06		1.5	18	60	6		
2ALE 020 050 S06	2ALEC 020 050 S06	2	5	45	6		
2ALE 020 070 S06	2ALEC 020 070 S06	2	7	45	6		

단위: mm

Order Number		날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	샙크 Shank Dia d	비고	
비코팅 Un coated	RTAC 코팅 RTAC Coated					비코팅 Un coated	코팅 Coated
2ALE 020 100 S06	2ALEC 020 100 S06	2	10	50	6		
2ALE 020 120 S06	2ALEC 020 120 S06	2	12	50	6		
2ALE 020 140 S06	2ALEC 020 140 S06	2	14	50	6		
2ALE 020 160 S06	2ALEC 020 160 S06	2	16	60	6		
New 2ALE 020 180 S06		2	18	60	6		
New 2ALE 020 200 S06		2	20	60	6		
2ALE 025 080 S06	2ALEC 025 080 S06	2.5	8	45	6		
2ALE 025 120 S06	2ALEC 025 120 S06	2.5	12	50	6		
2ALE 025 150 S06	2ALEC 025 150 S06	2.5	15	60	6		
New 2ALE 025 180 S06		2.5	18	60	6		
New 2ALE 025 200 S06		2.5	20	60	6		
2ALE 030 080 S06	2ALEC 030 080 S06	3	8	45	6		
2ALE 030 100 S06	2ALEC 030 100 S06	3	10	45	6		
2ALE 030 120 S06	2ALEC 030 120 S06	3	12	50	6		
2ALE 030 150 S06	2ALEC 030 150 S06	3	15	50	6		
2ALE 030 200 S06	2ALEC 030 200 S06	3	20	60	6		
2ALE 030 250 S06	2ALEC 030 250 S06	3	25	65	6		
New 2ALE 030 300 S06		3	30	70	6		
2ALE 035 100 S06	2ALEC 035 100 S06	3.5	10	45	6		
2ALE 035 150 S06	2ALEC 035 150 S06	3.5	15	50	6		
New 2ALE 035 200 S06		3.5	20	60	6		
2ALE 040 120 S06	2ALEC 040 120 S06	4	12	50	6		
2ALE 040 150 S06	2ALEC 040 150 S06	4	15	55	6		
2ALE 040 180 S06	2ALEC 040 180 S06	4	18	55	6		
2ALE 040 250 S06	2ALEC 040 250 S06	4	25	65	6		
2ALE 040 300 S06	2ALEC 040 300 S06	4	30	70	6		
New 2ALE 040 350 S06		4	35	75	6		
New 2ALE 040 400 S06		4	40	80	6		
2ALE 045 120 S06	2ALEC 045 120 S06	4.5	12	50	6		
2ALE 045 180 S06	2ALEC 045 180 S06	4.5	18	55	6		
New 2ALE 045 220 S06		4.5	22	65	6		
New 2ALE 045 250 S06		4.5	25	70	6		
2ALE 050 150 S06	2ALEC 050 150 S06	5	15	50	6		
2ALE 050 200 S06	2ALEC 050 200 S06	5	20	60	6		
2ALE 050 250 S06	2ALEC 050 250 S06	5	25	65	6		
2ALE 050 300 S06	2ALEC 050 300 S06	5	30	70	6		
New 2ALE 050 400 S06		5	40	80	6		
2ALE 055 150 S06	2ALEC 055 150 S06	5.5	15	50	6		
2ALE 060 150 S06	2ALEC 060 150 S06	6	15	50	6		
2ALE 060 200 S06	2ALEC 060 200 S06	6	20	60	6		
2ALE 060 250 S06	2ALEC 060 250 S06	6	25	65	6		
2ALE 060 300 S06	2ALEC 060 300 S06	6	30	70	6		
2ALE 060 350 S06	2ALEC 060 350 S06	6	35	75	6		
2ALE 060 400 S06	2ALEC 060 400 S06	6	40	80	6		
New 2ALE 060 450 S06		6	45	90	6		
New 2ALE 060 500 S06		6	50	100	6		
2ALE 070 200 S08	2ALEC 070 200 S08	7	20	60	8		
2ALE 070 300 S08	2ALEC 070 300 S08	7	30	70	8		
2ALE 080 200 S08	2ALEC 080 200 S08	8	20	60	8		
2ALE 080 250 S08	2ALEC 080 250 S08	8	25	65	8		



- 알루미늄, 알루미늄 합금 등 비철 비금속 계열 전용 엔드밀
- 날부 인선을 고풍면 설계하여 절삭시 피삭재의 표면조도가 우수합니다.
- 다양한 날장(S, L, Exl, Etc) 선택으로 맞춤 가공이 가능합니다.
- 코팅 피막에 경도가 높고 마찰계수가 낮은 Tetrabond TAC코팅을 적용하여 내마모성이 우수하며, 피삭재의 표면조도가 월등히 우수합니다.
- 2중 인선과 홈포켓을 깊게 설계하여 흡착현상을 최소화 하였습니다.
- Endmills for Aluminum, AL alloy, non-ferrous and non-metallic materials.
- Applied fine WC grade for excellent surface finish.
- Various flute length design for covering wide range application.
- Tetrabond TAC coating provides excellent work surface finish by high hardness and low friction.
- Minimize built up edge and deep pocket design.



D Size	D Tolerance
Ø 0.8 ~ 20	+0 ~ -0.01mm

단위: mm

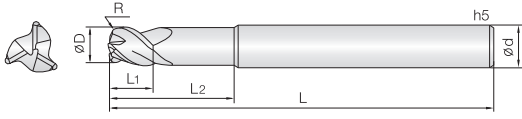
Order Number		날경 Diameter D	날장 Length of cut L1	전장 Overall Length L	샙크 Shank Dia d	비고	
비코팅 Un coated	RTAC 코팅 RTAC Coated					비코팅 Un coated	코팅 Coated
New	3ALE 008 012 S04	0.8	1.2	40	4		
New	3ALE 008 020 S04	0.8	2	40	4		
New	3ALE 008 030 S04	0.8	3	40	4		
New	3ALE 008 040 S04	0.8	4	40	4		
	3ALE 010 015 S06	1	1.5	40	6		
	3ALE 010 030 S06	1	3	40	6		
	3ALE 010 050 S06	1	5	45	6		
	3ALE 010 060 S06	1	6	45	6		
	3ALE 010 080 S06	1	8	45	6		
	3ALE 010 100 S06	1	10	45	6		
New	3ALE 010 120 S06	1	12	50	6		
New	3ALE 010 140 S06	1	14	50	6		
	3ALE 012 030 S06	1.2	3	40	6		
	3ALE 012 040 S06	1.2	4	40	6		
	3ALE 012 060 S06	1.2	6	45	6		
New	3ALE 012 080 S06	1.2	8	45	6		
New	3ALE 012 100 S06	1.2	10	45	6		
New	3ALE 012 120 S06	1.2	12	50	6		
	3ALE 015 025 S06	1.5	2.5	40	6		
	3ALE 015 040 S06	1.5	4	40	6		
	3ALE 015 060 S06	1.5	6	45	6		
	3ALE 015 080 S06	1.5	8	45	6		
	3ALE 015 100 S06	1.5	10	50	6		
	3ALE 015 120 S06	1.5	12	50	6		
	3ALE 015 150 S06	1.5	15	50	6		
New	3ALE 015 180 S06	1.5	18	60	6		
New	3ALE 015 200 S06	1.5	20	60	6		
	3ALE 020 030 S06	2	3	45	6		
	3ALE 020 050 S06	2	5	45	6		
	3ALE 020 070 S06	2	7	45	6		
	3ALE 020 100 S06	2	10	50	6		
	3ALE 020 120 S06	2	12	50	6		
	3ALE 020 140 S06	2	14	60	6		
	3ALE 020 160 S06	2	16	60	6		
	3ALE 020 180 S06	2	18	60	6		
	3ALE 020 200 S06	2	20	60	6		
New	3ALE 020 220 S06	2	22	60	6		
New	3ALE 020 250 S06	2	25	65	6		
	3ALE 025 040 S06	2.5	4	45	6		
	3ALE 025 080 S06	2.5	8	45	6		
	3ALE 025 120 S06	2.5	12	50	6		
	3ALE 025 150 S06	2.5	15	60	6		
New	3ALE 025 200 S06	2.5	20	60	6		
New	3ALE 025 250 S06	2.5	25	65	6		
	3ALE 030 045 S06	3	4.5	45	6		
	3ALE 030 080 S06	3	8	45	6		
	3ALE 030 120 S06	3	12	50	6		
	3ALE 030 150 S06	3	15	50	6		
	3ALE 030 200 S06	3	20	55	6		
	3ALE 030 250 S06	3	25	60	6		

단위: mm

Order Number		날경	날장	전장	샙크	비고	
비코팅 Un coated	RTAC 코팅 RTAC Coated	Diameter D	Length of cut L1	Overall Length L	Shank Dia d	비코팅 Un coated	코팅 Coated
3ALE 030 300 S06	3ALEC 030 300 S06	3	30	65	6		
New 3ALE 030 350 S06		3	35	75	6		
New 3ALE 030 400 S06		3	40	80	6		
3ALE 035 055 S06	3ALEC 035 055 S06	3.5	5.5	45	6		
3ALE 035 100 S06	3ALEC 035 100 S06	3.5	10	45	6		
3ALE 035 150 S06	3ALEC 035 150 S06	3.5	15	50	6		
3ALE 035 200 S06	3ALEC 035 200 S06	3.5	20	55	6		
3ALE 035 250 S06	3ALEC 035 250 S06	3.5	25	60	6		
3ALE 035 300 S06	3ALEC 035 300 S06	3.5	30	65	6		
New 3ALE 035 350 S06		3.5	35	75	6		
3ALE 040 060 S06	3ALEC 040 060 S06	4	6	45	6		
3ALE 040 110 S06	3ALEC 040 110 S06	4	11	45	6		
3ALE 040 160 S06	3ALEC 040 160 S06	4	16	50	6		
3ALE 040 200 S06	3ALEC 040 200 S06	4	20	55	6		
3ALE 040 250 S06	3ALEC 040 250 S06	4	25	60	6		
3ALE 040 300 S06	3ALEC 040 300 S06	4	30	65	6		
New 3ALE 040 350 S06		4	35	75	6		
New 3ALE 040 400 S06		4	40	80	6		
3ALE 045 120 S06	3ALEC 045 120 S06	4.5	12	50	6		
3ALE 045 180 S06	3ALEC 045 180 S06	4.5	18	55	6		
3ALE 045 250 S06	3ALEC 045 250 S06	4.5	25	60	6		
3ALE 045 300 S06	3ALEC 045 300 S06	4.5	30	65	6		
3ALE 050 075 S06	3ALEC 050 075 S06	5	7.5	50	6		
3ALE 050 130 S06	3ALEC 050 130 S06	5	13	50	6		
3ALE 050 200 S06	3ALEC 050 200 S06	5	20	55	6		
3ALE 050 250 S06	3ALEC 050 250 S06	5	25	60	6		
3ALE 050 300 S06	3ALEC 050 300 S06	5	30	65	6		
3ALE 050 350 S06	3ALEC 050 350 S06	5	35	70	6		
3ALE 050 400 S06	3ALEC 050 400 S06	5	40	75	6		
New 3ALE 050 450 S06		5	45	80	6		
3ALE 055 150 S06	3ALEC 055 150 S06	5.5	15	50	6		
3ALE 055 200 S06	3ALEC 055 200 S06	5.5	20	55	6		
3ALE 055 250 S06	3ALEC 055 250 S06	5.5	25	60	6		
3ALE 060 090 050	3ALEC 060 090 050	6	9	50	6		
3ALE 060 150 050	3ALEC 060 150 050	6	15	50	6		
3ALE 060 200 055	3ALEC 060 200 055	6	20	55	6		
3ALE 060 250 060	3ALEC 060 250 060	6	25	60	6		
3ALE 060 300 070	3ALEC 060 300 070	6	30	70	6		
3ALE 060 350 070	3ALEC 060 350 070	6	35	70	6		
3ALE 060 400 075	3ALEC 060 400 075	6	40	75	6		
3ALE 060 450 080	3ALEC 060 450 080	6	45	80	6		
3ALE 060 500 090	3ALEC 060 500 090	6	50	90	6		
3ALE 070 200 060	3ALEC 070 200 060	7	20	60	8		
3ALE 070 300 075	3ALEC 070 300 075	7	30	75	8		
3ALE 070 400 090	3ALEC 070 400 090	7	40	90	8		
3ALE 080 120 060	3ALEC 080 120 060	8	12	60	8		
3ALE 080 200 060	3ALEC 080 200 060	8	20	60	8		
3ALE 080 250 065	3ALEC 080 250 065	8	25	65	8		
3ALE 080 300 070	3ALEC 080 300 070	8	30	70	8		
3ALE 080 350 075	3ALEC 080 350 075	8	35	75	8		



3날 45° 헬릭스 알루미늄 전용 코너 레디우스 엔드밀



- 알루미늄, 알루미늄 합금 등 비철 비금속 계열 가공 엔드밀
- 날부 인선을 고광면 설계하여 절삭시 피삭재의 표면조도가 우수합니다.
- 2중 인선과 홈포켓을 깊게 설계하여 흠착현상을 최소화 하였습니다.
- 코팅피막에 경도가 높고 마찰계수가 낮은 Tetrabond TAC코팅을 적용하여 내마모성이 우수하며, 피삭재의 표면조도가 월등히 우수합니다.
- 3날45°헬릭스의 짧은 날장으로 설계, 고속 고이송 작업에 적합합니다.
- Endmills for Aluminum, AL alloy, non-ferrous and non-metallic materials.
- Applied fine WC grade for excellent surface finish.
- Minimize built up edge by double edge and deep pocket design.
- Tetrabond TAC coating provides excellent work surface finish by high hardness and low friction.
- High speed, feed applicable by 3 flute 45° degree helix and short flute design.

3

WC
마립자

RTAC
Coating

R
± 0.005

R
± 0.01

R
± 0.015

45°
Helix Angle

CUTTING
DATA

R0.5 R1 ~ 1.5 R2 ~ 5 50P

D Size	D Tolerance
ø 3 ~ 20	+0 ~ -0.015mm

단위: mm

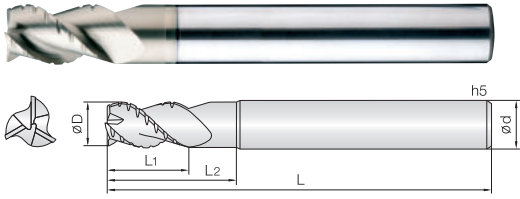
Order Number		날경	날장	유효장	전장	샤프트	비고		
		Diameter	Length of cut	Effective Length	Overall Length	Shank Dia	비코팅	코팅	
		D × R	L1	L2	L	d	Un coated	Coated	
							비코팅	코팅	
							Un coated	Coated	
New	3ALC 030 005 050	New	3ALCC 030 005 050	3 X R0.5	10	-	50	6	
New	3ALC 030 005 060	New	3ALCC 030 005 060	3 X R0.5	10	15	60	6	
New	3ALC 030 010 050	New	3ALCC 030 010 050	3 X R1	10	-	50	6	
New	3ALC 030 010 060	New	3ALCC 030 010 060	3 X R1	10	15	60	6	
New	3ALC 040 005 050	New	3ALCC 040 005 050	4 X R0.5	12	-	50	6	
New	3ALC 040 005 060	New	3ALCC 040 005 060	4 X R0.5	12	20	60	6	
New	3ALC 040 010 050	New	3ALCC 040 010 050	4 X R1	12	-	50	6	
New	3ALC 040 010 060	New	3ALCC 040 010 060	4 X R1	12	20	60	6	
New	3ALC 050 005 050	New	3ALCC 050 005 050	5 X R0.5	15	-	50	6	
New	3ALC 050 005 060	New	3ALCC 050 005 060	5 X R0.5	15	20	60	6	
New	3ALC 050 010 050	New	3ALCC 050 010 050	5 X R1	15	-	50	6	
New	3ALC 050 010 060	New	3ALCC 050 010 060	5 X R1	15	20	60	6	
	3ALC 060 005 050		3ALCC 060 005 050	6 X R0.5	15	-	50	6	
	3ALC 060 005 070		3ALCC 060 005 070	6 X R0.5	7	20	70	6	
	3ALC 060 010 050		3ALCC 060 010 050	6 X R1	15	-	50	6	
	3ALC 060 010 070		3ALCC 060 010 070	6 X R1	7	20	70	6	
	3ALC 080 005 060		3ALCC 080 005 060	8 X R0.5	20	-	60	8	
	3ALC 080 005 080		3ALCC 080 005 080	8 X R0.5	9	25	80	8	
	3ALC 080 010 060		3ALCC 080 010 060	8 X R1	20	-	60	8	
	3ALC 080 010 080		3ALCC 080 010 080	8 X R1	9	25	80	8	
	3ALC 080 020 060		3ALCC 080 020 060	8 X R2	20	-	60	8	
	3ALC 080 020 080		3ALCC 080 020 080	8 X R2	9	25	80	8	
	3ALC 080 025 080		3ALCC 080 025 080	8 X R2.5	9	25	80	8	
	3ALC 100 005 070		3ALCC 100 005 070	10 X R0.5	25	-	70	10	
	3ALC 100 005 100		3ALCC 100 005 100	10 X R0.5	11	30	100	10	
	3ALC 100 010 070		3ALCC 100 010 070	10 X R1	25	-	70	10	
	3ALC 100 010 100		3ALCC 100 010 100	10 X R1	11	30	100	10	
	3ALC 100 015 070		3ALCC 100 015 070	10 X R1.5	25	-	70	10	
	3ALC 100 015 100		3ALCC 100 015 100	10 X R1.5	11	30	100	10	
	3ALC 100 020 070		3ALCC 100 020 070	10 X R2	25	-	70	10	
	3ALC 100 020 100		3ALCC 100 020 100	10 X R2	11	30	100	10	
	3ALC 100 025 100		3ALCC 100 025 100	10 X R2.5	11	30	100	10	
	3ALC 120 005 075		3ALCC 120 005 075	12 X R0.5	30	-	75	12	
	3ALC 120 005 110		3ALCC 120 005 110	12 X R0.5	13	36	110	12	
	3ALC 120 010 075		3ALCC 120 010 075	12 X R1	30	-	75	12	
	3ALC 120 010 110		3ALCC 120 010 110	12 X R1	13	36	110	12	
New	3ALC 120 015 075	New	3ALCC 120 015 075	12 X R1.5	30	-	75	12	
	3ALC 120 015 110		3ALCC 120 015 110	12 X R1.5	13	36	110	12	
	3ALC 120 020 075		3ALCC 120 020 075	12 X R2	30	-	75	12	
	3ALC 120 020 110		3ALCC 120 020 110	12 X R2	13	36	110	12	
	3ALC 120 025 110		3ALCC 120 025 110	12 X R2.5	13	36	110	12	
	3ALC 120 030 075		3ALCC 120 030 075	12 X R3	30	-	75	12	
	3ALC 120 030 110		3ALCC 120 030 110	12 X R3	13	36	110	12	
	3ALC 120 040 075		3ALCC 120 040 075	12 X R4	30	-	75	12	
	3ALC 120 040 110		3ALCC 120 040 110	12 X R4	13	36	110	12	
	3ALC 160 005 130		3ALCC 160 005 130	16 X R0.5	17	50	130	16	
	3ALC 160 010 090		3ALCC 160 010 090	16 X R1	35	-	90	16	
	3ALC 160 010 130		3ALCC 160 010 130	16 X R1	17	50	130	16	
	3ALC 160 020 090		3ALCC 160 020 090	16 X R2	35	-	90	16	
	3ALC 160 020 130		3ALCC 160 020 130	16 X R2	17	50	130	16	

FORAL ALUMINUM

3ARE

3 Flutes Semi-Finishing & Roughing End Mills for Aluminum

3날 알루미늄 세미 피니싱 & 라핑엔드밀



- 알루미늄, 알루미늄 합금 등 비철 비금속 계열의 고속 중삭 및 황삭
- JCRO 코팅 처리하여 다양한 피삭재 가공시 인선부에 스트레스가 적으며, 내마모성 또한 향상됩니다.
- 칩 브레이커와 홈포켓을 깊게 설계하여 흡착현상을 최소화하며, 중삭 및 황삭의 고속 작업시 우수한 성능을 보입니다.
- 일반 알루미늄 라핑과 다르게 피삭재의 가공면이 깨끗합니다.
- 항절력이 높은 미립자 초경합금을 채택, 엔드밀의 파손을 최소화 하였습니다.
- **High speed semi finishing and roughing endmills for Aluminum, AL alloy, non-ferrous and non-metallic materials.**
- JCRO coating provides wear resistance improvement as well as avoid edge stress in various applications.
- Minimize built up edge by chip braker and deep pocket design.
- Minimize fracturing by high TRS fine (0.5 μ m) WC grade.
- Good surface integrity differently from competitor's AL roughing endmills.

ø6 ~ ø8 ø10 ~ ø20 Shield Edge 50P

D Size	D Tolerance
ø 6 ~ 8	-0.02 ~ -0.04mm
ø 10 ~ 20	-0.02 ~ -0.05mm

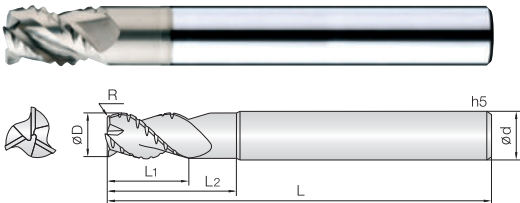
Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고	Order Number	날경 Diameter D	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고
3ARE 060 150 S06	6	10	15	50	6		3ARE 200 500 S20	20	35	50	110	20	
3ARE 060 200 S06	6	15	20	70	6		3ARE 200 600 S20	20	45	60	120	20	
3ARE 080 200 S08	8	15	20	60	8								
3ARE 080 250 S08	8	20	25	80	8								
3ARE 100 250 S10	10	18	25	70	10								
3ARE 100 300 S10	10	23	30	90	10								
3ARE 120 300 S12	12	20	30	80	12								
3ARE 120 400 S12	12	30	40	100	12								
3ARE 160 350 S16	16	25	35	110	16								
3ARE 160 500 S16	16	35	50	120	16								

단위: mm

3ARC

3 Flutes Semi-Finishing & Roughing Corner Radius End Mills for Aluminum

3날 알루미늄 세미 피니싱 & 라핑 코너 레디우스 엔드밀



- 알루미늄, 알루미늄 합금 등 비철 비금속 계열의 고속 중삭 및 황삭
- JCRO 코팅 처리하여 다양한 피삭재 가공시 인선부에 스트레스가 적으며, 내마모성 또한 향상됩니다.
- 칩 브레이커와 홈포켓을 깊게 설계하여 흡착현상을 최소화하며, 중삭 및 황삭의 고속 작업시 우수한 성능을 보입니다.
- 일반 알루미늄 라핑과 다르게 피삭재의 가공면이 깨끗합니다.
- 항절력이 높은 미립자 초경합금을 채택, 엔드밀의 파손을 최소화 하였습니다.
- **High speed semi finishing and roughing endmills for Aluminum, AL alloy, non-ferrous and non-metallic materials.**
- JCRO coating provides wear resistance improvement as well as avoid edge stress in various applications.
- Minimize built up edge by chip braker and deep pocket design.
- Minimize fracturing by high TRS fine (0.5 μ m) WC grade.
- Good surface integrity differently from competitor's AL roughing endmills.

R0.5 R1 R02 ~ 3 50P

D Size	D Tolerance
ø 6 ~ 8	-0.02 ~ -0.04mm
ø 10 ~ 20	-0.02 ~ -0.05mm

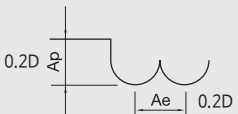
Order Number	날경 Diameter D × R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고	Order Number	날경 Diameter D × R	날장 Length of cut L1	유효장 Effective Length L2	전장 Overall Length L	샙크 Shank Dia d	비고
3ARC 060 005 S06	6 X R0.5	9	15	65	6		3ARC 200 020 S20	20 X R2	30	50	110	20	
3ARC 060 010 S06	6 X R1	9	15	65	6		3ARC 200 030 S20	20 X R3	30	50	110	20	
3ARC 080 005 S08	8 X R0.5	12	20	70	8								
3ARC 080 010 S08	8 X R1	12	20	70	8								
3ARC 100 010 S10	10 X R1	15	25	75	10								
3ARC 100 020 S10	10 X R2	15	25	75	10								
3ARC 120 010 S12	12 X R1	20	30	80	12								
3ARC 120 020 S12	12 X R2	20	30	80	12								
3ARC 120 030 S12	12 X R3	20	30	80	12								
3ARC 160 010 S16	16 X R1	25	35	110	16								
3ARC 160 020 S16	16 X R2	25	35	110	16								
3ARC 160 030 S16	16 X R3	25	35	110	16								

단위: mm

2CPB Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	CFRP				GFRP			
	반경 Radius	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth
R 0.25	28,000	273	0.05	0.05	13,720	112	0.05	0.05
R 0.3	25,760	315	0.06	0.06	12,622	129	0.06	0.06
R 0.4	18,816	399	0.08	0.08	9,220	164	0.08	0.08
R 0.5	17,920	420	0.1	0.1	8,781	172	0.1	0.1
R 1	17,920	840	0.2	0.2	8,781	344	0.2	0.2
R 2	17,920	2,205	0.4	0.4	8,781	904	0.4	0.4
R 3	16,800	3,098	0.6	0.6	8,232	1,270	0.6	0.6
R 4	14,560	3,150	0.8	0.8	7,134	1,292	0.8	0.8
R 5	12,880	3,360	1	1	6,311	1,378	1	1
R 6	11,200	3,308	1.2	1.2	5,488	1,356	1.2	1.2

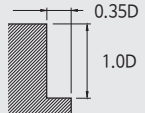
절입량 Depth of Cut	
------------------	---

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 유효장에 따라 같은 직경에 비례하여 회전수와 이송속도를 DOWN 시켜주십시오.
- 이 절삭조건표는 절삭조건이참고수치입니다. 실가공시 가공형상, 가공목적, 적용기계에 따라 조건변경요망합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할 시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

8 ~ 12CPE Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	CFRP				GFRP			
	외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth
Ø 6	8,400	840	6	2.1	4116	378	6	2.1
Ø 8	6,200	860	8	2.8	3038	387	8	2.8
Ø 10	5,100	780	10	3.5	2499	351	10	3.5
Ø 12	4,150	750	12	4.2	2034	338	12	4.2

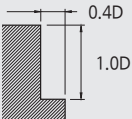
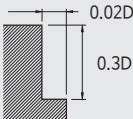
절입량 Depth of Cut	
------------------	---

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정하십시오.
- 상기 조건은 8날 기준이며 날 수가 증가시 같은 직경에 비례하여 회전수와 이송속도를 UP 시켜주십시오.
- 이 절삭 조건표는 절삭 조건의 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- 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.
- Above the value of the table is based on 8 flutes. If you use more than 8 flutes of endmill, raise up the RPM and Feed in a same proportion compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

피삭재 Material	CFRP			
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth
ø 6	8,000	600	6	2.4
ø 8	6,000	600	8	3.2
ø 10	4,800	540	10	4.0
ø 12	4,000	540	12	4.8

4&6CPR DIA Coating

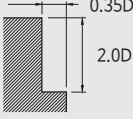
피삭재 Material	4 CPR								6 CPR							
	CFRP				GFRP				CFRP				GFRP			
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
ø 6	7,900	1,100	6	2.4	4,200	430	6	2.4	10,500	1,950	1.8	0.12	5,300	7,400	1.8	0.12
ø 8	5,960	1,600	8	3.2	3,200	590	8	3.2	7,970	2,950	2.4	0.16	3,900	950	2.4	0.16
ø 10	4,750	1,500	10	4.0	2,550	560	10	4.0	6,350	2,930	3	0.20	3,120	850	3	0.20
ø 12	3,950	2,060	12	4.8	2,120	725	12	4.8	5,300	3,900	3.6	0.24	2,600	1,050	3.6	0.24

절입량 Depth of Cut	4 CPR	6 CPR
		

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 이 절삭 조건표는 절삭조건의 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송 속도를 비례적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 콜러트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- 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.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

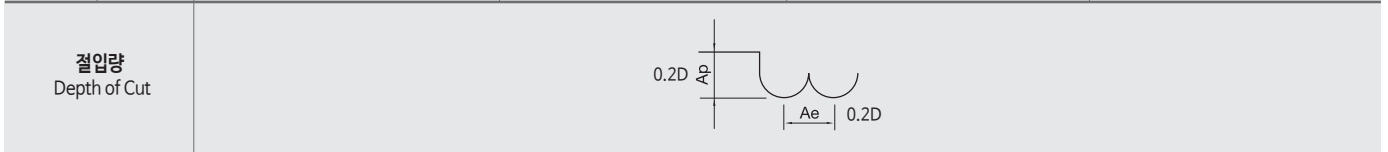
6 ~16CPO Cutting Condition

피삭재 Material	CFRP				GFRP			
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
ø 4	15,900	1,400	8	1.4	15,900	1,400	8	1.4
ø 5	13,000	1,900	10	1.8	13,000	1,900	10	1.8
ø 6	10,600	2,200	12	2.1	10,600	2,200	12	2.1
ø 8	7,950	2,600	16	2.8	7,950	2,600	16	2.8
ø 10	6300	3050	20	3.5	6300	3050	20	3.5
ø 12	5300	3300	24	4.2	5300	3300	24	4.2

절입량 Depth of Cut	6 ~16CPO
	

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 조건은 8날 기준이며 날 수가 증가시 같은 직경에 비례하여 회전수와 이송속도를 UP 시켜주십시오.
- 이 절삭 조건표는 절삭 조건의 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송속도를 비례적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 콜러트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- 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.
- Above the value of the table is recommended. If you use more than 8 flutes of endmill, raise up the RPM and Feed in a same proportion compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

피삭재 Material		흑연 Graphite			
반경 Radius	유효장 Effective Length	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R 0.25	5	25,000	320	0.05	0.05
R 0.5	10	21,850	380	0.10	0.10
"	20	19,665	342	0.09	0.09
"	30	18,682	325	0.08	0.08
R 0.75	10	21,850	646	0.15	0.15
"	20	19,665	630	0.14	0.14
"	30	18,682	580	0.11	0.11
R 1	15	19,950	760	0.20	0.20
"	20	17,955	684	0.18	0.18
"	30	16,160	616	0.16	0.16
"	40	13,736	523	0.13	0.13
"	50	10,988	419	0.10	0.10
R 1.5	20	17,575	1,378	0.30	0.30
"	30	15,818	1,240	0.27	0.27
"	40	14,236	1,116	0.24	0.24
"	50	12,100	948	0.22	0.22
R 2	20	15,200	1,995	0.40	0.40
"	35	13,680	1,796	0.36	0.36
"	45	12,312	1,616	0.31	0.31
R 2.5	25	14,725	2,423	0.50	0.50
"	50	11,780	1,938	0.40	0.40
R 3	25	14,250	2,803	0.60	0.60
R 4	30	12,350	2,850	0.80	0.80
R 5	-	10,925	2,898	1.00	1.00
R 6	-	9,975	2,993	1.20	1.20
R 8	-	7,600	2,375	1.60	1.60
R 10	-	6,175	1,900	2.00	2.00



- 유효장이 긴 경우에는 회전수와 이송속도를 최대20% 이하로 줄이십시오.
- 절삭 조건표에 없는 유효장은 같은 직경과 비례하여 DOWN 시켜주십시오.
- 이 절삭 조건표는 절삭조건에 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

2TGB Cutting Condition

3TBD

• RPM : rev./min • Feed : mm/min

피삭재 Material		흑연 Graphite				
반경 Radius	유효장 Effective Length	Angle θ	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R 0.5	20	0° 30	18,000	300	0.10	0.10
"	30	0° 30	17,100	285	0.10	0.10
"	40	0° 30	16,245	271	0.09	0.09
"	25	1°	16,740	279	0.10	0.10
"	35	1°	15,903	265	0.09	0.09
"	50	1°	15,108	252	0.08	0.08
R 0.75	30	0° 30	17,000	320	0.15	0.15
"	40	0° 30	16,150	304	0.14	0.14
"	50	0° 30	15,343	289	0.12	0.12
"	30	1°	15,300	288	0.14	0.14
"	50	1°	14,229	268	0.13	0.13
"	60	1°	13,233	249	0.12	0.12
R 1	40	0° 30	16,500	600	0.20	0.20
"	50	0° 30	14,850	540	0.19	0.19
"	70	0° 30	13,365	486	0.18	0.18
"	60	1°	12,029	437	0.20	0.20
"	90	1°	10,224	372	0.19	0.19
R 2	70	0° 30	13,500	1,600	0.40	0.40
"	80	1°	12,825	1,520	0.36	0.36
R 3	100	0° 30	11,000	2,200	0.60	0.60
"	100	1°	10,780	2,156	0.59	0.59
R 5	83	0° 30	9,600	2,250	1.00	1.00
R 6	110	0° 30	7,500	2,300	1.20	1.20

절입량
Depth of Cut

피삭재 Material		흑연 Graphite				
반경 Radius	유효장 Effective Length	Angle θ	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R 0.5	20	0° 30	18,900	360	0.10	0.10
"	30	0° 30	17,955	342	0.10	0.10
"	40	0° 30	17,057	325	0.09	0.09
"	25	1°	17,577	335	0.10	0.10
"	35	1°	16,698	318	0.09	0.09
"	50	1°	15,863	302	0.08	0.08
R 0.75	30	0° 30	17,850	384	0.15	0.15
"	40	0° 30	16,958	365	0.14	0.14
"	50	0° 30	16,110	347	0.12	0.12
"	40	1°	16,065	346	0.14	0.14
"	50	1°	14,940	321	0.13	0.13
"	60	1°	13,895	299	0.12	0.12
R 1	40	0° 30	17,325	720	0.20	0.20
"	50	0° 30	15,593	648	0.19	0.19
"	60	0° 30	14,702	559	0.19	0.19
"	50	1°	14,524	588	0.20	0.20
"	60	1°	12,630	525	0.20	0.20
"	70	1°	11,367	472	0.19	0.19
R 2	80	0° 30	13,466	1,824	0.40	0.40
"	100	1°	12,120	1,642	0.36	0.36

절입량
Depth of Cut

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 절삭조건표에 없는 유효장은 같은 직경과 비례하여 DOWN 시켜주십시오.
- 절삭조건에 없는 각도는 같은 직경에 이전 각도와 비례하여 사용 하십시오.
- 이송속도 및 축 방향의 절입 깊이는 리브창과 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 이 절삭 조건표는 절삭 조건의 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 동작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.

- In case of long effective length, reduce the RPM and feed by 20% or less.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- If there is no parameter for the angle of your tool, refer to the previous angle, and adjust compare to it.
- Adjust the value of the feed and Ap based on the effective length and taper angle, and adjust the milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

2DDCA Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	CFRP			
외경 Outside Diameter	RPM	FEED	V/C	Fz
ø 2	15,900	960	100 ~ 150	0.03 ~ 0.07
ø 2.5	12,700	760	"	"
ø 3	10,600	630	"	"
ø 4	7,960	480	"	"
ø 5	6,370	380	"	"
ø 6	5,300	320	"	"
ø 8	3,980	240	"	"
ø 9	3,540	210	"	"
ø 10	3,180	190	"	"
ø 11	2,890	175	"	"
ø 12	2,650	160	"	"

- 상기조건은 V/C 100, Fz 0.03 기준이며, 실가공시 가공목적, 적용기계에 따라 조건변경요망합니다.
- 조건표가 기계의 최대스핀들속도를 초과할시 스펙속도와 이송속도를 비례적으로 조정하십시오.
- 에어브로, 절삭유, 오일미스트쿨러를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의하십시오.

- Above the parameters are based on V/C 100 with Fz 0.03. Actual machining can be changed depending on your machining purpose and condition of your machine.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

2GEM / 4GEM / 6GEM Cutting Condition

• RPM : rev./min • Feed : mm/min

	2 G E M				4 G E M				6 G E M			
피삭재 Material	흑연 Graphite				흑연 Graphite				흑연 Graphite			
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
∅ 1	8,000	160	1.00	0.10	-	-	1.00	0.10	-	-	1.00	0.10
∅ 2	8,000	250	2.00	0.20	-	-	2.00	0.20	-	-	2.00	0.20
∅ 3	8,000	380	3.00	0.30	8,000	430	3.00	0.30	-	-	3.00	0.30
∅ 4	8,000	510	4.00	0.40	8,000	570	4.00	0.40	-	-	4.00	0.40
∅ 5	8,000	640	5.00	0.50	8,000	720	5.00	0.50	-	-	5.00	0.50
∅ 6	8,000	770	6.00	0.60	8,000	860	6.00	0.60	8,000	960	6.00	0.60
∅ 8	8,000	1,000	8.00	0.80	8,000	1,100	8.00	0.80	8,000	1,300	8.00	0.80
∅ 10	8,000	1,250	10.00	1.00	8,000	1,400	10.00	1.00	8,000	1,600	10.00	1.00
∅ 12	8,000	1,500	12.00	1.20	7,000	1,400	12.00	1.20	7,000	1,600	12.00	1.20
∅ 16	8,000	1,600	16.00	1.60	7,000	1,500	16.00	1.60	7,000	1,800	16.00	1.60
∅ 20	8,000	1,600	20.00	2.00	7,000	1,500	20.00	2.00	7,000	1,800	20.00	2.00

절입량
Depth of Cut

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 이 절삭 조건표는 절삭조건에 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과 하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (∅1이하 사용자 진동 허용 관리 5µm이내 일것.)
- 흑연 가공시 에어브로를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contac measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (∅1 or less, the vibration tolerance management should be within 5µm).
- For graphite milling, air blow method is recommended.

2DCR / 4DCR Cutting Condition

• RPM : rev./min • Feed : mm/min

	2 D C R				4 D C R			
피삭재 Material	흑연 Graphite				흑연 Graphite			
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
∅ 0.2	40,000	100	0.06	0.06	-	-	-	-
∅ 0.4	40,000	200	0.12	0.12	-	-	-	-
∅ 0.5	40,000	300	0.15	0.15	-	-	-	-
∅ 0.6	40,000	400	0.18	0.18	-	-	-	-
∅ 0.8	40,000	500	0.24	0.24	-	-	-	-
∅ 1	40,000	900	0.30	0.30	-	-	-	-
∅ 2	36,000	900	0.60	0.60	40,000	2,800	0.60	0.60
∅ 3	32,000	1,300	0.90	0.90	40,000	3,150	0.90	0.90
∅ 4	26,000	1,500	1.20	1.20	40,000	3,500	1.2	1.2
∅ 5	24,000	1,100	1.50	1.50	-	-	-	-
∅ 6	21,000	1,100	1.80	1.80	40,000	5,600	1.8	1.8
∅ 8	-	-	-	-	32,000	5,600	2.4	2.4
∅ 10	-	-	-	-	26,000	5,700	3.0	3.0
∅ 12	-	-	-	-	21,000	5,500	3.6	3.6
∅ 16	-	-	-	-	15,800	5,500	4.8	4.8

절입량
Depth of Cut

경사진면절삭
Inclined Cutting

- 유효장이 긴 경우에는 회전속도와 이송속도를 최대20% 이하로 줄이십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 50%까지 UP 해주십시오.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 이 절삭 조건표는 절삭조건에 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적절한 쿨런트 사용과 가공시 발열, 발화에 주의 하십시오.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- 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 50% 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.

2DBE / 3DBE / 4DBE Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	2DBE				3DBE				4DBE			
	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
흑연 Graphite												
외경 Outside Diameter												
Ø 1	16,000	400	0.20	0.20	16,000	480	0.20	0.20	16,000	700	0.20	0.20
Ø 2	16,000	800	0.40	0.40	16,000	960	0.40	0.40	16,000	1,200	0.40	0.40
Ø 3	16,000	1,450	0.60	0.60	16,000	1,740	0.60	0.60	16,000	2,000	0.60	0.60
Ø 4	16,000	2,100	0.80	0.80	16,000	2,520	0.80	0.80	16,000	3,100	0.80	0.80
Ø 5	15,500	2,550	1.00	1.00	15,500	3,060	1.00	1.00	15,000	3,800	1.00	1.00
Ø 6	15,000	2,950	1.20	1.20	15,000	3,540	1.20	1.20	15,000	4,400	1.20	1.20
Ø 8	13,000	3,000	1.60	1.60	13,000	3,600	1.60	1.60	13,000	4,500	1.60	1.60
Ø 10	11,500	3,000	2.00	2.00	12,000	3,600	2.00	2.00	12,000	4,600	2.00	2.00
Ø 12	10,700	3,200	2.40	2.40	10,000	3,840	2.40	2.40	10,000	4,700	2.40	2.40
절입량 Depth of Cut												

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 절삭 조건표에 없는 유효장은 같은 직경과 비례하여 DOWN 시켜주십시오.
- 이 절삭 조건표는 절삭 조건 의 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건 변경 요망 합니다.
- 공작 기계와 가공물의 강성이 없는 경우 진동이 발생할 시 조건 표에 회전 속도와 이송 속도를 같은 비율로 줄여서 적용 합니다.
- If the effective length is long, reduce the RPM and feed maximum 20%.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

2DEM / 3DEM / 4&6DEM Cutting Condition

• RPM : rev./min • Feed : mm/min

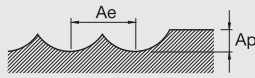
피삭재 Material	2DEM				4DEM				6DEM			
	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
흑연 Graphite												
외경 Outside Diameter												
Ø 0.2	40,000	100	0.3	0.02	-	-	-	-	-	-	-	-
Ø 0.4	40,000	200	0.6	0.04	-	-	-	-	-	-	-	-
Ø 0.6	40,000	350	0.9	0.06	-	-	-	-	-	-	-	-
Ø 0.8	40,000	550	1.2	0.08	-	-	-	-	-	-	-	-
Ø 1	40,000	700	1.5	0.10	-	-	-	-	-	-	-	-
Ø 2	25,000	800	3.0	0.20	-	-	-	-	-	-	-	-
Ø 3	20,000	800	4.5	0.30	20,000	1,600	4.5	0.3	-	-	-	-
Ø 4	18,000	950	6.0	0.40	18,000	1,900	6.0	0.4	-	-	-	-
Ø 5	14,000	1,200	7.5	0.50	14,000	2,400	7.5	0.5	-	-	-	-
Ø 6	11,000	1,400	9.0	0.60	11,000	2,800	9.0	0.6	22,200	8,000	9	0.6
Ø 8	8,000	1,300	12.0	0.80	8,000	2,600	12.0	0.8	16,800	8,000	12	0.8
Ø 10	6,500	1,200	15.0	1.00	6,500	2,400	15.0	1.0	13,400	8,000	15	1.0
Ø 12	5,500	1,200	18.0	1.20	5,500	2,400	18.0	1.2	11,350	6,700	18	1.2
Ø 16	5,500	1,200	24.0	1.60	-	-	-	-	8,400	5,000	24	1.6
절입량 Depth of Cut												

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 이 절삭 조건표는 절삭 조건 의 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건 변경 요망 합니다.
- 조건표가 기계의 최대 스피indle 속도를 초과 하거나 버 및 적열 현상이 발생할 때 스피indle 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작 기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5µm 이내 일것.)
- 흑연 가공시 에어브로를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- 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.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5µm).
- For graphite milling, air blow method is recommended.

2DRB Cutting Condition

• RPM : rev./min • Feed : mm/min

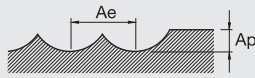
피삭재 Material	알루미늄합금재 Aluminum Alloy Expanding Material A7075				알루미늄합금주물 / 다이캐스팅 Aluminum Alloys Casting / Die Casting Si1 3%				탄소섬유 / 동합금 Magnesium Alloy / Copper Alloy / CFRP AZ91 / AZ80A / C1100		동합금 Copper Alloy C1100	
	일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling	
반경 Radius	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R0.1	32,000	220	45,000	290	32,000	220	45,000	290	32,000	220	45,000	290
R0.3	32,000	480	45,000	660	32,000	480	45,000	660	32,000	480	45,000	660
R0.5	28,800	760	45,000	1,100	28,800	760	45,000	1,100	28,800	760	45,000	1,100
R0.8	28,800	850	45,000	1,400	28,800	850	45,000	1,400	25,200	850	35,900	1,300
R1	28,600	1,400	45,000	2,000	28,600	1,400	43,000	1,900	21,500	1,000	35,900	1,600
R1.5	19,100	1,400	45,000	3,000	19,100	1,400	28,600	1,900	14,300	1,000	23,900	1,600
R2	14,300	1,400	35,900	3,200	14,300	1,400	21,400	1,900	10,700	1,000	17,900	1,600
R3	9,500	1,400	23,900	3,200	9,500	1,400	14,300	1,900	7,200	1,000	12,000	1,600
R4	7,200	1,800	17,600	4,100	7,200	1,800	10,700	2,400	5,400	1,300	8,900	2,000
R5	5,700	1,600	14,000	3,600	5,700	1,600	8,600	2,200	4,300	1,200	7,200	1,800
R6	4,800	1,500	11,700	3,400	4,800	1,500	7,200	2,000	3,600	1,100	5,900	1,700
절입량 Depth of Cut	Ap	Ae	Ap	Ae	Ap	Ap	Ap	Ap	Ap	Ap	Ap	Ap
	0.1D	0.2D	0.05D	0.1D	0.1D	0.2D	0.05D	0.1D	0.1D	0.2D	0.02D	0.05D



2DLB Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	알루미늄합금재 Aluminum Alloy Expanding Material A7075				알루미늄합금주물 / 다이캐스팅 Aluminum Alloys Casting / Die Casting Si1 3%				탄소섬유 / 동합금 Magnesium Alloy / Copper Alloy / CFRP AZ91 / AZ80A / C1100		동합금 Copper Alloy C1100	
	일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling	
반경 Radius	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R0.3	28,800	350	40,000	490	28,800	350	36,100	480	28,800	350	31,600	420
R0.5	23,400	720	31,500	950	23,400	720	25,200	900	23,400	720	20,700	800
R0.8	23,400	760	35,900	1,120	23,400	760	25,200	1,000	22,500	720	20,700	800
R1	22,500	950	31,500	1,260	22,500	950	25,200	1,100	17,100	720	20,700	800
R1.5	15,300	950	20,700	1,260	15,300	950	16,700	1,100	11,300	720	13,500	800
R2	11,300	950	15,800	1,260	11,300	950	12,600	1,100	8,600	720	10,400	800
R3	9,000	950	13,200	1,260	9,000	950	12,600	1,100	5,900	720	8,900	800
R4	6,400	1,150	11,600	1,260	6,400	1,150	9,800	1,000	4,800	880	6,400	950
R5	5,200	1,050	9,400	1,120	5,200	1,050	7,800	860	3,900	760	5,300	880
R6	4,100	1,000	6,700	950	4,100	1,000	5,400	520	3,000	740	4,600	840
절입량 Depth of Cut	Ap	Ap	Ap	Ap	Ap	Ap	Ap	Ae	Ap	Ae	Ap	Ap
	0.1D	0.2D	0.05D	0.1D	0.1D	0.2D	0.05D	0.1D	0.1D	0.2D	0.02D	0.05D



- 이 절삭조건표는 절삭조건을 참고하십시오. 실가공시 가공형상, 가공목적, 적용기계에 따라 조건변경요망합니다.
- 조건표가 기계의 최대스핀들속도를 초과하거나 버밍 및 열현상이 발생할 때 스펙속도와 이송속도를 비례적으로 조정하십시오.
- 에어블로우 또는 미스트쿨란트를 추천합니다.

- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolant is recommended.

2DRE / 3DRE Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	알루미늄합금재 Aluminum Alloy Expanding Material A7075				알루미늄합금주물 / 다이캐스팅 Aluminum Alloys Casting / Die Casting Si1 3%				탄소섬유 / 동합금 Magnesium Alloy / Copper Alloy / CFRP AZ91 / AZ80A / C1100		동합금 Copper Alloy C1100	
	일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling	
외경 Outside Diameter	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
∅ 0.5	28,800	160	45,000	500	28,800	160	45,000	450	28,800	140	45,000	410
∅ 0.6	28,800	180	45,000	590	28,800	180	45,000	540	28,800	160	45,000	500
∅ 0.8	28,800	200	45,000	770	28,800	200	45,000	720	26,100	180	45,000	590
∅ 1	28,800	200	45,000	900	28,800	200	45,000	960	20,700	200	37,800	630
∅ 1.2	28,800	210	45,000	1,100	28,800	210	45,000	1,000	17,100	200	32,400	630
∅ 1.5	28,800	250	45,000	1,400	28,800	250	45,000	1,100	14,000	200	26,600	630
∅ 2	28,800	400	45,000	1,800	28,800	380	45,000	1,100	13,000	200	25,200	680
∅ 2.5	22,500	540	43,200	1,900	22,500	540	27,900	1,100	8,600	230	18,000	680
∅ 3	18,900	630	36,000	1,900	18,900	630	23,400	1,100	7,200	230	15,300	680
∅ 4	14,000	650	29,700	2,000	14,000	650	18,000	1,200	5,400	250	12,600	720
∅ 5	11,300	680	27,900	2,500	11,300	680	17,280	1,500	4,300	270	11,300	860
∅ 6	9,500	750	23,400	2,500	9,500	750	14,310	1,500	3,600	280	9,500	900
∅ 8	7,200	800	17,550	2,600	7,200	800	10,800	1,600	2,600	270	7,100	900
∅ 10	5,700	900	13,950	2,900	5,700	900	8,640	1,700	2,100	330	5,700	1,000
∅ 12	4,800	950	11,700	2,900	4,800	950	7,200	1,700	1,800	350	4,800	1,000
측면절삭 Side Cutting	Ap	Ae	Ap	Ap	Ap	Ap	Ap	Ae	Ap	Ae	Ap	Ap
	1.5D	0.1D	1D	0.1D	1.5D	0.1D	1D	0.1D	1.5D	0.1D	1D	0.05D
홈절삭 Slotting	Ap		Ap		Ap		Ap		Ap		Ap	
	0.3D < ∅ 1 < 0.5D		0.15D		0.3D < ∅ 1 < 0.5D		0.15D		0.3D < ∅ 1 < 0.5D		0.1D	
절입량 Depth of Cut												

2DLE Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	알루미늄합금재 Aluminum Alloy Expanding Material A7075				알루미늄합금주물 / 다이캐스팅 Aluminum Alloys Casting / Die Casting Si1 3%				탄소섬유 / 동합금 Magnesium Alloy / Copper Alloy / CFRP AZ91 / AZ80A / C1100		동합금 Copper Alloy C1100	
	일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling	
외경 Outside Diameter	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
∅ 0.1	32,000	35	45,000	120	32,000	35	45,000	120	32,000	35	45,000	100
∅ 0.3	32,000	60	45,000	300	32,000	60	45,000	300	32,000	60	45,000	210
∅ 0.5	28,800	90	45,000	500	28,800	90	45,000	500	28,800	90	45,000	390
∅ 0.8	28,800	120	45,000	700	28,800	130	45,000	700	23,000	110	45,000	500
∅ 1	28,800	170	45,000	900	28,800	170	45,000	900	20,700	125	37,800	630
∅ 1.5	28,800	230	40,500	1,100	28,800	230	40,500	1,100	14,000	130	26,700	630
∅ 2	23,000	270	30,600	1,100	23,000	270	30,600	1,100	10,400	135	21,600	675
∅ 3	15,300	460	20,700	1,100	15,300	460	20,700	1,100	7,200	200	15,300	675
∅ 4	11,300	470	15,300	1,100	11,300	470	15,300	1,100	5,400	210	11,700	675
∅ 5	9,000	490	12,200	1,100	9,000	490	12,200	1,100	4,300	225	9,000	675
∅ 6	7,700	540	10,000	1,100	7,700	540	10,000	1,100	3,600	225	7,200	675
∅ 8	6,000	600	8,200	1,200	6,000	600	8,200	1,200	2,600	300	5,900	720
∅ 10	4,500	650	6,000	1,400	4,500	650	6,000	1,400	2,100	300	4,300	800
∅ 12	3,100	690	4,500	1,500	3,100	690	4,500	1,500	1,600	320	3,200	850
측면절삭 Side Cutting	Ap	Ae	Ap	Ap	Ap	Ap	Ap	Ae	Ap	Ae	Ap	Ae
	1.2D	0.1D	1D	0.1D	1.2D	0.1D	1D	0.1D	1D	0.1D	1D	0.05D
홈절삭 Slotting	Ap		Ap		Ap		Ap		Ap		Ap	
	0.3D		0.15D		0.3D		0.15D		0.3D		0.1D	
절입량 Depth of Cut												

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 이 절삭 조건표는 절삭조건의 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (∅1이하 사용시 진동 허용 관리 5µm이내 일것.)
- 에어브로, 절삭유, 오일 미스트 클린트를 추천하며, 칩을 잘 제거하고 가공시의 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.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (∅1 or less, the vibration tolerance management should be within 5µm).
- Air blow or mist coolant is recommended and note for chip emission, heat, or ignition.

2DLC Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	알루미늄합금재 Aluminum Alloy Expanding Material A7075				알루미늄합금주물 / 다이캐스팅 Aluminum Alloys Casting / Die Casting Si1 3%				탄소섬유 / 동합금 Magnesium Alloy / Copper Alloy / CFRP AZ91 / AZ80A / C1100		동합금 Copper Alloy C1100	
	일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling		일반가공 Regular Milling		고속가공 High Speed Milling	
외경 Outside Diameter	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
∅ 1	37,500	220	50,000	1,170	37,400	220	50,000	1,170	27,000	160	49,000	820
∅ 1.5	37,500	300	50,000	1,430	37,400	300	50,000	1,430	18,000	170	34,700	820
∅ 2	30,000	350	40,000	1,430	30,000	350	40,000	1,430	13,500	180	28,000	880
∅ 3	20,000	600	27,000	1,430	20,000	600	27,000	1,430	9,400	260	20,000	880
∅ 4	15,000	610	20,000	1,430	14,700	610	20,000	1,430	7,000	270	15,200	880
∅ 6	10,000	700	13,000	1,430	10,000	700	13,000	1,430	4,700	290	9,400	880
∅ 8	7,800	780	11,000	1,560	7,800	780	10,700	1,560	3,400	390	7,700	940
∅ 10	5,900	850	7,800	1,820	5,900	850	7,800	1,820	2,700	390	5,600	1,000
∅ 12	4,000	900	5,900	1,950	4,000	900	5,900	1,950	2,100	410	4,200	1,100
측면절삭 Side Cutting	Ap	Ae	Ap	Ae	Ap	Ae	Ap	Ae	Ap	Ae	Ap	Ae
	1.2D	0.1D	1D	0.1D	1.2D	0.1D	1D	0.1D	1D	0.1D	1D	0.05D
홀절삭 Slotting	Ap		Ap		Ap		Ap		Ap		Ap	
	0.3D		0.15D		0.3D		0.15D		0.3D		0.1D	
절입량 Depth of Cut												

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 측면 절삭시 코너R 부분을 참고하여 절삭하시기 바랍니다.
- 홀 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 이 절삭 조건표는 절삭조건에 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 에어브로 혹은 미스트 쿨러를 추천하며 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.

- In case of long effective length, reduce the RPM and feed by 20% or less.
- Refer to the corner radius value for side milling
- Consider the corner radius value when you set up the Ae value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Air blow or mist coolant is recommended and note for chip emission, heat, or ignition.

3FALE Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	홀절삭 Slotting				측면절삭 Side Cutting			
	알루미늄합금 Aluminum Alloys				알루미늄합금 Aluminum Alloys			
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
∅ 6	8,000	1,000	6	6	8,000	1,200	15	1.8
∅ 8	6,000	1,000	8	8	6,000	1,200	20	2.4
∅ 10	4,800	1,000	10	10	4,800	1,200	25	3
∅ 12	4,000	1,000	12	12	4,000	1,200	30	3.6
∅ 16	3,000	1,000	16	16	3,000	1,200	40	4.8
절입량 Depth of Cut								

- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 이 절삭 조건표는 절삭조건에 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전 속도와 이송 속도를 같은 비율로 줄여서 적용 합니다.
- 피삭재와 가공 모양에 따라 적절한 쿨러를 사용 하십시오.

- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.

3ALR / 3ALE

• RPM : rev./min • Feed : mm/min

피삭재 Material		알루미늄합금 Aluminum Alloys etc.							
외경 Outside Diameter	RPM	3ALR			3ALE				
		수직 Vertical	FEED		수직 Vertical	FEED			
			홈절삭 Solting	측면절삭 Side Milling		홈절삭 Solting	측면절삭 Side Milling		
ø 1	30,000	150	900	1,100	25,500	130	770	930	
ø 2	30,000	225	1,800	2,150	25,500	190	1,530	1,800	
ø 3	21,600	225	2,000	2,400	18,400	190	1,700	2,000	
ø 4	16,200	300	2,000	2,400	14,000	255	1,700	2,000	
ø 5	13,000	300	2,000	2,400	11,000	255	1,700	2,000	
ø 6	10,800	300	2,000	2,400	9,200	255	1,700	2,000	
ø 8	8,100	300	2,000	2,400	7,000	255	1,700	2,000	
ø 10	6,480	250	2,000	2,400	5,500	210	1,700	2,000	
ø 12	5,400	200	2,000	2,400	4,400	170	1,700	2,000	
ø 16	-	-	-	-	3,200	130	1,530	1,900	
ø 20	-	-	-	-	2,000	85	1,360	1,700	
Milling Amount (mm)		Ap=0.75D	Ap=0.75D	Ap=0.75D/ Ae=0.3D		Ap=0.75D	Ap=0.75D	Ap=0.75D/ Ae=0.3D	
절입량 Depth of Cut									

2ALE

• RPM : rev./min • Feed : mm/min

피삭재 Material		알루미늄합금 Aluminum Alloys				알루미늄합금주물 Aluminum Alloys			
외경 Outside Diameter	측면가공 Side Milling		홈가공 Solting		측면가공 Side Milling		홈가공 Solting		
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	
	ø 1	34,000	500	34,000	400	34,000	400	34,000	300
ø 2	34,000	950	32,300	720	32,300	720	27,200	470	
ø 3	27,200	1,200	21,300	800	21,300	800	18,000	510	
ø 4	20,400	1,300	16,000	850	16,000	850	14,000	550	
ø 5	16,200	1,400	13,000	850	13,000	850	11,000	600	
ø 6	13,600	1,600	11,000	940	11,000	940	9,400	640	
ø 8	10,200	1,600	8,000	1,000	8,000	1,000	6,800	680	
ø 10	8,100	1,600	6,500	1,000	6,500	1,000	5,400	680	
ø 12	6,800	1,600	5,400	1,000	5,400	1,000	4,500	680	
ø 16	5,100	1,600	4,100	1,000	4,100	1,000	3,400	610	
ø 20	4,100	1,300	3,200	850	3,200	850	2,700	560	
절입량 Depth of Cut									

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정하십시오.
- 이 절삭 조건표는 절삭조건에 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피indle 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피indle 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 클린트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의하십시오
- 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.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

3ALC Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	홈절삭 Slotting				측면절삭 Side Cutting			
	알루미늄합금 Aluminum Alloys				알루미늄합금 Aluminum Alloys			
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
∅ 6	20,000	6,600	6	6	20,000	8,400	4.8	1.8
∅ 8	18,000	5,400	8	8	18,000	7,500	6.4	2.4
∅ 10	15,000	4,000	10	10	15,000	6,000	8	3
∅ 12	13,000	3,200	12	12	13,000	5,400	9.6	3.6
∅ 16	10,000	3,200	16	16	10,000	5,400	12.8	4.8
∅ 20	8,000	3,000	10	10	8,000	5,000	16	6

절입량 Depth of Cut		
------------------	--	--

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 측면 절삭시 코너R 부분을 참고하여 절삭 하시기 바랍니다.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 이 절삭 조건표는 절삭조건외의 참고 수치 입니다. 실 가공시 가공형상, 가공목적, 적용 기계에 따라 조건변경 요망 합니다.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의하십시오.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Refer to the corner radius value for side milling.
- Consider the corner radius value when you set up the Ae value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

3ARE / 3ARC Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	동 Copper						알루미늄 Aluminum					
			홈절삭 Slotting		측면절삭 Side Cutting				홈절삭 Slotting		측면절삭 Side Cutting	
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	Ap Axial Depth	Ae Radial Depth
∅ 6	4,200	1,500	6	6	15	1.8	8,000	1,800	6	6	15	1.8
∅ 8	3,200	1,500	8	8	20	2.4	6,000	1,800	8	8	20	2.4
∅ 10	2,600	1,500	10	10	25	3	4,800	1,800	10	10	25	3
∅ 12	2,100	1,500	12	12	30	3.6	4,000	1,800	12	12	30	3.6
∅ 16	1,600	1,500	16	16	40	4.8	3,000	1,800	16	16	40	4.8
∅ 20	1,300	1,500	20	20	50	6	2,400	1,800	20	20	50	6

절입량 Depth of Cut		
------------------	--	--

- 가공진입가능한피삭재밖에서진입하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 이 절삭 조건표는 절삭조건외의 참고 수치 입니다. 실가공시 가공형상, 가공목적, 적용 기계에 따라 조건변경요망합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전 속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 피삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.

피삭재 Material	측면절삭 Side Cutting							
	알루미늄 합금 Aluminum Alloys				알루미늄 합금 Aluminum Alloys			
외경 Outside Diameter	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
∅ 4	30,000	4,200	6	1	16,000	1,800	6	1
∅ 5	27,000	4,900	7.5	1.25	14,400	2,000	7.5	1.25
∅ 6	24,300	5,500	9	1.5	11,700	2,100	9	1.5
∅ 8	18,000	5,400	12	2	9,000	2,200	12	2
∅ 10	14,400	5,200	15	2.5	7,200	2,100	15	2.5
∅ 12	11,700	4,800	18	3	5,900	1,900	18	3
∅ 16	9,000	4,600	24	4	4,500	1,800	24	4
∅ 20	7,200	4,300	30	5	3,600	1,700	30	5

$Ap \leq 0.25D$
 $Ae \leq 1.5D$

- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 이 절삭 조건표는 절삭조건에 참고 수치입니다. 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전 속도와 이송속도를 같은비율로 줄여서 적용 합니다.
- 피삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.

4&6CTDB

- 6CTDB는 RPM 동일, FEED만 최대 30% Up 적용.
- Use the same RPM and raise up the feed up to 30% for 6CTDB.

피삭재 Material		흑연 Graphite				고경도강 Hardened Steels			
경도 Hardness		< 35HRC							
반경 Radius	a/2	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R 0.5	10	35,000	4,200	0.22	0.05	42,000	3,000	0.09	0.3
R 0.75	10	33,000	5,250	0.27	0.05	39,000	4,400	0.10	0.3
R 1	10	32,000	6,300	0.32	0.10	38,500	5,400	0.20	0.6
R 1	15	25,000	6,000	1.18	0.10	30,000	4,200	0.20	0.6
R 1.5	10	25,000	6,000	0.39	0.10	30,000	4,800	0.30	0.8
R 2	10	16,000	4,500	0.45	0.10	20,000	3,500	0.40	1.1
R 2	30	14,500	3,700	1.18	0.10	18,000	3,000	0.40	1.1
R 3	10	12,000	4,250	0.49	0.10	14,000	3,400	0.60	1.4
R 3	20	10,500	4,000	1.18	0.10	13,200	3,100	0.60	1.4
R 4	5	9,500	4,100	0.45	0.10	11,000	3,200	0.80	1.6
R 4	10	8,000	3,850	0.45	0.10	10,000	3,000	0.80	1.6

절입량 Depth of Cut

Ap : Axial Depth 축방향의절입깊이(mm)
 Ae : Radial Depth 반경방향의절입깊이(mm)
 D : Outside Diameter 외경(mm)
 n : Speed 회전속도 (min⁻¹)
 Vf : Feed 이송속도 (mm/min)

- 절삭 조건표는 4날 기준이며, 6날시에는 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대30%까지 UP 해주십시오.
- 절삭 조건에 없는 각도는 같은 직경에 이전 각도와 비례하여 사용 하십시오.
- 이송속도 및 축 방향의 절입 깊이는 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 5축 가공시 유효장 부분을 확인 하여 주십시오.
- 절삭양이 작은 경우, Feed를 최대 20% 까지 UP 시켜 주십시오.
- 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- The parameters on the table is based on 4 flutes. For using 6 flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- If there is no parameter for the angle of your tool, refer to the previous angle, and adjust compare to it.
- Consider the RPM and feed based on the taper angle and adjust it with milling condition.
- For 5-axis milling, check the length of the effective length before milling.
- If you want to increase metal removal rates, raise up the feed up to 20%.
- During the chip evacuation, note for heat and ignition.

Your specials are our standards.

당신의스페셜은우리의표준품입니다.

WWW.JJTOOLS.CO.KR

LONG Life HIGH Performance

- HRC60이상의 다양한 재료 가공
- TSIN-S 코팅에 의한 절삭 수명 향상
- 단면, 외경, 내경, 직경에 의한 코팅과 내열
- 소재별 입상도별 용량 적용을 위한 4종 코팅도
- Variety cutting processes for various materials
- High quality cutting surfaces by high precision of insert
- High quality cutting surfaces by high precision of insert
- High quality cutting surfaces by high precision of insert
- High quality cutting surfaces by high precision of insert

FINISHING 초경 장식용 인서트 INSERTS

New Products

당신의스페셜은우리의표준품입니다.

LOW Price HIGH Performance

강사진 표면 및 곡면 가공을 위한 FLAT 디자인 적용!

Applied flat design for inclined or curved surfaces when counter boring and drilling

가격만족, 성능만족 - 다기능 플랫드릴 시리즈

FLAT DRILL

Price Satisfaction, Performance Satisfaction - Multi functional Flat Drill Series

NEW

플랫 20° 워킹 힐 제품 !
Flat 20° Working Hill product !

플랫 25°~30° 코어드 힐 제품 !
Flat 25°~30° Coated Hill type !

당신의스페셜은우리의표준품입니다.

4ETM 시리즈 2DTM

공구 교체없이 드릴링, 나사가공, 챔퍼가공을 한번에 -

THREAD MILLS

Drilling, threading and chamfering in one tool operation

4ETM Series, 2DTM Series, 4ETM Series, 4ETM Series

당신의스페셜은우리의표준품입니다.

DENTAL 정밀가공에 최적화된 - DENTAL SERIES

최고의 내구성 (DANISH) 제품 제조

정비 제조사별 CAD/CAM Milling Bur

WISLAND, HYF, ARUM, POLAND, ZHONGYUAN, BRES-CORE, ARAMOR, GIBBERICH, SIKOMA

당신의스페셜은우리의표준품입니다.

강하고 오래가는 - 나노 다이아몬드 코팅!

Strong & Long Lasting Nano Diamond Coating

마찰계수가 낮은 나노 다이아몬드 코팅을 적용하여 흡착현상을 최소화!

Minimize built-up chips by nano diamond coating

강한 몰리브덴(CVD) 코팅, 분-분말, 유리(인산염, 고리화합물) 등 최첨단 재료의 복합소재 전용 엔드밀

Endmills for CFRP, GFRP, copper alloy, glass/carbon fiber, granite, ceramics and non-metallic materials

복합소재 가공을 선도하는 - 복합소재용 엔드밀

For Composite Materials

당신의스페셜은우리의표준품입니다.

Carbide EndMills

High Precision & High Speed Cutting

Wide range of products

15,113

Your specials are our standards. 당신의스페셜은우리의표준품입니다.

ISO 9001:2015, ISO 13120:2015, ISO 13121:2015, ISO 13122:2015, ISO 13123:2015, ISO 13124:2015, ISO 13125:2015, ISO 13126:2015, ISO 13127:2015, ISO 13128:2015, ISO 13129:2015, ISO 13130:2015, ISO 13131:2015, ISO 13132:2015, ISO 13133:2015, ISO 13134:2015, ISO 13135:2015, ISO 13136:2015, ISO 13137:2015, ISO 13138:2015, ISO 13139:2015, ISO 13140:2015, ISO 13141:2015, ISO 13142:2015, ISO 13143:2015, ISO 13144:2015, ISO 13145:2015, ISO 13146:2015, ISO 13147:2015, ISO 13148:2015, ISO 13149:2015, ISO 13150:2015, ISO 13151:2015, ISO 13152:2015, ISO 13153:2015, ISO 13154:2015, ISO 13155:2015, ISO 13156:2015, ISO 13157:2015, ISO 13158:2015, ISO 13159:2015, ISO 13160:2015, ISO 13161:2015, ISO 13162:2015, ISO 13163:2015, ISO 13164:2015, ISO 13165:2015, ISO 13166:2015, ISO 13167:2015, ISO 13168:2015, ISO 13169:2015, ISO 13170:2015, ISO 13171:2015, ISO 13172:2015, ISO 13173:2015, ISO 13174:2015, ISO 13175:2015, ISO 13176:2015, ISO 13177:2015, ISO 13178:2015, ISO 13179:2015, ISO 13180:2015, ISO 13181:2015, ISO 13182:2015, ISO 13183:2015, ISO 13184:2015, ISO 13185:2015, ISO 13186:2015, ISO 13187:2015, ISO 13188:2015, ISO 13189:2015, ISO 13190:2015, ISO 13191:2015, ISO 13192:2015, ISO 13193:2015, ISO 13194:2015, ISO 13195:2015, ISO 13196:2015, ISO 13197:2015, ISO 13198:2015, ISO 13199:2015, ISO 13200:2015, ISO 13201:2015, ISO 13202:2015, ISO 13203:2015, ISO 13204:2015, ISO 13205:2015, ISO 13206:2015, ISO 13207:2015, ISO 13208:2015, ISO 13209:2015, ISO 13210:2015, ISO 13211:2015, ISO 13212:2015, ISO 13213:2015, ISO 13214:2015, ISO 13215:2015, ISO 13216:2015, ISO 13217:2015, ISO 13218:2015, ISO 13219:2015, ISO 13220:2015, ISO 13221:2015, ISO 13222:2015, ISO 13223:2015, ISO 13224:2015, ISO 13225:2015, ISO 13226:2015, ISO 13227:2015, ISO 13228:2015, ISO 13229:2015, ISO 13230:2015, ISO 13231:2015, ISO 13232:2015, ISO 13233:2015, ISO 13234:2015, ISO 13235:2015, ISO 13236:2015, ISO 13237:2015, ISO 13238:2015, ISO 13239:2015, ISO 13240:2015, ISO 13241:2015, ISO 13242:2015, ISO 13243:2015, ISO 13244:2015, ISO 13245:2015, ISO 13246:2015, ISO 13247:2015, ISO 13248:2015, ISO 13249:2015, ISO 13250:2015, ISO 13251:2015, ISO 13252:2015, ISO 13253:2015, ISO 13254:2015, ISO 13255:2015, ISO 13256:2015, ISO 13257:2015, ISO 13258:2015, ISO 13259:2015, ISO 13260:2015, ISO 13261:2015, ISO 13262:2015, ISO 13263:2015, ISO 13264:2015, ISO 13265:2015, ISO 13266:2015, ISO 13267:2015, ISO 13268:2015, ISO 13269:2015, ISO 13270:2015, ISO 13271:2015, ISO 13272:2015, ISO 13273:2015, ISO 13274:2015, ISO 13275:2015, ISO 13276:2015, ISO 13277:2015, ISO 13278:2015, ISO 13279:2015, ISO 13280:2015, ISO 13281:2015, ISO 13282:2015, ISO 13283:2015, ISO 13284:2015, ISO 13285:2015, ISO 13286:2015, ISO 13287:2015, ISO 13288:2015, ISO 13289:2015, ISO 13290:2015, ISO 13291:2015, ISO 13292:2015, ISO 13293:2015, ISO 13294:2015, ISO 13295:2015, ISO 13296:2015, ISO 13297:2015, ISO 13298:2015, ISO 13299:2015, ISO 13300:2015, ISO 13301:2015, ISO 13302:2015, ISO 13303:2015, ISO 13304:2015, ISO 13305:2015, ISO 13306:2015, ISO 13307:2015, ISO 13308:2015, ISO 13309:2015, ISO 13310:2015, ISO 13311:2015, ISO 13312:2015, ISO 13313:2015, ISO 13314:2015, ISO 13315:2015, ISO 13316:2015, ISO 13317:2015, ISO 13318:2015, ISO 13319:2015, ISO 13320:2015, ISO 13321:2015, ISO 13322:2015, ISO 13323:2015, ISO 13324:2015, ISO 13325:2015, ISO 13326:2015, ISO 13327:2015, ISO 13328:2015, ISO 13329:2015, ISO 13330:2015, ISO 13331:2015, ISO 13332:2015, ISO 13333:2015, ISO 13334:2015, ISO 13335:2015, ISO 13336:2015, ISO 13337:2015, ISO 13338:2015, ISO 13339:2015, ISO 13340:2015, ISO 13341:2015, ISO 13342:2015, ISO 13343:2015, ISO 13344:2015, ISO 13345:2015, ISO 13346:2015, ISO 13347:2015, ISO 13348:2015, ISO 13349:2015, ISO 13350:2015, ISO 13351:2015, ISO 13352:2015, ISO 13353:2015, ISO 13354:2015, ISO 13355:2015, ISO 13356:2015, ISO 13357:2015, ISO 13358:2015, ISO 13359:2015, ISO 13360:2015, ISO 13361:2015, ISO 13362:2015, ISO 13363:2015, ISO 13364:2015, ISO 13365:2015, ISO 13366:2015, ISO 13367:2015, ISO 13368:2015, ISO 13369:2015, ISO 13370:2015, ISO 13371:2015, ISO 13372:2015, ISO 13373:2015, ISO 13374:2015, ISO 13375:2015, ISO 13376:2015, ISO 13377:2015, ISO 13378:2015, ISO 13379:2015, ISO 13380:2015, ISO 13381:2015, ISO 13382:2015, ISO 13383:2015, ISO 13384:2015, ISO 13385:2015, ISO 13386:2015, ISO 13387:2015, ISO 13388:2015, ISO 13389:2015, ISO 13390:2015, ISO 13391:2015, ISO 13392:2015, ISO 13393:2015, ISO 13394:2015, ISO 13395:2015, ISO 13396:2015, ISO 13397:2015, ISO 13398:2015, ISO 13399:2015, ISO 13400:2015, ISO 13401:2015, ISO 13402:2015, ISO 13403:2015, ISO 13404:2015, ISO 13405:2015, ISO 13406:2015, ISO 13407:2015, ISO 13408:2015, ISO 13409:2015, ISO 13410:2015, ISO 13411:2015, ISO 13412:2015, ISO 13413:2015, ISO 13414:2015, ISO 13415:2015, ISO 13416:2015, ISO 13417:2015, ISO 13418:2015, ISO 13419:2015, ISO 13420:2015, ISO 13421:2015, ISO 13422:2015, ISO 13423:2015, ISO 13424:2015, ISO 13425:2015, ISO 13426:2015, ISO 13427:2015, ISO 13428:2015, ISO 13429:2015, ISO 13430:2015, ISO 13431:2015, ISO 13432:2015, ISO 13433:2015, ISO 13434:2015, ISO 13435:2015, ISO 13436:2015, ISO 13437:2015, ISO 13438:2015, ISO 13439:2015, ISO 13440:2015, ISO 13441:2015, ISO 13442:2015, ISO 13443:2015, ISO 13444:2015, ISO 13445:2015, ISO 13446:2015, ISO 13447:2015, ISO 13448:2015, ISO 13449:2015, ISO 13450:2015, ISO 13451:2015, ISO 13452:2015, ISO 13453:2015, ISO 13454:2015, ISO 13455:2015, ISO 13456:2015, ISO 13457:2015, ISO 13458:2015, ISO 13459:2015, ISO 13460:2015, ISO 13461:2015, ISO 13462:2015, ISO 13463:2015, ISO 13464:2015, ISO 13465:2015, ISO 13466:2015, ISO 13467:2015, ISO 13468:2015, ISO 13469:2015, ISO 13470:2015, ISO 13471:2015, ISO 13472:2015, ISO 13473:2015, ISO 13474:2015, ISO 13475:2015, ISO 13476:2015, ISO 13477:2015, ISO 13478:2015, ISO 13479:2015, ISO 13480:2015, ISO 13481:2015, ISO 13482:2015, ISO 13483:2015, ISO 13484:2015, ISO 13485:2015, ISO 13486:2015, ISO 13487:2015, ISO 13488:2015, ISO 13489:2015, ISO 13490:2015, ISO 13491:2015, ISO 13492:2015, ISO 13493:2015, ISO 13494:2015, ISO 13495:2015, ISO 13496:2015, ISO 13497:2015, ISO 13498:2015, ISO 13499:2015, ISO 13500:2015, ISO 13501:2015, ISO 13502:2015, ISO 13503:2015, ISO 13504:2015, ISO 13505:2015, ISO 13506:2015, ISO 13507:2015, ISO 13508:2015, ISO 13509:2015, ISO 13510:2015, ISO 13511:2015, ISO 13512:2015, ISO 13513:2015, ISO 13514:2015, ISO 13515:2015, ISO 13516:2015, ISO 13517:2015, ISO 13518:2015, ISO 13519:2015, ISO 13520:2015, ISO 13521:2015, ISO 13522:2015, ISO 13523:2015, ISO 13524:2015, ISO 13525:2015, ISO 13526:2015, ISO 13527:2015, ISO 13528:2015, ISO 13529:2015, ISO 13530:2015, ISO 13531:2015, ISO 13532:2015, ISO 13533:2015, ISO 13534:2015, ISO 13535:2015, ISO 13536:2015, ISO 13537:2015, ISO 13538:2015, ISO 13539:2015, ISO 13540:2015, ISO 13541:2015, ISO 13542:2015, ISO 13543:2015, ISO 13544:2015, ISO 13545:2015, ISO 13546:2015, ISO 13547:2015, ISO 13548:2015, ISO 13549:2015, ISO 13550:2015, ISO 13551:2015, ISO 13552:2015, ISO 13553:2015, ISO 13554:2015, ISO 13555:2015, ISO 13556:2015, ISO 13557:2015, ISO 13558:2015, ISO 13559:2015, ISO 13560:2015, ISO 13561:2015, ISO 13562:2015, ISO 13563:2015, ISO 13564:2015, ISO 13565:2015, ISO 13566:2015, ISO 13567:2015, ISO 13568:2015, ISO 13569:2015, ISO 13570:2015, ISO 13571:2015, ISO 13572:2015, ISO 13573:2015, ISO 13574:2015, ISO 13575:2015, ISO 13576:2015, ISO 13577:2015, ISO 13578:2015, ISO 13579:2015, ISO 13580:2015, ISO 13581:2015, ISO 13582:2015, ISO 13583:2015, ISO 13584:2015, ISO 13585:2015, ISO 13586:2015, ISO 13587:2015, ISO 13588:2015, ISO 13589:2015, ISO 13590:2015, ISO 13591:2015, ISO 13592:2015, ISO 13593:2015, ISO 13594:2015, ISO 13595:2015, ISO 13596:2015, ISO 13597:2015, ISO 13598:2015, ISO 13599:2015, ISO 13600:2015, ISO 13601:2015, ISO 13602:2015, ISO 13603:2015, ISO 13604:2015, ISO 13605:2015, ISO 13606:2015, ISO 13607:2015, ISO 13608:2015, ISO 13609:2015, ISO 13610:2015, ISO 13611:2015, ISO 13612:2015, ISO 13613:2015, ISO 13614:2015, ISO 13615:2015, ISO 13616:2015, ISO 13617:2015, ISO 13618:2015, ISO 13619:2015, ISO 13620:2015, ISO 13621:2015, ISO 13622:2015, ISO 13623:2015, ISO 13624:2015, ISO 13625:2015, ISO 13626:2015, ISO 13627:2015, ISO 13628:2015, ISO 13629:2015, ISO 13630:2015, ISO 13631:2015, ISO 13632:2015, ISO 13633:2015, ISO 13634:2015, ISO 13635:2015, ISO 13636:2015, ISO 13637:2015, ISO 13638:2015, ISO 13639:2015, ISO 13640:2015, ISO 13641:2015, ISO 13642:2015, ISO 13643:2015, ISO 13644:2015, ISO 13645:2015, ISO 13646:2015, ISO 13647:2015, ISO 13648:2015, ISO 13649:2015, ISO 13650:2015, ISO 13651:2015, ISO 13652:2015, ISO 13653:2015, ISO 13654:2015, ISO 13655:2015, ISO 13656:2015, ISO 13657:2015, ISO 13658:2015, ISO 13659:2015, ISO 13660:2015, ISO 13661:2015, ISO 13662:2015, ISO 13663:2015, ISO 13664:2015, ISO 13665:2015, ISO 13666:2015, ISO 13667:2015, ISO 13668:2015, ISO 13669:2015, ISO 13670:2015, ISO 13671:2015, ISO 13672:2015, ISO 13673:2015, ISO 13674:2015, ISO 13675:2015, ISO 13676:2015, ISO 13677:2015, ISO 13678:2015, ISO 13679:2015, ISO 13680:2015, ISO 13681:2015, ISO 13682:2015, ISO 13683:2015, ISO 13684:2015, ISO 13685:2015, ISO 13686:2015, ISO 13687:2015, ISO 13688:2015, ISO 13689:2015, ISO 13690:2015, ISO 13691:2015, ISO 13692:2015, ISO 13693:2015, ISO 13694:2015, ISO 13695:2015, ISO 13696:2015, ISO 13697:2015, ISO 13698:2015, ISO 13699:2015, ISO 13700:2015, ISO 13701:2015, ISO 13702:2015, ISO 13703:2015, ISO 13704:2015, ISO 13705:2015, ISO 13706:2015, ISO 13707:2015, ISO 13708:2015, ISO 13709:2015, ISO 13710:2015, ISO 13711:2015, ISO 13712:2015, ISO 13713:2015, ISO 13714:2015, ISO 13715:2015, ISO 13716:2015, ISO 13717:2015, ISO 13718:2015, ISO 13719:2015, ISO 13720:2015, ISO 13721:2015, ISO 13722:2015, ISO 13723:2015, ISO 13724:2015, ISO 13725:2015, ISO 13726:2015, ISO 13727:2015, ISO 13728:2015, ISO 13729:2015, ISO 13730:2015, ISO 13731:2015, ISO 13732:2015, ISO 13733:2015, ISO 13734:2015, ISO 13735:2015, ISO 13736:2015, ISO 13737:2015, ISO 13738:2015, ISO 13739:2015, ISO 13740:2015, ISO 13741:2015, ISO 13742:2015, ISO 13743:2015, ISO 13744:2015, ISO 13745:2015, ISO 13746:2015, ISO 13747:2015, ISO 13748:2015, ISO 13749:2015, ISO 13750:2015, ISO 13751:2015, ISO 13752:2015, ISO 13753:2015, ISO 13754:2015, ISO 13755:2015, ISO 13756:2015, ISO 13757:2015, ISO 13758:2015, ISO 13759:2015, ISO 13760:2015, ISO 13761:2015, ISO 13762:2015, ISO 13763:2015, ISO 13764:2015, ISO 13765:2015, ISO 13766:2015, ISO 13767:2015, ISO 13768:2015, ISO 13769:2015, ISO 13770:2015, ISO 13771:2015, ISO 13772:2015, ISO 13773:2015, ISO 13774:2015, ISO 13775:2015, ISO 13776:2015, ISO 13777:2015, ISO 13778:2015, ISO 13779:2015, ISO 13780:2015, ISO 13781:2015, ISO 13782:2015, ISO 13783:2015, ISO 13784:2015, ISO 13785:2015, ISO 13786:2015, ISO 13787:2015, ISO 13788:2015, ISO 13789:2015, ISO 13790:2015, ISO 13791:2015, ISO 13792:2015, ISO 13793:2015, ISO 13794:2015, ISO 13795:2015, ISO 13796:2015, ISO 13797:2015, ISO 13798:2015, ISO 13799:2015, ISO 13800:2015, ISO 13801:2015, ISO 13802:2015, ISO 13803:2015, ISO 13804:2015, ISO 13805:2015, ISO 13806:2015, ISO 13807:2015, ISO 13808:2015, ISO 13809:2015, ISO 13810:2015, ISO 13811:2015, ISO 13812:2015, ISO 13813:2015, ISO 13814:2015, ISO 13815:2015, ISO 13816:2015, ISO 13817:2015, ISO 13818:2015, ISO 13819:2015, ISO 13820:2015, ISO 13821:2015, ISO 13822:2015, ISO 13823:2015, ISO 13824:2015, ISO 13825:2015, ISO 13826:2015, ISO 13827:2015, ISO 13828:2015, ISO 13829:2015, ISO 13830:2015, ISO 13831:2015, ISO 13832:2015, ISO 13833:2015, ISO 13834:2015, ISO 13835:2015, ISO 13836:2015, ISO 13837:2015, ISO 13838:2015, ISO 13839:2015, ISO 13840:2015, ISO 13841:2015, ISO 13842:2015, ISO 13843:2015, ISO 13844:2015, ISO 13845:2015, ISO 13846:2015, ISO 13847:2015, ISO 13848:2015, ISO 13849:2015, ISO 13850:2015, ISO 13851:2015, ISO 13852:2015, ISO 13853:2015, ISO 13854:2015, ISO 13855:2015, ISO 13856:2015, ISO 13857:2015, ISO 13858:2015, ISO 13859:2015, ISO 13860:2015, ISO 13861:2015, ISO 13862:2015, ISO 13863:2015, ISO 13864:2015, ISO 13865:2015, ISO 13866:2015, ISO 13867:2015, ISO 13868:2015, ISO 13869:2015, ISO 13870:2015, ISO 13871:2015, ISO 13872:2015, ISO 13873:2015, ISO 13874:2015, ISO 13875:2015, ISO 13876:2015, ISO 13877:2015, ISO 13878:2015, ISO 13879:2015, ISO 13880:2015, ISO 13881:2015, ISO 13882:2015, ISO 13883:2015, ISO 13884:2015, ISO 13885:2015, ISO 13886:2015, ISO 13887:2015, ISO 13888:2015, ISO 13889:2015, ISO 13890:2015, ISO 13891:2015, ISO 13892:2015, ISO 13893:2015, ISO 13894:2015, ISO 13895:2015, ISO 13896:2015, ISO 13897:2015, ISO 13898:2015, ISO 13899:2015, ISO 13900:2015, ISO 13901:2015, ISO 13902:2015, ISO 13903:2015, ISO 13904:2015, ISO 13905:2015, ISO 13906:2015, ISO 13907:2015, ISO 13908:2015, ISO 13909:2015, ISO 13910:2015, ISO 13911:2015, ISO 13912:2015, ISO 13913:2015, ISO 13914:2015, ISO 13915:2015, ISO 13916:2015, ISO 13917:2015, ISO 13918:2015, ISO 13919:2015, ISO 13920:2015, ISO 13921:2015, ISO 13922:2015, ISO 13923:2015, ISO 13924:2015, ISO 13925:2015, ISO 13926:2015, ISO 13927:2015, ISO 13928:2015, ISO 13929:2015, ISO 13930:2015, ISO 13931:2015, ISO 13932:2015, ISO 13933:2015, ISO 13934:2015, ISO 13935:2015, ISO 13936:2015, ISO 13937:2015, ISO 13938:2015, ISO 13939:2015, ISO 13940:2015, ISO 13941:2015, ISO 13942:2015, ISO 13943:2015, ISO 13944:2015, ISO 13945:2015, ISO 13946:2015, ISO 13947:2015, ISO 13948:2015, ISO 13949:2015, ISO 13950:2015, ISO 13951:2015, ISO 13952:2015, ISO 13953:2015, ISO 13954:2015, ISO 13955:2015, ISO 13956:2015, ISO 13957:2015, ISO 13958:2015, ISO 13959:2015, ISO 1