



■ Made
■ in
■ Germany



FRANKEN
TOP-Cut

모든 소재에 사용 가능한, 유니버설 엔드밀
Universal End Mill, for all Material Groups



100여년 전통의 정밀성과 혁신. Nearly 100 years of precision and innovation.

설립 이후부터 지금까지, 프랑켄은 에무게-프랑켄의 일원으로서 밀링툴의 개발과 생산에 매진해 오고 있습니다. 초경 엔드밀, HSS 엔드밀 뿐만 아니라 PCD, CBN 인서트 또는 인서트 교체형 밀링 커터에 걸쳐 다양한 종류의 제품들이 정밀함과 혁신으로 특성화됩니다.

Rückersdorf에 위치한 독일 현지 공장에서는 표준형 엔드밀과 조립형 커터뿐만 아니라 고정밀 스페셜 폼 & 프로파일 밀링툴도 생산합니다. 매우 다양한 톨 타입과 절삭 소재, 변함없는 높은 품질 기준 그리고 타협하지 않는 정밀성을 통해, 우리의 밀링 커터 제품들은 최상의 품질 요구사항들을 만족시킵니다.

덧붙여 밀링 톨의 선정 뿐만 아니라, 우리는 또한 포괄적인 범위의 클램핑 시스템, 톨 홀더 및 액세서리를 제공합니다.

Ever since its foundation FRANKEN as part of the EMUGE-FRANKEN company association has been developing and manufacturing milling tools. The wide range of end mills of solid carbide and HSS as well as PCD and CBN inserts or milling cutters with indexable inserts is characterised by precision and innovation.

The production in our German manufacturing plant in Rückersdorf includes standard end mills and bore cutters as well as highly precise special form and profile milling tools. With its large variety of tool types and cutting materials, the consistently high standards and uncompromising precision, our product range of milling cutters meets even the highest quality requirements.

In addition to our selection of milling tools, we also offer a comprehensive range of clamping systems, tool holders and accessories.





초경 또는 HSS 소재로 만들어진 TOP-Cut 툴은 고유의 특별한 형상 특성에 의해 거의 모든 종류의 피삭재와 밀링 가공법에 사용 가능한 다재 다능한 유니버설 엔드밀입니다.

특 성:

- 다양한 헬릭스각
- 테이퍼 형태의 중심부 직경
- 고성능 코팅
- 선택 가능한 축방향 토출의 내부 절삭유 공급 (ICA)

주요 특징:

모든 피삭 재종에 사용 가능

우리는 이 브로셔를 통해 매우 중요한 TOP-Cut 초경 엔드밀을 소개합니다. 우리가 제공하는 모든 툴에 대해서, 각각의 피삭재 군에 따라 안전한 초기 절삭조건(절삭 속도(V_c) 및 날당 이송(f_z))과 절삭유 추천 및 사용법을 제공합니다.

TOP-Cut tools are versatile end mills made from solid carbide or HSS which can be used in nearly all materials and milling strategies due to their special geometry properties.

Characteristics

- Variable helix angle
- Tapered core diameter
- High-performance coating
- Optionally available with internal coolant supply, axial exit (ICA)

Main feature:

Universal use, for all material groups.

In this brochure we present a selection of the most important solid carbide TOP-Cut end mills. For every tool we give, depending on the respective material group safe starting conditions (V_c / f_z) and directions about the recommended coolant.

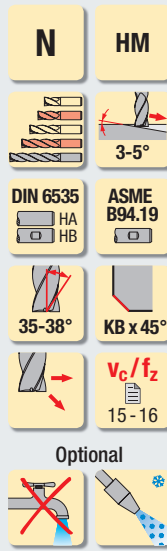
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- 다양한 용도의 고성능 툴
- ENORM 형상
- 낮은 절삭 진동
- 중심부 절삭날
- 3 가지 타입의 길이 선택 가능

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available



Allround

TIALN

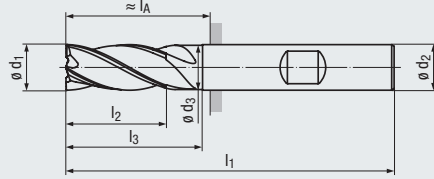
P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.2-1.4
N	2.1-4.1, 5.2
S	1.1-2.6
H	1.1 1.2-1.3



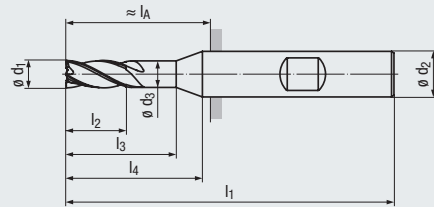
Allround

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.2-1.4
N	2.1-4.1, 5.2
S	1.1-2.6
H	1.1 1.2-1.3



Design l4:



코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능
- 황삭 및 정삭에 적합

Applications – material (see page 14)

- For almost all materials
- Suitable for roughing and finishing

DIN 6527 - Short 디자인 · Short design

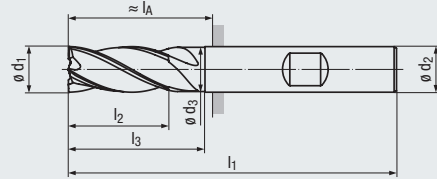
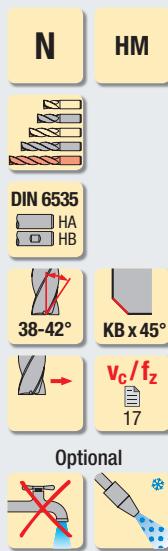
주문 코드 · Order code											1916A	1917A				
ø d1 f8	l2	l3	l1	ø d3	l4	ø d2 h5	lA	KB	Z (Flutes)	치수 코드						
3	5	9	50	2,9	14	6	14	0,07	4	.003	●	●				
4	8	12	54	3,8	18	6	18	0,07	4	.004	●	●				
5	9	16	54	4,8	18	6	18	0,07	4	.005	●	●				
6	10	16	54	5,8	—	6	18	0,12	4	.006	●	●				
8	12	20	58	7,7	—	8	22	0,12	4	.008	●	●				
10	15	24	66	9,5	—	10	26	0,2	4	.010	●	●				
12	18	26	73	11,5	—	12	28	0,2	4	.012	●	●				
16	24	32	82	15,5	—	16	34	0,2	4	.016	●	●				
18	27	34	84	17,5	—	18	36	0,2	4	.018	●	●				
20	30	40	92	19,5	—	20	42	0,3	4	.020	●	●				

DIN 6527 - Long 디자인 · Long design

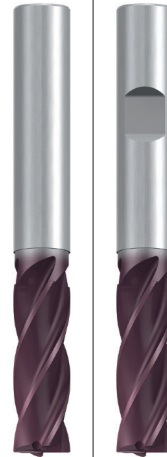
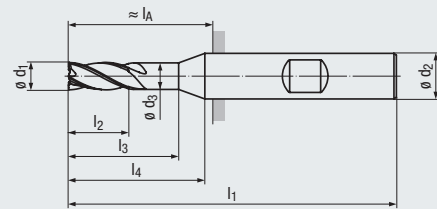
주문 코드 · Order code													1998A	1999A		
ø d1 f8	l2	l3	l1	ø d3	l4	ø d2 h5	lA	KB	Z (Flutes)	치수 코드						
3	8	14	57	2,9	20	6	21	0,07	4	.003			●	●		
4	11	18	57	3,8	20	6	21	0,07	4	.004			●	●		
5	13	19	57	4,8	20	6	21	0,12	4	.005			●	●		
6	13	20	57	5,8	—	6	21	0,12	4	.006			●	●		
8	19	25	63	7,7	—	8	27	0,12	4	.008			●	●		
10	22	30	72	9,5	—	10	32	0,2	4	.010			●	●		
12	26	35	83	11,5	—	12	38	0,2	4	.012			●	●		
14	26	35	83	13,5	—	14	38	0,2	4	.014			●	●		
16	32	40	92	15,5	—	16	44	0,2	4	.016			●	●		
18	32	50	100	17,5	—	18	52	0,2	4	.018			●	●		
20	38	50	104	19,5	—	20	54	0,3	4	.020			●	●		

- 다양한 용도의 고성능 툴
- ENORM 형상
- 낮은 절삭 진동
- 양심부 절삭날
- 3 가지 타입의 길이 선택 가능

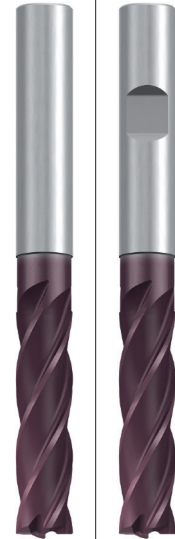
- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available



Design l₄:



Allround



Allround

코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능
- 황삭 및 정삭에 적합

Applications – material (see page 14)

- For almost all materials
- Suitable for roughing and finishing

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.4 1.5-1.6
N	2.1-2.8, 5.2
S	1.1-1.3 2.1-2.6

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.4 1.5-1.6
N	2.1-2.8, 5.2
S	1.1-1.3 2.1-2.6

3 x d₁ - Extra long 디자인 · Extra long design

주문 코드 · Order code

ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h6	l _A	KB	Z (Flutes)	치수 코드	2526A	2527A			
3	9	12	62	2.9	23	6	26	0,07	4	.003	●	●			
4	12	16	62	3.8	25	6	26	0,07	4	.004	●	●			
5	15	20	62	4.8	25	6	26	0,12	4	.005	●	●			
6	18	25	62	5.8	—	6	26	0,12	4	.006	●	●			
8	24	30	68	7.7	—	8	32	0,12	5	.008	●	●			
10	30	35	80	9.5	—	10	40	0,2	5	.010	●	●			
12	36	45	93	11.5	—	12	48	0,2	5	.012	●	●			
16	48	60	112	15.5	—	16	64	0,2	5	.016	●	●			
20	60	75	130	19.5	—	20	80	0,3	5	.020	●	●			

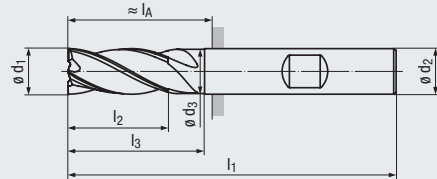
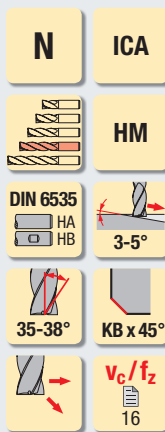
4 x d₁ - Extra long 디자인 · Extra long design

주문 코드 · Order code

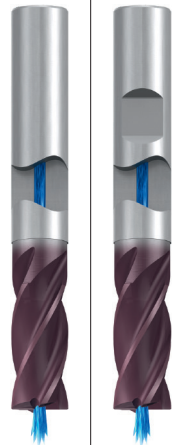
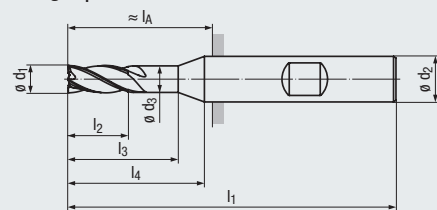
ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h6	l _A	KB	Z (Flutes)	치수 코드				2528A	2529A
6	24	30	68	5.8	—	6	32	0,12	4	.006				●	●
8	32	40	80	7.7	—	8	44	0,12	5	.008				●	●
10	40	50	95	9.5	—	10	55	0,2	5	.010				●	●
12	48	60	107	11.5	—	12	62	0,2	5	.012				●	●
16	64	75	128	15.5	—	16	80	0,2	5	.016				●	●
20	80	90	150	19.5	—	20	100	0,3	5	.020				●	●

- 다양한 용도의 고성능 툴
- ENORM 형상
- 낮은 절삭 진동
- 내부 절삭유 공급, 축방향 토출 방식 (ICA)

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Internal coolant supply, axial exit (ICA)



Design I₄:



Allround

코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능,
- 고인성 소재 포함
- 황삭 및 정삭에 적합

Applications – material (see page 14)

- For almost all materials, including tough materials
- Suitable for roughing and finishing

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.2-1.4
N	2.1-4.1, 5.2
S	1.1-2.6
H	1.1 1.2-1.3

DIN 6527 - Long 디자인 · Long design

주문 코드 · Order code

주문 코드	1998AZ	1999AZ				
ϕd_1 f8 l_2 l_3 l_1 ϕd_3 l_4 ϕd_2 h_5 l_A KB Z (Flutes) 치수 코드						
3 8 14 57 2,9 20 6 21 0,07 4 .003	●	●				
4 11 18 57 3,8 20 6 21 0,07 4 .004	●	●				
5 13 19 57 4,8 20 6 21 0,12 4 .005	●	●				
6 13 20 57 5,8 — 6 21 0,12 4 .006	●	●				
8 19 25 63 7,7 — 8 27 0,12 4 .008	●	●				
10 22 30 72 9,5 — 10 32 0,2 4 .010	●	●				
12 26 35 83 11,5 — 12 38 0,2 4 .012	●	●				
16 32 40 92 15,5 — 16 44 0,2 4 .016	●	●				
20 38 50 104 19,5 — 20 54 0,3 4 .020	●	●				

- 다양한 용도의 고성능 툴
- 새롭게 개발된 형상
- 낮은 절삭 진동
- 양심부 절삭날
- 3 가지 타입의 길이 선택 가능

- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available

N



HM



Ø 0,3 - 1,8 mm:



Ø 2 - 20 mm:

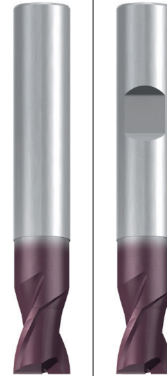


KB x 45°

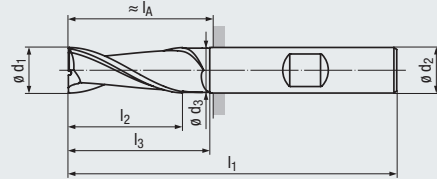


V_c/f_z
15

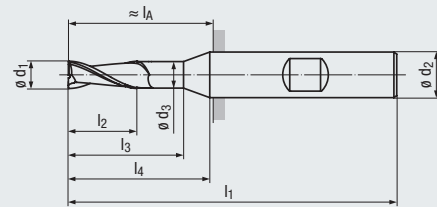
Optional



Allround



Design I₄:



코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능
- 환삭 및 정삭에 적합

Applications – material (see page 14)

- For almost all materials
- Suitable for roughing and finishing

TIALN

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.1-1.3	1.4
N	2.1-4.2, 5.2	
S	1.1-2.1	2.2-2.6
H	1.1-1.2	

DIN 6527 - Short 디자인 · Short design

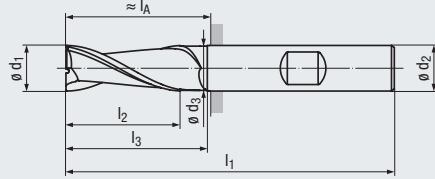
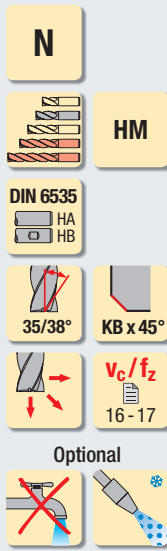
주문 코드 · Order code

Ø d ₁ e8	l ₂ h10	l ₃	l ₁	Ø d ₃	l ₄	Ø d ₂ h6	l _A h6	KB	Z (Flutes)	치수 코드	2510A	2511A				
0,3	1	—	38	—	8	3	—	—	2	.0003	●					
0,5	1,5	—	38	—	9	3	—	—	2	.0005	●					
1	3	—	38	—	10	3	—	—	2	.001	●					
1,2	4	—	38	—	10	3	—	—	2	.0012	●					
1,3	4	—	38	—	10	3	—	—	2	.0013	●					
1,4	4	—	38	—	10	3	—	—	2	.0014	●					
1,5	4	—	38	—	10	3	—	—	2	.0015	●					
1,6	4	—	38	—	10	3	—	—	2	.0016	●					
1,8	5	—	38	—	10	3	—	—	2	.0018	●					

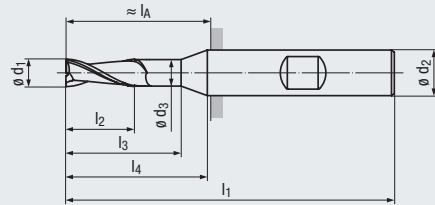
Ø d ₁ e8	l ₂ h10	l ₃	l ₁	Ø d ₃	l ₄	Ø d ₂ h5	l _A h5	KB	Z (Flutes)	치수 코드						
2	3	5	50	1,9	14	6	14	0,04	2	.002	●	●				
2,5	3	5	50	2,4	14	6	14	0,07	2	.0025	●	●				
	2,8	4	7	50	2,7	14	6	14	0,07	2	.0028	●	●			
3	4	7	50	2,9	14	6	14	0,07	2	.003	●	●				
	3,5	4	7	50	3,3	14	6	14	0,07	2	.0035	●	●			
	3,8	5	9	54	3,6	18	6	18	0,07	2	.0038	●	●			
4	5	9	54	3,8	18	6	18	0,07	2	.004	●	●				
	4,5	5	9	54	4,3	18	6	18	0,12	2	.0045	●	●			
	4,8	6	11	54	4,6	18	6	18	0,12	2	.0048	●	●			
5	6	11	54	4,8	18	6	18	0,12	2	.005	●	●				
	5,75	7	16	54	5,55	—	6	18	0,12	2	.00575	●	●			
6	7	16	54	5,8	—	6	18	0,12	2	.006	●	●				
7	8	18	58	6,7	20	8	22	0,12	2	.007	●	●				
8	9	20	58	7,7	—	8	22	0,12	2	.008	●	●				
	9	10	22	66	8,7	24	10	26	0,2	2	.009	●	●			
10	11	24	66	9,5	—	10	26	0,2	2	.010	●	●				
12	12	26	73	11,5	—	12	28	0,2	2	.012	●	●				
14	14	28	75	13,5	—	14	30	0,2	2	.014	●	●				
16	16	32	82	15,5	—	16	34	0,2	2	.016	●	●				
18	18	34	84	17,5	—	18	36	0,2	2	.018	●	●				
20	20	40	92	19,5	—	20	42	0,3	2	.020	●	●				

- 다양한 용도의 고성능 툴
- 새롭게 개발된 형상
- 낮은 절삭 진동
- 중심부 절삭날
- 3 가지 타입의 길이 선택 가능

- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available



Design l₄:



Allround

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.3 1.4
N	2.1-4.2, 5.2
S	1.1-2.1 2.2-2.6
H	1.1-1.2

2512A

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2513A

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코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능
- 황삭 및 정삭에 적합

Applications – material (see page 14)

- For almost all materials
- Suitable for roughing and finishing

DIN 6527 - Long 디자인 · Long design

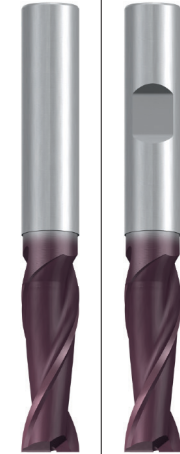
주문 코드 · Order code

ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h5	l _A	KB	Z (Flutes)	치수 코드
2	6	8	57	1,9	20	6	21	0,04	2	.002
3	7	10	57	2,9	20	6	21	0,07	2	.003
4	8	12	57	3,8	20	6	21	0,07	2	.004
5	10	15	57	4,8	20	6	21	0,12	2	.005
6	10	20	57	5,8	—	6	21	0,12	2	.006
7	13	23	63	6,7	25	8	27	0,12	2	.007
8	16	25	63	7,7	—	8	27	0,12	2	.008
10	19	30	72	9,5	—	10	32	0,2	2	.010
12	22	35	83	11,5	—	12	38	0,2	2	.012
16	26	40	92	15,5	—	16	44	0,2	2	.016
20	32	50	104	19,5	—	20	54	0,3	2	.020

Extra Long 디자인 · Extra long design

주문 코드 · Order code

ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h5	l _A	KB	Z (Flutes)	치수 코드
3	9	12	62	2,9	23	6	26	0,07	2	.003
4	12	16	62	3,8	25	6	26	0,07	2	.004
5	15	20	62	4,8	25	6	26	0,12	2	.005
6	18	25	62	5,8	—	6	26	0,12	2	.006
8	24	30	68	7,7	—	8	32	0,12	2	.008
10	30	40	80	9,5	—	10	40	0,2	2	.010
12	36	45	93	11,5	—	12	48	0,2	2	.012
16	48	55	108	15,5	—	16	60	0,2	2	.016
20	60	70	126	19,5	—	20	76	0,3	2	.020



Allround

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.3 1.4-1.6
N	2.1-2.8, 5.2
S	1.1-2.1 2.2-2.6

2514A

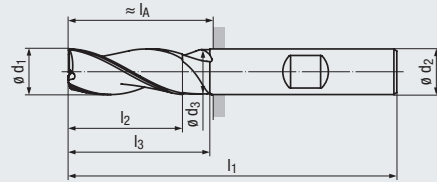
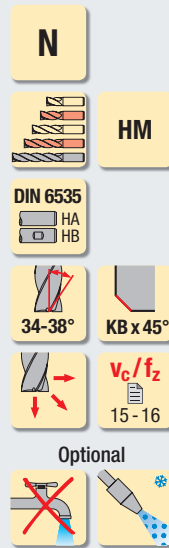
●
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●
●

2515A

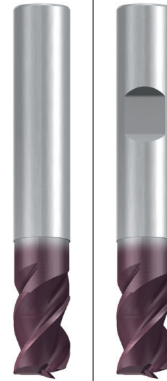
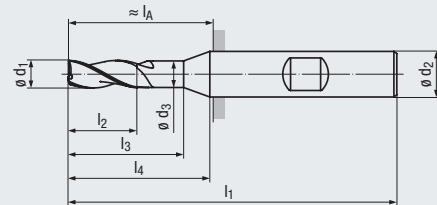
●
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- 다양한 용도의 고성능 툴
- 새롭게 개발된 형상
- 낮은 절삭 진동
- 양심부 절삭날
- 3 가지 타입의 길이 선택 가능

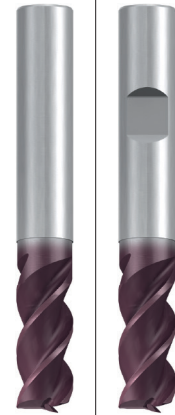
- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available



Design I₄:



Allround



Allround

코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능
- 황삭 및 정삭에 적합

Applications – material (see page 14)

- For almost all materials
- Suitable for roughing and finishing

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.4
N	2.1-2.8, 5.2 4.1-4.2
S	1.1 1.2-1.3
S	2.1 2.2-2.6
H	1.1-1.2

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.4
N	2.1-2.8, 5.2 4.1-4.2
S	1.1 1.2-1.3
S	2.1 2.2-2.6
H	1.1-1.2

DIN 6527 - Short 디자인 · Short design

주문 코드 · Order code

ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h5	l _A	KB	Z (Flutes)	치수 코드	2516A	2517A				
1,5	3	—	50	—	14	6	14	0,04	3	.0015	●	●				
2	3	5	50	1,9	14	6	14	0,04	3	.002	●	●				
2,5	3	5	50	2,4	14	6	14	0,07	3	.0025	●	●				
2,8	4	7	50	2,7	14	6	14	0,07	3	.0028	●	●				
3	4	7	50	2,9	14	6	14	0,07	3	.003	●	●				
3,5	4	7	50	3,3	14	6	14	0,07	3	.0035	●	●				
3,8	5	9	54	3,6	18	6	18	0,07	3	.0038	●	●				
4	5	9	54	3,8	18	6	18	0,07	3	.004	●	●				
4,5	5	9	54	4,3	18	6	18	0,12	3	.0045	●	●				
4,8	6	11	54	4,6	18	6	18	0,12	3	.0048	●	●				
5	6	11	54	4,8	18	6	18	0,12	3	.005	●	●				
5,5	7	12	54	5,3	18	6	18	0,12	3	.0055	●	●				
5,75	7	16	54	5,55	18	6	18	0,12	3	.00575	●	●				
6	7	16	54	5,8	—	6	18	0,12	3	.006	●	●				
7,75	9	18	58	7,45	20	8	22	0,12	3	.00775	●	●				
8	9	20	58	7,7	—	8	22	0,12	3	.008	●	●				
9,7	11	22	66	9,4	24	10	26	0,2	3	.0097	●	●				
10	11	24	66	9,5	—	10	26	0,2	3	.010	●	●				
11,7	12	24	73	11,2	26	12	28	0,2	3	.0117	●	●				
12	12	26	73	11,5	—	12	28	0,2	3	.012	●	●				
16	16	32	82	15,5	—	16	34	0,2	3	.016	●	●				
20	20	40	92	19,5	—	20	42	0,3	3	.020	●	●				

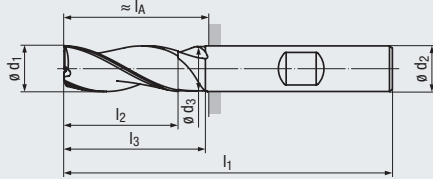
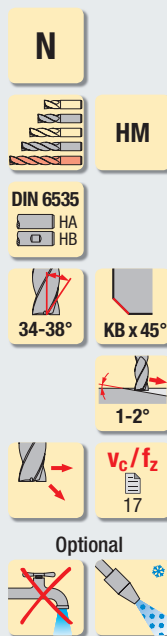
DIN 6527 - Long 디자인 · Long design

주문 코드 · Order code

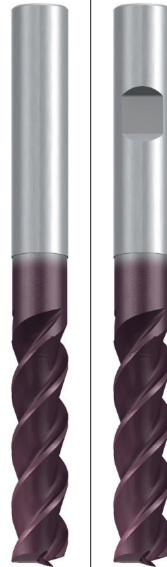
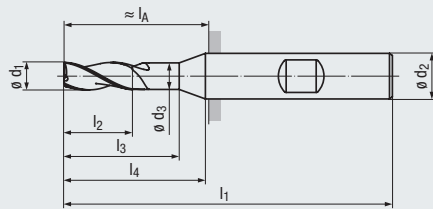
ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h5	l _A	KB	Z (Flutes)	치수 코드				2518A	2519A		
2	6	8	57	1,9	20	6	21	0,04	3	.002				●	●		
3	7	10	57	2,9	20	6	21	0,07	3	.003				●	●		
4	8	12	57	3,8	20	6	21	0,07	3	.004				●	●		
5	10	15	57	4,8	20	6	21	0,12	3	.005				●	●		
6	10	20	57	5,8	—	6	21	0,12	3	.006				●	●		
7	13	23	63	6,7	25	8	27	0,12	3	.007				●	●		
8	16	25	63	7,7	—	8	27	0,12	3	.008				●	●		
10	19	30	72	9,5	—	10	32	0,2	3	.010				●	●		
12	22	35	83	11,5	—	12	38	0,2	3	.012				●	●		
16	26	40	92	15,5	—	16	44	0,2	3	.016				●	●		
20	32	50	104	19,5	—	20	54	0,3	3	.020				●	●		

- 다양한 용도의 고성능 툴
- 새롭게 개발된 형상
- 낮은 절삭 진동
- 중심부 절삭날
- 3 x d₁ 의 플루트 길이
- 3 가지 타입의 길이 선택 가능

- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- Flute length 3 x d₁
- 3 lengths available



Design I₄:



Allround

코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능
- 황삭 및 정삭에 적합

Applications – material (see page 14)

- For almost all materials
- Suitable for finishing

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-2.8, 5.2
S	1.1 1.2-1.3
S	2.1 2.2, 2.4

Extra Long 디자인 · Extra long design

주문 코드 · Order code											2520A	2521A				
ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h5	l _A	KB	Z (Flutes)	치수 코드						
3	9	12	62	2,9	23	6	26	0,07	3	.003	●	●				
4	12	16	62	3,8	25	6	26	0,07	3	.004	●	●				
5	15	20	62	4,8	25	6	26	0,12	3	.005	●	●				
6	18	25	62	5,8	—	6	26	0,12	3	.006	●	●				
8	24	30	68	7,7	—	8	32	0,12	3	.008	●	●				
10	30	40	80	9,5	—	10	40	0,2	3	.010	●	●				
12	36	45	93	11,5	—	12	48	0,2	3	.012	●	●				
16	48	55	108	15,5	—	16	60	0,2	3	.016	●	●				
20	60	70	126	19,5	—	20	76	0,3	3	.020	●	●				

- Multifunktionales Hochleistungswerkzeug
- Mit ENORM-Geometrie
- Vibrationsarme Bearbeitung
- Schneidenlänge bis $3 \times d_1$
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Flute length up to $3 \times d_1$
- 2 lengths available

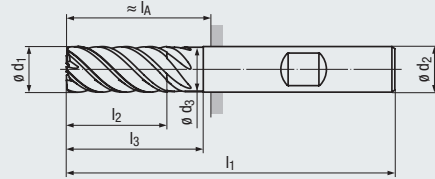
N



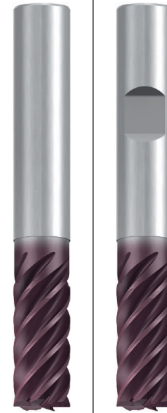
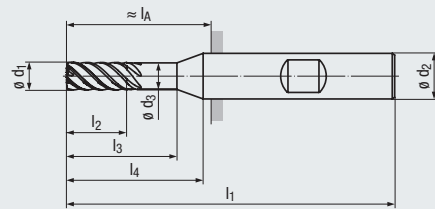
HM



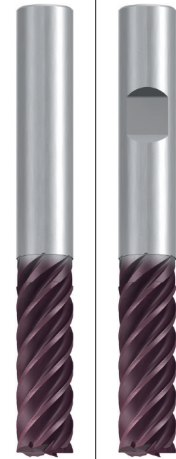
Optional



Design I₄:



Allround



Allround

코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능
- 황삭 및 정삭에 적합

Applications – material (see page 14)

- For all tough materials
- Suitable for HSC finishing

TIALN

P	1.1-5.1	
M	1.1-2.1	3.1-4.1
K	1.1-2.1	2.2
K	3.1-4.1	4.2
N	1.1-1.4	
N	2.1-3.2	4.1-4.2, 5.2
S	1.1-2.2	2.3
S	2.4	2.5-2.6
H		1.1

TIALN

P	1.1-5.1	
M	1.1-2.1	3.1-4.1
K	1.1-2.1	2.2
K	3.1-4.1	4.2
N	1.1-1.4	1.5-1.6
N	2.1-2.8	5.2
S	1.1-2.2	2.3
S	2.4	2.5-2.6

DIN 6527 - Long 디자인 · Long design

주문 코드 · Order code

$\emptyset d_1$ f8	l_2	l_3	l_1	$\emptyset d_3$	l_4	$\emptyset d_2$ h5	l_A	KB	Z (Flutes)	치수 코드	2522A	2523A			
5	13	18	57	4,8	20	6	21	0,12	6	.005	●	●			
6	13	20	57	5,8	—	6	21	0,12	6	.006	●	●			
8	19	25	63	7,7	—	8	27	0,12	6	.008	●	●			
10	22	30	72	9,7	—	10	32	0,2	6	.010	●	●			
12	26	35	83	11,6	—	12	38	0,2	6	.012	●	●			
16	32	40	92	15,5	—	16	44	0,2	6	.016	●	●			
20	38	50	104	19,5	—	20	54	0,3	8	.020	●	●			

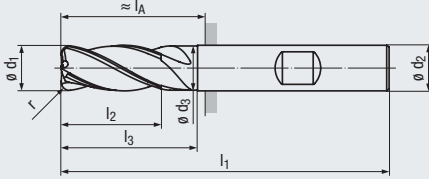
Extra Long 디자인 · Extra long design

주문 코드 · Order code

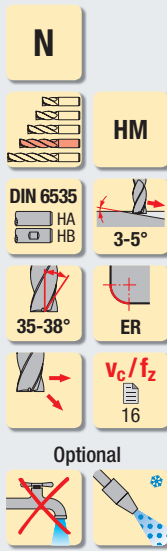
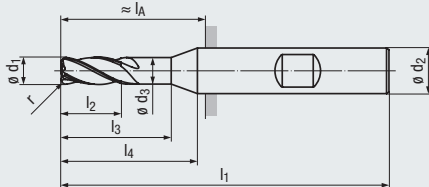
$\emptyset d_1$ h10	l_2	l_3	l_1	$\emptyset d_3$	l_4	$\emptyset d_2$ h6	l_A	KB	Z (Flutes)	치수 코드			2524A	2525A	
6	18	25	62	5,8	—	6	26	0,12	6	.006			●	●	
8	24	30	68	7,7	—	8	32	0,12	6	.008			●	●	
10	30	35	80	9,7	—	10	40	0,2	6	.010			●	●	
12	36	45	93	11,6	—	12	48	0,2	6	.012			●	●	
16	48	55	108	15,5	—	16	60	0,2	6	.016			●	●	
20	60	70	126	19,5	—	20	76	0,3	8	.020			●	●	

- 다양한 용도의 고성능 툴
- ENORM 형상
- 낮은 절삭 진동
- 절삭 직경별 다양한 코너R
- 중심부 절삭날

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Several corner radii per cutting diameter
- Centre cutting



Design l₄:



Allround

코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능, 고인성 소재 포함
- 황삭 및 정삭에 매우 적합

Applications – material (see page 14)

- For almost all materials, including tough materials
- Very suitable for roughing and finishing

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.2-1.4
N	2.1-4.1, 5.2
S	1.1-2.6
H	1.1 1.2-1.3

DIN 6527 - Long 디자인 · Long design

코너R · Corner radius

주문 코드 · Order code										2698A	2699A				
ø d ₁ f8	r ±0.01	l ₂	l ₃	l ₁	ø d ₃	l ₄	ø d ₂ h5	l _A h6	Z (Flutes)	치수 코드					
3	0,1	8	14	57	2,9	20	6	21	4	.003001	●	●			
3	0,3	8	14	57	2,9	20	6	21	4	.003003	●	●			
3	0,5	8	14	57	2,9	20	6	21	4	.003005	●	●			
4	0,1	11	18	57	3,8	20	6	21	4	.004001	●	●			
4	0,3	11	18	57	3,8	20	6	21	4	.004003	●	●			
4	0,4	11	18	57	3,8	20	6	21	4	.004004	●	●			
4	0,5	11	18	57	3,8	20	6	21	4	.004005	●	●			
5	0,1	13	19	57	4,8	20	6	21	4	.005001	●	●			
5	0,3	13	19	57	4,8	20	6	21	4	.005003	●	●			
5	0,5	13	19	57	4,8	20	6	21	4	.005005	●	●			
5	1	13	19	57	4,8	20	6	21	4	.005010	●	●			
6	0,1	13	20	57	5,8	—	6	21	4	.006001	●	●			
6	0,5	13	20	57	5,8	—	6	21	4	.006005	●	●			
6	1,0	13	20	57	5,8	—	6	21	4	.006010	●	●			
6	1,5	13	20	57	5,8	—	6	21	4	.006015	●	●			
8	0,15	19	25	63	7,7	—	8	27	4	.008001	●	●			
8	0,5	19	25	63	7,7	—	8	27	4	.008005	●	●			
8	1	19	25	63	7,7	—	8	27	4	.008010	●	●			
8	1,5	19	25	63	7,7	—	8	27	4	.008015	●	●			
8	2	19	25	63	7,7	—	8	27	4	.008020	●	●			
10	0,15	22	30	72	9,5	—	10	32	4	.010001	●	●			
10	0,5	22	30	72	9,5	—	10	32	4	.010005	●	●			
10	1	22	30	72	9,5	—	10	32	4	.010010	●	●			
10	1,5	22	30	72	9,5	—	10	32	4	.010015	●	●			
10	2	22	30	72	9,5	—	10	32	4	.010020	●	●			
12	0,2	26	35	83	11,5	—	12	38	4	.012002	●	●			
12	0,5	26	35	83	11,5	—	12	38	4	.012005	●	●			
12	1	26	35	83	11,5	—	12	38	4	.012010	●	●			
12	1,5	26	35	83	11,5	—	12	38	4	.012015	●	●			
12	2	26	35	83	11,5	—	12	38	4	.012020	●	●			
12	3	26	35	83	11,5	—	12	38	4	.012030	●	●			
14	1	26	35	83	13,5	—	14	38	4	.014010	●	●			
16	0,3	32	40	92	15,5	—	16	44	4	.016003	●	●			
16	0,5	32	40	92	15,5	—	16	44	4	.016005	●	●			
16	1	32	40	92	15,5	—	16	44	4	.016010	●	●			
16	1,5	32	40	92	15,5	—	16	44	4	.016015	●	●			
16	2	32	40	92	15,5	—	16	44	4	.016020	●	●			
16	3	32	40	92	15,5	—	16	44	4	.016030	●	●			
16	4	32	40	92	15,5	—	16	44	4	.016040	●	●			
20	0,3	38	50	104	19,5	—	20	54	4	.020003	●	●			
20	0,5	38	50	104	19,5	—	20	54	4	.020005	●	●			
20	1	38	50	104	19,5	—	20	54	4	.020010	●	●			
20	1,5	38	50	104	19,5	—	20	54	4	.020015	●	●			
20	2	38	50	104	19,5	—	20	54	4	.020020	●	●			
20	3	38	50	104	19,5	—	20	54	4	.020030	●	●			

- 다양한 용도의 고성능 툴
- ENORM 형상
- 낮은 절삭 진동
- 절삭 직경별 다양한 코너R
- 내부 절삭유 공급, 축방향 토출 방식 (ICA)

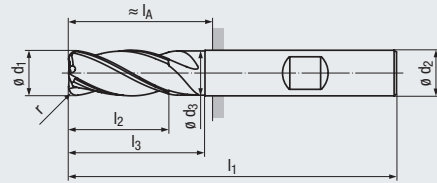
- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Several corner radii per cutting diameter
- Internal coolant supply, axial exit (ICA)

N

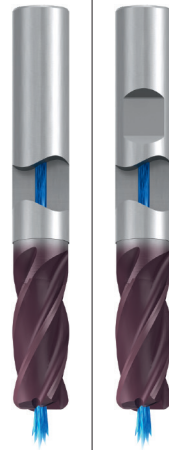
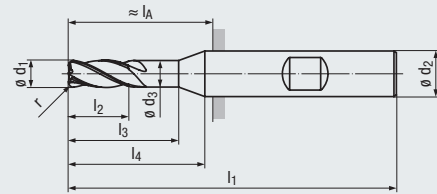
ICA



HM



Design I₄:



Allround

코팅 · Coating

피삭 소재별 적용 범위 (14 페이지)

- 거의 모든 소재에 적용 가능, 고인성 소재 포함
- 황삭 및 정삭에 매우 적합

Applications – material (see page 14)

- For almost all materials, including tough materials
- Very suitable for roughing and finishing

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.2-1.4
N	2.1-4.1, 5.2
S	1.1-2.6
H	1.1 1.2-1.3

DIN 6527 - Long 디자인 · Long design

코너R · Corner radius

주문 코드 · Order code

2698AZ 2699AZ

Ø d ₁ f8	r ±0.01	l ₂	l ₃	l ₁	Ø d ₃	l ₄	Ø d ₂ h5	l _A	Z (Flutes)	치수 코드	2698AZ	2699AZ			
3	0,3	8	14	57	2,9	20	6	21	4	.003003	●	●			
3	0,5	8	14	57	2,9	20	6	21	4	.003005	●	●			
4	0,3	11	18	57	3,8	20	6	21	4	.004003	●	●			
4	0,5	11	18	57	3,8	20	6	21	4	.004005	●	●			
5	0,3	13	19	57	4,8	20	6	21	4	.005003	●	●			
5	0,5	13	19	57	4,8	20	6	21	4	.005005	●	●			
6	0,5	13	20	57	5,8	—	6	21	4	.006005	●	●			
6	1,0	13	20	57	5,8	—	6	21	4	.006010	●	●			
6	1,5	13	20	57	5,8	—	6	21	4	.006015	●	●			
8	0,5	19	25	63	7,7	—	8	27	4	.008005	●	●			
8	1	19	25	63	7,7	—	8	27	4	.008010	●	●			
8	1,5	19	25	63	7,7	—	8	27	4	.008015	●	●			
8	2	19	25	63	7,7	—	8	27	4	.008020	●	●			
10	1	22	30	72	9,5	—	10	32	4	.010010	●	●			
10	1,5	22	30	72	9,5	—	10	32	4	.010015	●	●			
10	2	22	30	72	9,5	—	10	32	4	.010020	●	●			
12	1	26	35	83	11,5	—	12	38	4	.012010	●	●			
12	1,5	26	35	83	11,5	—	12	38	4	.012015	●	●			
12	2	26	35	83	11,5	—	12	38	4	.012020	●	●			
12	3	26	35	83	11,5	—	12	38	4	.012030	●	●			
16	1	32	40	92	15,5	—	16	44	4	.016010	●	●			
16	1,5	32	40	92	15,5	—	16	44	4	.016015	●	●			
16	2	32	40	92	15,5	—	16	44	4	.016020	●	●			
16	3	32	40	92	15,5	—	16	44	4	.016030	●	●			
20	1,5	38	50	104	19,5	—	20	54	4	.020015	●	●			
20	2	38	50	104	19,5	—	20	54	4	.020020	●	●			
20	3	38	50	104	19,5	—	20	54	4	.020030	●	●			

각국의 소재 규격 비교표는 FRANKEN 카탈로그 250 의 416 - 429 페이지에서 확인 가능합니다.
International comparison of materials, see page 416 - 429 in FRANKEN Catalogue 250

피삭 소재별 적용 범위 Applications – material				소재 예시 Material examples	소재 규격 번호 Material numbers
P	강	Steel materials			
	1.1 냉간압출강, 구조강, 폐삭강, 기타.	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm ²	Cq15 S235JR (St37-2) 10SPb20	1.1132 1.0037 1.0722
	2.1 구조강, 표면경화강, 주강.	Construction steels, Case-hardened steels, Steel castings, etc.	≤ 800 N/mm ²	E360 (St70-2) 16MnCr5 GS-25CrMo4	1.0070 1.7131 1.7218
	3.1 표면경화강, 열처리강, 냉간가공강, 기타.	Case-hardened steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm ²	20MoCr3 42CrMo4 102Cr6	1.7320 1.7225 1.2067
	4.1 열처리강, 냉간가공강, 질화강, 기타.	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm ²	50CrMo4 X45NiCrMo4 31CrMo12	1.7228 1.2767 1.8515
M	5.1 고합금강, 냉간가공강, 열간가공강, 기타.	High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm ²	X38CrMoV5-3 X100CrMoV8-1-1 X40CrMoV5-1	1.2367 1.2990 1.2344
	스테인리스강	Stainless steel materials			
	1.1 페라이트계, 마르텐사이트계	Ferritic, martensitic	≤ 950 N/mm ²	X2CrTi12	1.4512
	2.1 오스테나이트계	Austenitic	≤ 950 N/mm ²	X6CrNiMoTi17-12-2	1.4571
	3.1 오스테나이트-페라이트계 (듀플렉스)	Austenitic-ferritic (Duplex)	≤ 1100 N/mm ²	X2CrNiMoN22-5-3	1.4462
K	4.1 내열성 오스테나이트-페라이트계 (슈퍼 듀플렉스)	Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm ²	X2CrNiMoN25-7-4	1.4410
	주철	Cast materials			
	1.1 회주철 (GJL)	Cast iron with lamellar graphite (GJL)	100-250 N/mm ²	EN-GJL-200 (GG20)	EN-JL-1030
	2.1 구상흑연주철 (GJS)	Cast iron with nodular graphite (GJS)	250-450 N/mm ² 350-500 N/mm ² 500-900 N/mm ²	EN-GJL-300 (GG30) EN-GJS-400-15 (GGG40) EN-GJS-700-2 (GGG70)	EN-JL-1050 EN-JS-1030 EN-JS-1070
	3.1 CV주철 (GJV)	Cast iron with vermicular graphite (GJV)	300-400 N/mm ² 400-500 N/mm ²	GJV 300 GJV 450	
N	4.1 가단주철 (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	250-500 N/mm ² 500-800 N/mm ²	EN-GJMW-350-4 (GTW-35) EN-GJMB-450-6 (GTS-45)	EN-JM-1010 EN-JM-1140
	비철금속	Non-ferrous materials			
	알루미늄 합금	Aluminium alloys			
	1.1 알루미늄 합금 전신재	Wrought aluminium alloys	≤ 200 N/mm ² ≤ 350 N/mm ² ≤ 550 N/mm ²	EN AW-AlMn1 EN AW-AlMgSi EN AW-AlZn5Mg3Cu	EN AW-3103 EN AW-6060 EN AW-7022
	2.1 알루미늄 합금 주물	Aluminium cast alloys	Si ≤ 7% 7% < Si ≤ 12% 12% < Si ≤ 17%	EN AC-AlMg5 EN AC-AISi9Cu3 GD-AISi17Cu4FeMg	EN AC-51300 EN AC-46500
S	동 합금	Copper alloys			
	2.1 순동, 저합금동	Pure copper, low-alloyed copper	≤ 400 N/mm ²	E-Cu 57	EN CW 004 A
	2.2 동-아연 합금 (황동, 롱-칩 발생)	Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm ²	CuZn37 (Ms63)	EN CW 508 L
	2.3 동-아연 합금 (황동, 숏-칩 발생)	Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm ²	CuZn36Pb3 (Ms58)	EN CW 603 N
	2.4 동-알루미늄 합금 (알루브론즈, 롱-칩 발생)	Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm ²	CuAl10Ni5Fe4	EN CW 307 G
H	2.5 동-주석 합금 (청동, 롱-칩 발생)	Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm ²	CuSn8P	EN CW 459 K
	2.6 동-주석 합금 (청동, 숏-칩 발생)	Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm ²	CuSn7 ZnPb (Rg7)	2.1090
	2.7 특수 동 합금	Special copper alloys	≤ 600 N/mm ² ≤ 1400 N/mm ²	(AMPICO® 8) (AMPICO® 45)	
	마그네슘 합금	Magnesium alloys			
	3.1 마그네슘 합금	Magnesium wrought alloys	≤ 500 N/mm ²	MgAl6Zn	3.5612
H	3.2 마그네슘 합금 주물	Magnesium cast alloys	≤ 500 N/mm ²	EN-MCMgAl9Zn1	EN-MC21120
	합성수지	Synthetics			
	4.1 열경화성수지 (숏-칩 발생)	Duroplastics (short-chipping)		Bakelit, Pertinax	
	4.2 열가소성수지 (롱-칩 발생)	Thermoplastics (long-chipping)		PMMA, POM, PVC	
	4.3 섬유강화수지 (섬유함유율 < 30%)	Fibre-reinforced synthetics (fibre content < 30%)		GFK, CFK, AFK	
S	4.4 섬유강화수지 (섬유함유율 > 30%)	Fibre-reinforced synthetics (fibre content > 30%)		GFK, CFK, AFK	
	특수 소재	Special materials			
	5.1 그래파이트 (흑연)	Graphite		C 8000	
	5.2 텅스텐-구리 합금	Tungsten-copper alloys		W-Cu 80/20	
	5.3 복합 소재	Composite materials		Hylite, Alucobond	
S	특수 소재	Special materials			
	티타늄 합금	Titanium alloys			
	1.1 순티타늄	Pure titanium	≤ 450 N/mm ² ≤ 900 N/mm ² ≤ 1250 N/mm ²	Ti1 TiAl6V4 TiAl4Mo4Sn2	3.7025 3.7165 3.7185
	2.1 니켈 합금, 코발트 합금, 철 합금	Nickel alloys, cobalt alloys and iron alloys			
	2.2 순니켈	Pure nickel	≤ 600 N/mm ²	Ni 99,6	2.4060
H	2.3 니켈기 합금	Nickel-base alloys	≤ 1000 N/mm ² ≤ 1600 N/mm ² ≤ 1000 N/mm ² ≤ 1600 N/mm ² ≤ 1500 N/mm ²	Monel 400 Inconel 718 Udimet 605 Haynes 25 Incoloy 800	2.4360 2.4668 2.4964 1.4958
	2.4 코발트기 합금	Cobalt-base alloys			
	2.5 철기 합금	Iron-base alloys			
	2.6 고경도 소재	Hard materials			
	1.1 고강도강, 경화강, 칠드 주철	High strength steels, hardened steels, hard castings	44 - 50 HRC 50 - 55 HRC 55 - 60 HRC 60 - 63 HRC 63 - 66 HRC	Weldox 1100 Hardox 550 Armox 600T Ferro-Titanit HSSE	

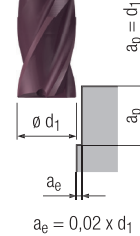
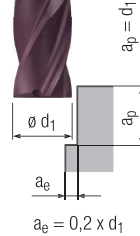
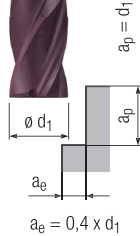
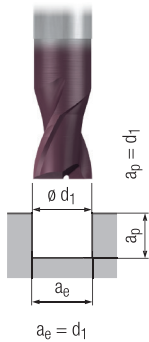


솔리드 초경 엔드밀, 슬롯 드릴 - short 디자인
Solid carbide end mills and slot drills – short design

N

적용 대상 · Valid for

1916A 2510A 2516A
1917A 2511A 2517A



		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	1.1	170	$0,005 \times d_1$	190	$0,006 \times d_1$	200	$0,007 \times d_1$	240	$0,008 \times d_1$	□	■	□	■
	2.1	150	$0,004 \times d_1$	170	$0,005 \times d_1$	180	$0,006 \times d_1$	210	$0,007 \times d_1$	□	■	□	■
	3.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	□	■	□	■
	4.1	120	$0,003 \times d_1$	130	$0,004 \times d_1$	140	$0,004 \times d_1$	170	$0,005 \times d_1$	□	■		
	5.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	□	■		
M	1.1	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$			□	■
	2.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$			□	■
	3.1	50	$0,002 \times d_1$	60	$0,003 \times d_1$	60	$0,003 \times d_1$	70	$0,004 \times d_1$			□	■
	4.1	30	$0,002 \times d_1$	30	$0,003 \times d_1$	40	$0,003 \times d_1$	40	$0,004 \times d_1$			□	■
K	1.1	170	$0,005 \times d_1$	190	$0,006 \times d_1$	200	$0,007 \times d_1$	240	$0,008 \times d_1$	□	■		
	1.2	170	$0,005 \times d_1$	190	$0,006 \times d_1$	200	$0,007 \times d_1$	240	$0,008 \times d_1$	□	■		
	2.1	150	$0,004 \times d_1$	170	$0,005 \times d_1$	180	$0,006 \times d_1$	210	$0,006 \times d_1$	□	■		
	2.2	150	$0,004 \times d_1$	170	$0,005 \times d_1$	180	$0,006 \times d_1$	210	$0,006 \times d_1$	□	■		
	3.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	□	■		
	3.2	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	□	■		
	4.1	100	$0,003 \times d_1$	110	$0,004 \times d_1$	120	$0,004 \times d_1$	140	$0,005 \times d_1$	□	■		
	4.2	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$	□	■		
N	1.1	220	$0,009 \times d_1$	250	$0,010 \times d_1$	280	$0,011 \times d_1$	300	$0,013 \times d_1$			□	■
	1.2	220	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,011 \times d_1$			□	■
	1.3	220	$0,007 \times d_1$	250	$0,008 \times d_1$	280	$0,009 \times d_1$	300	$0,010 \times d_1$			□	■
	1.4	200	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,011 \times d_1$			□	■
	1.5												
	1.6												
	2.1	150	$0,005 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	210	$0,008 \times d_1$			□	■
	2.2	150	$0,005 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	210	$0,008 \times d_1$			□	■
	2.3	150	$0,005 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	210	$0,008 \times d_1$	□		□	■
	2.4	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$			□	■
	2.5	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$			□	■
	2.6	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	□		□	■
	2.7	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$			□	■
	2.8	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$			□	■
	3.1	340	$0,009 \times d_1$	370	$0,011 \times d_1$	410	$0,013 \times d_1$	480	$0,014 \times d_1$			□	■
	3.2	340	$0,007 \times d_1$	370	$0,008 \times d_1$	410	$0,010 \times d_1$	480	$0,011 \times d_1$			□	■
	4.1	340	$0,008 \times d_1$	370	$0,009 \times d_1$	410	$0,011 \times d_1$	480	$0,012 \times d_1$	□		□	■
	4.2	500	$0,008 \times d_1$	550	$0,009 \times d_1$	600	$0,011 \times d_1$	700	$0,012 \times d_1$			□	■
	4.3												
	4.4												
	5.1												
	5.2	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$				■
	5.3												
S	1.1	80	$0,004 \times d_1$	90	$0,004 \times d_1$	100	$0,005 \times d_1$	110	$0,006 \times d_1$				■
	1.2	70	$0,003 \times d_1$	80	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$				■
	1.3	40	$0,003 \times d_1$	40	$0,003 \times d_1$	50	$0,004 \times d_1$	60	$0,004 \times d_1$				■
	2.1	70	$0,002 \times d_1$	80	$0,002 \times d_1$	80	$0,003 \times d_1$	100	$0,003 \times d_1$				■
	2.2	30	$0,002 \times d_1$	30	$0,002 \times d_1$	35	$0,003 \times d_1$	40	$0,003 \times d_1$				■
	2.3	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				■
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				■
	2.5	20	$0,002 \times d_1$	20	$0,002 \times d_1$	20	$0,003 \times d_1$	30	$0,003 \times d_1$				■
H	1.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	□	■		
	1.2	80	$0,003 \times d_1$	90	$0,003 \times d_1$	100	$0,004 \times d_1$	110	$0,004 \times d_1$	□	■		
	1.3			90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	□	■		
	1.4												
	1.5												

v_c = 절삭 속도 · Cutting speed
 f_z = 날당 이송 · Feed per tooth

■ = 매우 적합함 · very suitable
□ = 적합함 · suitable

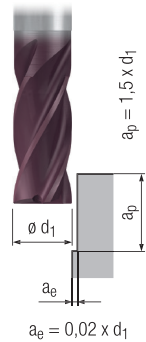
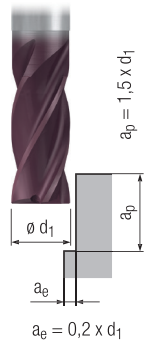
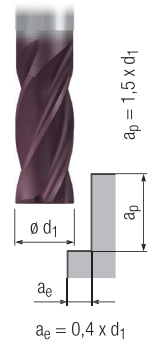
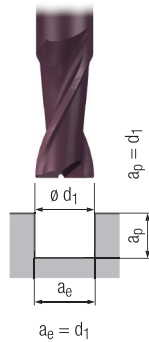


솔리드 초경 엔드밀 - long 디자인
Solid carbide end mills – long design

N

적용 대상 · Valid for

1998A	2513A	2698A
1998AZ	2518A	2698AZ
1999A	2519A	2699A
1999AZ	2522A	2699AZ
2512A	2523A	



		V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]				
P	1.1	140	$0,005 \times d_1$	150	$0,005 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	☐	☒	☐	☒
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	☐	☒	☐	☒
	3.1	110	$0,004 \times d_1$	120	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	☐	☒	☐	☒
	4.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	☐	☒		
	5.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,003 \times d_1$	130	$0,004 \times d_1$	☐	☒		
M	1.1	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$			☐	☒
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$			☐	☒
	3.1	40	$0,002 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$			☐	☒
	4.1	30	$0,002 \times d_1$	30	$0,003 \times d_1$	40	$0,003 \times d_1$	40	$0,003 \times d_1$			☐	☒
K	1.1	140	$0,005 \times d_1$	150	$0,006 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	☐	☒		
	1.2	140	$0,005 \times d_1$	150	$0,006 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	☐	☒		
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	☐	☒		
	2.2	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	☐	☒		
	3.1	110	$0,004 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	☐	☒		
	3.2	110	$0,004 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	☐	☒		
	4.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	☐	☒		
	4.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	☐	☒		
N	1.1	220	$0,009 \times d_1$	250	$0,010 \times d_1$	280	$0,011 \times d_1$	300	$0,013 \times d_1$			☐	☒
	1.2	220	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,011 \times d_1$			☐	☒
	1.3	220	$0,007 \times d_1$	250	$0,008 \times d_1$	280	$0,009 \times d_1$	300	$0,010 \times d_1$			☐	☒
	1.4	200	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,011 \times d_1$			☐	☒
	1.5												
	1.6												
	2.1	130	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,007 \times d_1$			☐	☒
	2.2	130	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,007 \times d_1$			☐	☒
	2.3	130	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,007 \times d_1$	☐		☐	☒
	2.4	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	170	$0,006 \times d_1$			☐	☒
	2.5	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	170	$0,006 \times d_1$			☐	☒
	2.6	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	170	$0,006 \times d_1$	☐		☐	☒
	2.7	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$			☐	☒
	2.8	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$			☐	☒
	3.1	290	$0,009 \times d_1$	320	$0,010 \times d_1$	350	$0,011 \times d_1$	410	$0,013 \times d_1$			☐	☒
	3.2	290	$0,007 \times d_1$	320	$0,008 \times d_1$	350	$0,009 \times d_1$	410	$0,010 \times d_1$			☐	☒
	4.1	290	$0,008 \times d_1$	320	$0,009 \times d_1$	350	$0,009 \times d_1$	410	$0,011 \times d_1$		☐	☐	☒
	4.2	430	$0,008 \times d_1$	470	$0,009 \times d_1$	520	$0,009 \times d_1$	600	$0,011 \times d_1$			☐	☒
	4.3												
	4.4												
	5.1												
	5.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$				☒
	5.3												
S	1.1	70	$0,004 \times d_1$	80	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$				☒
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$				☒
	1.3	40	$0,003 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,004 \times d_1$				☒
	2.1	60	$0,002 \times d_1$	70	$0,002 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$				☒
	2.2	20	$0,002 \times d_1$	20	$0,002 \times d_1$	15	$0,003 \times d_1$	30	$0,003 \times d_1$				☒
	2.3	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				☒
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				☒
	2.5	20	$0,002 \times d_1$	20	$0,002 \times d_1$	20	$0,003 \times d_1$	30	$0,003 \times d_1$				☒
H	1.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,003 \times d_1$	130	$0,004 \times d_1$	☐	☒		
	1.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,003 \times d_1$	100	$0,004 \times d_1$	☐	☒		
	1.3			70	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$	☐	☒		
	1.4												
	1.5												



솔리드 초경 엔드밀 - extra long 디자인
Solid carbide end mills – extra long design

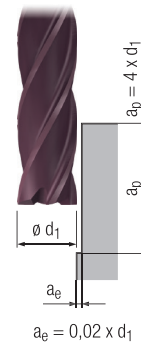
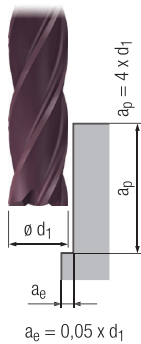
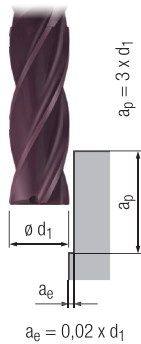
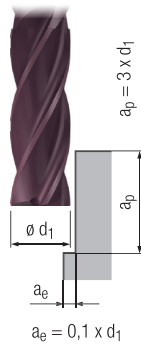
N

적용 대상 · Valid for

2514A 2524A 2528A
2515A 2525A 2529A
2520A 2526A
2521A 2527A

3 x d₁

4 x d₁



		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]				
P	1.1	120	0,005 x d ₁	140	0,006 x d ₁	100	0,005 x d ₁	120	0,005 x d ₁	□	■	□	■
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	90	0,004 x d ₁	110	0,005 x d ₁	□	■	□	■
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	70	0,004 x d ₁	90	0,004 x d ₁	□	■	□	■
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	60	0,003 x d ₁	70	0,003 x d ₁	□	■		
	5.1	60	0,003 x d ₁	70	0,003 x d ₁	50	0,003 x d ₁	60	0,003 x d ₁	□	■		
M	1.1	120	0,003 x d ₁	140	0,004 x d ₁	100	0,003 x d ₁	120	0,003 x d ₁			□	■
	2.1	100	0,003 x d ₁	120	0,003 x d ₁	80	0,003 x d ₁	100	0,003 x d ₁			□	■
	3.1	70	0,003 x d ₁	80	0,003 x d ₁	60	0,003 x d ₁	70	0,003 x d ₁			□	■
	4.1	50	0,003 x d ₁	60	0,003 x d ₁	40	0,003 x d ₁	50	0,003 x d ₁			□	■
K	1.1	120	0,005 x d ₁	140	0,006 x d ₁	100	0,005 x d ₁	120	0,006 x d ₁	□	■		
	1.2	120	0,005 x d ₁	140	0,006 x d ₁	100	0,005 x d ₁	120	0,006 x d ₁	□	■		
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	90	0,004 x d ₁	110	0,004 x d ₁	□	■		
	2.2	110	0,004 x d ₁	130	0,005 x d ₁	90	0,004 x d ₁	110	0,004 x d ₁	□	■		
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	70	0,004 x d ₁	90	0,004 x d ₁	□	■		
	3.2	90	0,004 x d ₁	110	0,005 x d ₁	70	0,004 x d ₁	90	0,004 x d ₁	□	■		
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	60	0,003 x d ₁	70	0,003 x d ₁	□	■		
	4.2	60	0,003 x d ₁	70	0,004 x d ₁	50	0,003 x d ₁	60	0,003 x d ₁	□	■		
N	1.1	360	0,009 x d ₁	430	0,011 x d ₁	300	0,009 x d ₁	430	0,009 x d ₁			□	■
	1.2	360	0,008 x d ₁	430	0,010 x d ₁	300	0,008 x d ₁	430	0,009 x d ₁			□	■
	1.3	360	0,007 x d ₁	430	0,008 x d ₁	300	0,007 x d ₁	430	0,008 x d ₁			□	■
	1.4	240	0,008 x d ₁	290	0,010 x d ₁	200	0,008 x d ₁	290	0,009 x d ₁			□	■
	1.5	230	0,007 x d ₁	280	0,008 x d ₁	180	0,007 x d ₁	280	0,008 x d ₁			□	■
	1.6	160	0,006 x d ₁	190	0,007 x d ₁	130	0,006 x d ₁	190	0,007 x d ₁			□	■
	2.1	110	0,005 x d ₁	130	0,006 x d ₁	90	0,005 x d ₁	110	0,006 x d ₁			□	■
	2.2	110	0,005 x d ₁	130	0,006 x d ₁	90	0,005 x d ₁	110	0,006 x d ₁			□	■
	2.3	110	0,005 x d ₁	130	0,006 x d ₁	90	0,005 x d ₁	110	0,006 x d ₁	□		□	■
	2.4	100	0,004 x d ₁	120	0,005 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁			□	■
	2.5	100	0,004 x d ₁	120	0,005 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁			□	■
	2.6	100	0,004 x d ₁	120	0,005 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	□		□	■
	2.7	60	0,003 x d ₁	70	0,004 x d ₁	50	0,003 x d ₁	60	0,003 x d ₁			□	■
	2.8	60	0,003 x d ₁	70	0,004 x d ₁	50	0,003 x d ₁	60	0,003 x d ₁			□	■
	3.1												
	3.2												
	4.1												
	4.2												
	4.3												
	4.4												
	5.1												
	5.2	60	0,003 x d ₁	70	0,004 x d ₁	50	0,003 x d ₁	60	0,003 x d ₁				■
	5.3												
S	1.1	90	0,004 x d ₁	100	0,005 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁				■
	1.2	70	0,003 x d ₁	80	0,004 x d ₁	60	0,003 x d ₁	70	0,003 x d ₁				■
	1.3	70	0,003 x d ₁	80	0,003 x d ₁	60	0,003 x d ₁	70	0,003 x d ₁				■
	2.1	70	0,004 x d ₁	80	0,004 x d ₁	60	0,004 x d ₁	70	0,004 x d ₁				■
	2.2	30	0,003 x d ₁	40	0,004 x d ₁	15	0,003 x d ₁	30	0,003 x d ₁				■
	2.3	20	0,002 x d ₁	25	0,002 x d ₁	25	0,002 x d ₁	20	0,002 x d ₁				■
	2.4	30	0,003 x d ₁	45	0,003 x d ₁	25	0,003 x d ₁	30	0,003 x d ₁				■
	2.5	20	0,002 x d ₁	20	0,002 x d ₁	20	0,002 x d ₁	20	0,002 x d ₁				■
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

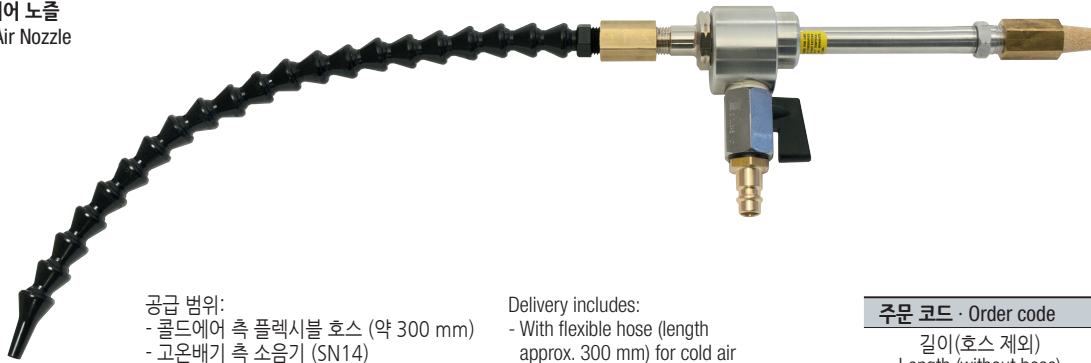
	P	M	K	N	S	H
툴 타입 Tool type	고성능 엔드밀 프로그램 High performance end mill programme					
NR	Multi-Cut	Multi-Cut	Multi-Cut			
NF		TiNox-Cut			TiNox-Cut	
N	Jet-Cut	TiNox-Cut	Jet-Cut		TiNox-Cut	
W				Alu-Cut		
WR				Alu-Cut		
H						Hard-Cut
툴 타입 Tool type	유니버설 엔드밀 Universal end mill					
N	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut

고성능 엔드밀을 위한 홍보 브로셔 및 카달로그

Sales literature for high performance end mills



콜드에어 노즐
Cold-Air Nozzle



공급 범위:

- 콜드웨어 측 플렉시블 호스 (약 300 mm)
- 고온배기 측 소음기 (SN14)
- 볼밸브 (1/4" 피팅 포함) 및 6 mm 흡기 호스 (7.2 mm 쿼체인지 어댑터 포함)

Delivery includes:

- With flexible hose (length approx. 300 mm) for cold air
- Silencer (SN14) for hot exhaust air
- Ball-valve with fitting (1/4") for inlet hose (6 mm) with quick-change attachment (7.2 mm)

주문 코드 · Order code		6910
길이(호스 제외) Length (without hose)	치수 코드	
225 mm	.15	●

예비 호스
Spare Hose



주문 코드 · Order code		6910
길이 Length	치수 코드	
≈ 300 mm	.20	●
≈ 400 mm	.22	●
≈ 500 mm	.21	●

콜드에어 노즐용 홀더
Holders for the Cold-Air Nozzle



기본 홀더 및 소켓
Socket with basic holder



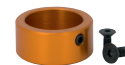
마그네틱 고정판 및 소켓
Socket with magnetic shoe



Socket



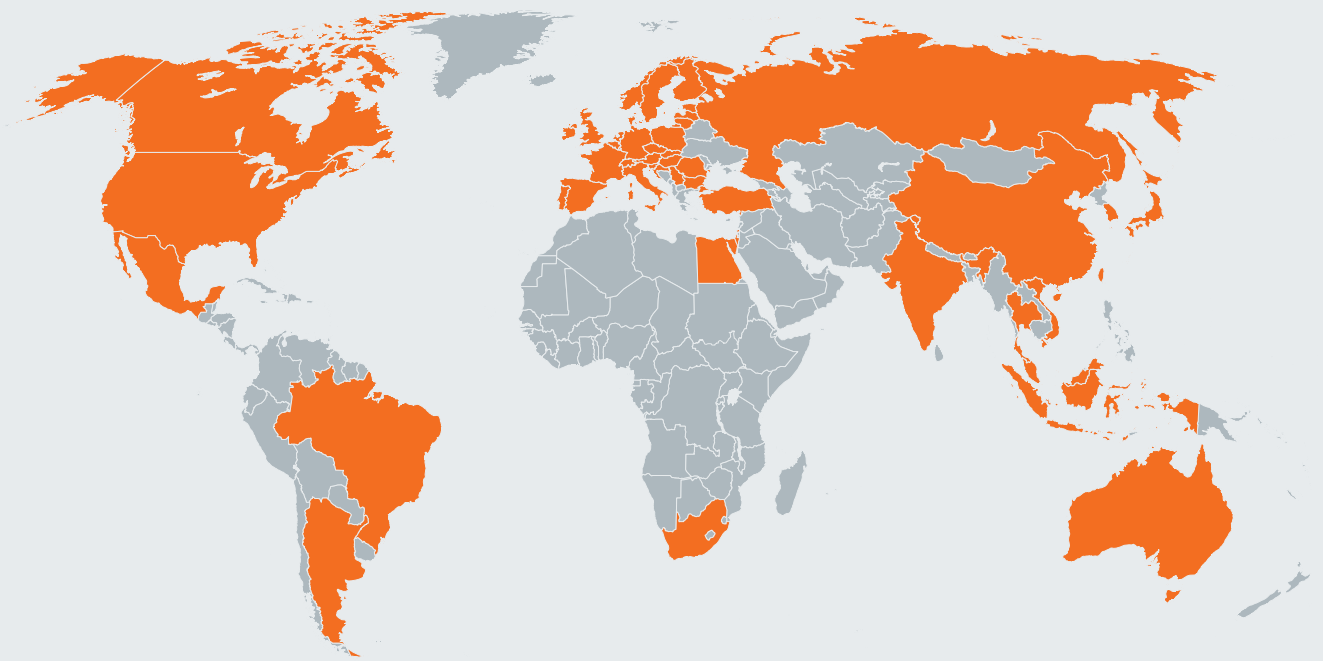
소켓용 기본 홀더
Basic holder for socket



소켓용 마그네틱 고정판
Magnetic shoe for socket



주문 코드 · Order code		6910				
치수 Dimensions	치수 코드					
ø 45 x 68 mm	.24	●				
ø 80 x 80 mm	.25		●			
ø 80 x 17 mm	.26					●
ø 32 x 63 mm	.27			●		
ø 45 x 20 mm	.32				●	



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