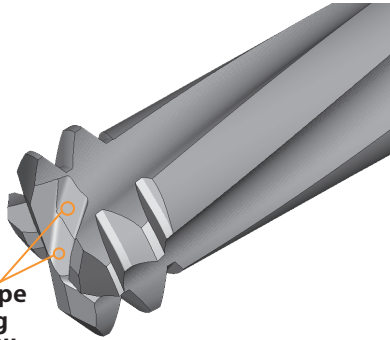
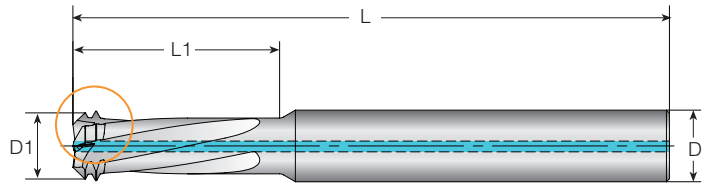
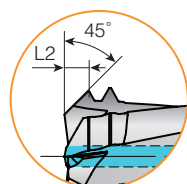
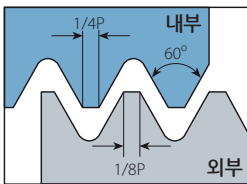


Endmill Type
2 gashing
Thread Mill

- ETMR 공구는 하나의 공구 작업에서 드릴, 나사 및 챔퍼작업을 모두 수행합니다.
- 미리 뚫은 구멍은 더 이상 필요하지 않습니다!
- 드릴링 및 나사산 밀링이 동시에 수행되며 챔퍼링으로 나사산 작업 마무리를 됩니다
- 다기능 공구로 막힌구멍, 관통 구멍 전부 사용이 가능합니다
- 샹크 직경의 경우 8, 10, 12mm 규격은 내부 급유형을 추천합니다
- 나사 길이 : 2xDo 및 2.5xDo (나사 직경)
- 모든 공구는 오른쪽 회전이며, 오른쪽 회전 및 왼쪽 회전 작업이 가능한 스레드밀 입니다.

- ETMR tool performs both drilling, threading and chamfering in one tool operation.
- Pre-drilled holes are no longer necessary!
- While drilling and thread milling are performed simultaneously, the chamfer is threaded finish.
- This multifunctional tool can be used with all blind holes and through holes
- For shank diameters 8, 10, and 12 mm tools are recommended for internal grade type
- Thread length: 2xDo and 2.5xDo (thread diameter)
- All tools are left-handed, thread mills capable of right-handed rotation and left-handed rotation.



ISO 측정 항목

단위(Unit) : mm

주문 번호	피치 규격		날 수		날 경		유효장(L1)		길이	전 장	샹크
Order Number	Thread	Pitch (mm)	Flutes	Teeth	Diameter		Effective Length		L2	Overall Length	Shank Dia
			Z	Zt	D1	D2	2D	2.5D		L	D

미니어처 타입 (알루미늄 용) Miniature Type (FOR Aluminum)

외부 급유형 (Without coolant)

ETMR	014 2D(2.5D)	M1.4	0.3	4	2	0.95	1.05	3.3	4.0	0.17	45	4
	016 2D(2.5D)	M1.6~M1.8	0.35	4	2	1.04	1.2	3.7	4.5	0.195	45	4
	020 2D(2.5D)	M2	0.4	4	2	1.4	1.55	4.5	5.5	0.23	45	4
	025 2D(2.5D)	M2.5~M2.6	0.45	4	2	1.85	2.0	5.5	6.75	0.345	45	4

E 타입 Endmill Type

외부 급유형 (Without coolant)

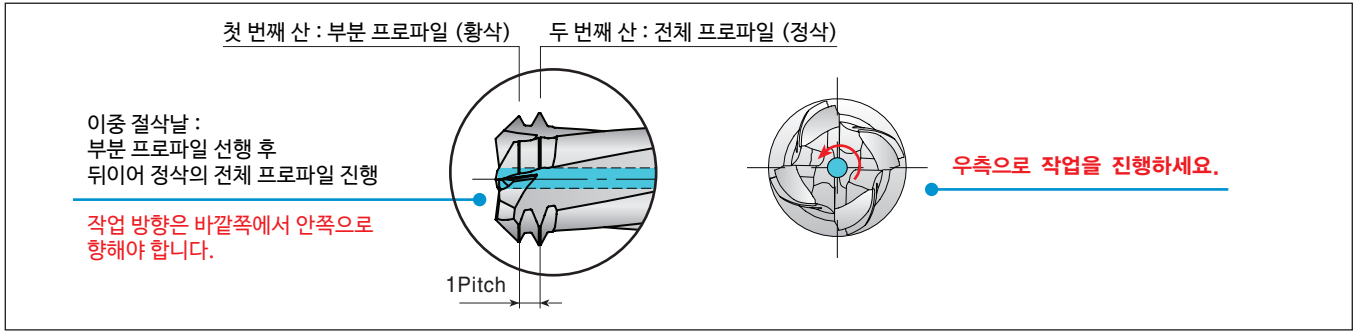
ETMR	030 2D(2.5D)	M3	0.5	4	2	2.17	2.4	7.0	8.5	0.4	60	6
	040 2D(2.5D)	M4	0.7	4	2	2.88	3.2	9.2	11.2	0.57	60	6
	050 2D(2.5D)	M5	0.8	4	2	3.61	3.9	11.5	14.4	0.7	60	6
	060 2D(2.5D)	M6~M9	1.0	4	2	4.4	4.7	14.0	17.0	0.79	60	6
	080 2D(2.5D)	M8~M12	1.25	4	2	5.8	6.1	18.0	22.0	0.9	65	8
	100 2D(2.5D)	M10~M15	1.5	4	2	7.4	7.8	23.0	28.0	1.12	65	8
	120 2D(2.5D)	M12	1.75	4	2	8.6	9.0	26.0	33.0	1.20	80	10
	160 2D(2.5D)	M16~M23	2.0	4	2	11.4	11.8	35.0	43.0	2.00	100	12

내부 급유형 (With coolant)

ETMR	060C 2D(2.5D)	M6~M9	1.0	4	2	4.4	4.7	14	17	0.79	60	6
	080C 2D(2.5D)	M8~M12	1.25	4	2	5.8	6.1	18	22	0.9	65	8
	100C 2D(2.5D)	M10~M15	1.5	4	2	7.4	7.8	23	28	1.12	65	8
	120C 2D(2.5D)	M12	1.75	4	2	8.6	9.0	26	33	1.20	80	10
	160C 2D(2.5D)	M16~M23	2.0	4	2	11.4	11.8	35	43	2.00	100	12

* 코팅은 알루미늄 전용(DLC), SUS(NACO3), 강용(N-PLUS) 추천하며, 고객의 피삭재 요청에 따라 생산이 가능 합니다

* The coating is recommended for aluminum (DLC), SUS (NACO3), steel (N-PLUS) and can be produced according to customer's request.



INCH 측정 항목

단위(Unit) : mm

주문 번호	피치 규격		날 수	날 경		유효장(L1)		길이	전 장	생크
Order Number	Thread	Pitch (TPI)	Flutes Z	Teeth Zt	Diameter D1 D2	Effective Length 2D 2.5D		L2	Overall Length L	Shank Dia D

E 타입 Endmill Type

외부 급유형 (Without coolant)

ETMR	4-40 2D(2.5D)	No.4-40	40	3	2	1.76	2.10	7.2	8.8	0.38	60	6
	6-32 2D(2.5D)	No.6-32	32	3	2	2.21	2.60	8.6	10.5	0.45	60	6
	8-32 2D(2.5D)	No.8-32	32	3	2	2.62	3.00	10.0	12.2	0.60	60	6
	1/4-28 2D(2.5D)	1/4"x28	28	3	2	4.58	5.00	14.4	17.8	0.69	60	6
	10-24 2D(2.5D)	No.10-24	24	3	2	3.18	3.50	11.4	-	0.80	60	6
	1/4-20 2D(2.5D)	1/4"x20	20	3	2	4.29	4.80	14.5	18.0	0.80	6058	6

내부 급유형 (With coolant)

ETMR	1/4-28C 2D(2.5D)	1/4"-28	28	3	2	4.58	5.00	14.4	17.8	0.69	65	8
	5/16-24C 2D(2.5D)	5/16"-24	24	3	2	6.02	6.50	17.6	21.8	0.85	65	8
	1/4-20C 2D(2.5D)	1/4"x20	20	3	2	4.29	4.80	14.5	18.0	0.80	65	8
	3/8-16C 2D(2.5D)	3/8"-16	16	3	2	6.18	6.70	-	26.0	1.10	65	8

* 코팅은 알루미늄 전용(DLC), SUS (NACO3), 강용(N-PLUS) 추천하며, 고객의 피삭재 요청에 따라 생산이 가능 합니다

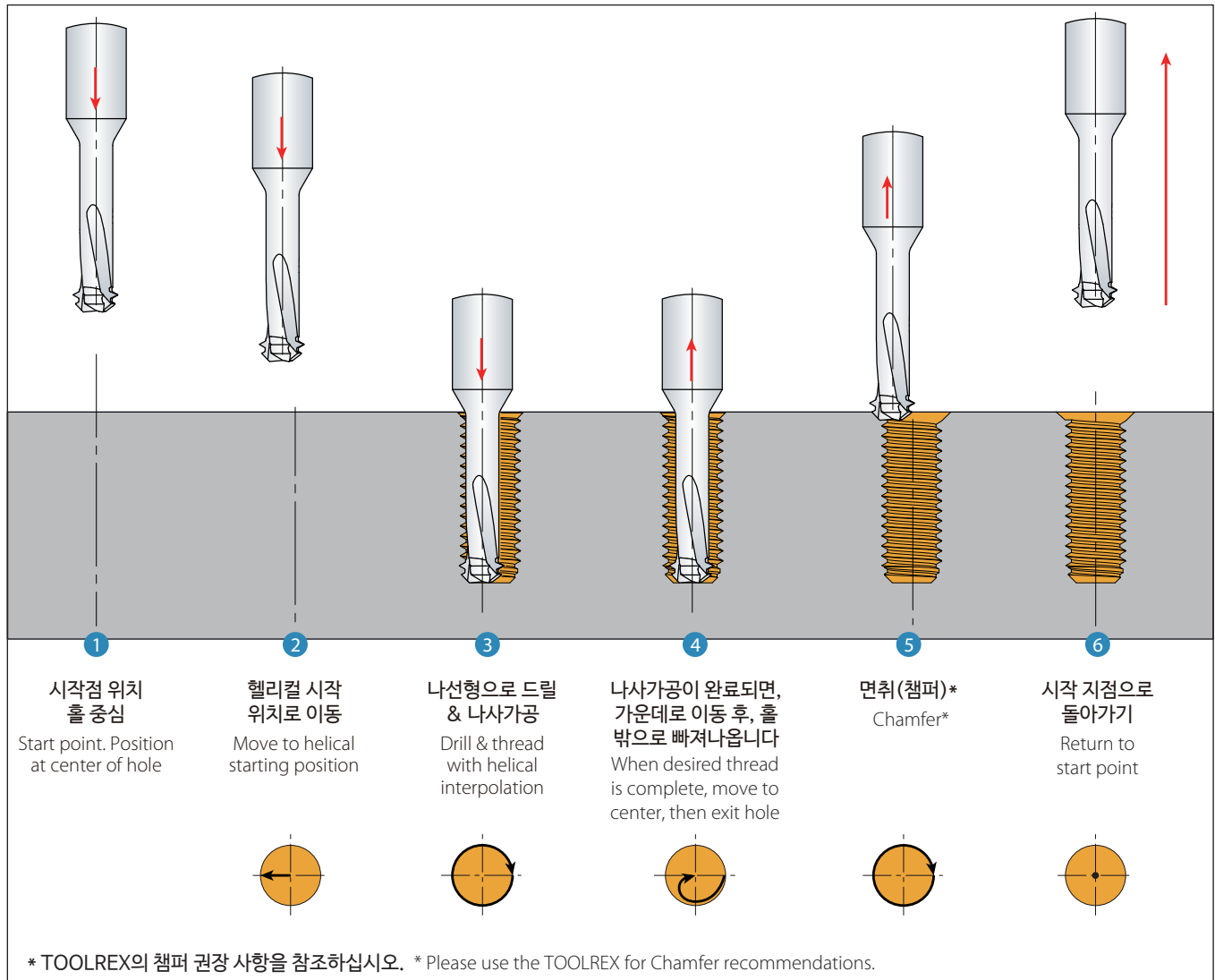
* The coating is recommended for aluminum (DLC), SUS (NACO3), steel (N-PLUS) and can be produced according to customer's request.

대응 피삭재표 (☆◎○ 순으로 추천) Material Applications (☆ Highly Recommended ◎ Recommended ○ Suggested)

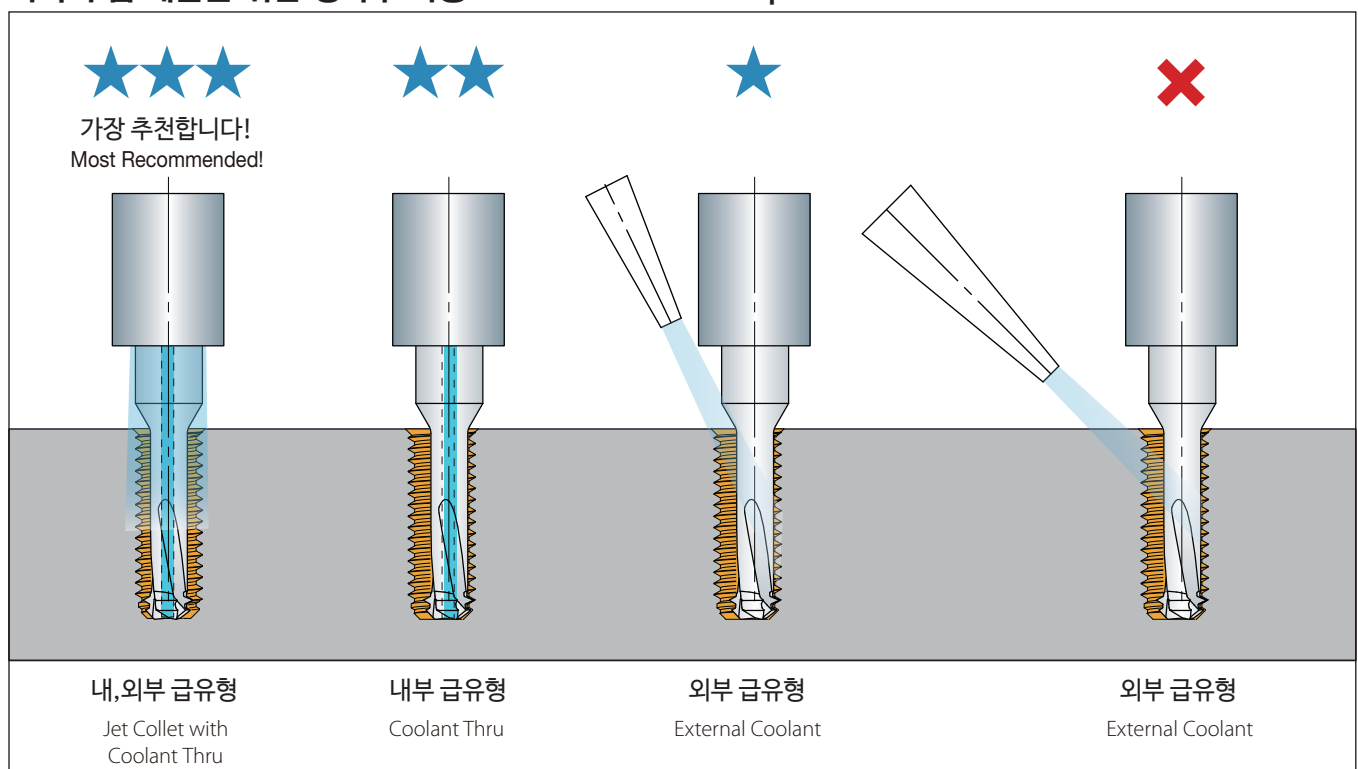
피 삭 재 Work Material												
일반구조 압연강 Structural Steels SS400	탄소강 Carbon Steels S45C S55C	합금강 Alloy Steels SK / SCM SUS	프리하든강 Prehardened Steels NAK HPM	주철 Cast Iron	알루미늄합금 Aluminum Alloys	그래파이트 Graphite	동 Copper	플라스틱 Plastics	유리함유수지 Glass Filled Plastics	티타늄합금 Titanium Alloys	초내열합금 Heat Resistant Alloys	초경합금 Cemented Carbide
◎	◎	◎	◎	◎	◎		◎	◎		○		

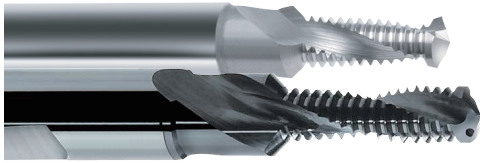
ISO
M1.4~M2.5

동작주기 Operating Cycle

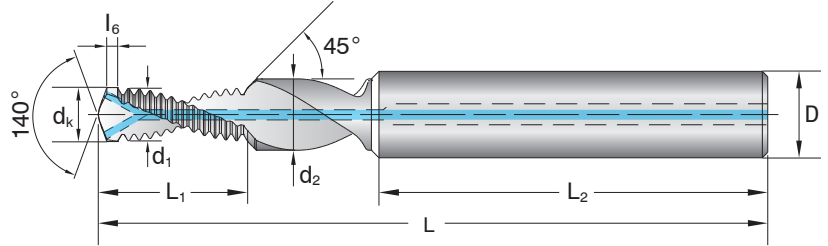
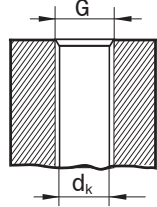
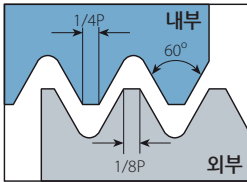


최적의 칩 배출을 위한 냉각수 사용 Coolant Use for Best Chip Evacuation





- DTM 공구는 하나의 공구 작업에서 드릴, 나사 및 챔퍼링을 모두 수행합니다.
- 하나의 공구로 드릴작업 및 나사작업을 동시에 진행하여 가공시간을 단축시킵니다.
- 최대 나사가공 길이 : $2 \times D_o$, $2.5 \times D_o$ (나사가공 직경)
- 비철금속에 권장합니다.
- DTM tool performs both drilling, threading and chamfering in one tool operation.
- Drill and thread mill with one tool
- Maximum thread length: $2 \times D_o$, $2.5 \times D_o$ (Thread Diameter)
- Recommended for non-ferrous materials



ISO 측정 항목

단위(Unit) : mm

주 문 번 호	피치 규격		드릴직경	외 경	목부직경	유효길이(L1)		생크길이	드릴길이	전 장	생크
Order Number	Thread	Pitch (mm)	Drill Dia	Cutter Dia	Max. C'sink	Effective Length		Shank Length	Shank Length	Drill Length	Shank Dia
			d _k	d ₁	d ₂	2D	2.5D	L ₂	l ₆	L	D

외부 급유형 (Without coolant)

DTM	030 2D(2.5D)	M3	0.50	2.5	2.45	3.4	6.7	8.2	36	0.4	50	6
	040 2D(2.5D)	M4	0.70	3.3	3.25	4.5	8.7	10.8	36	0.6	50	6
	050 2D(2.5D)	M5	0.80	4.2	4.0	5.5	10.9	13.3	36	0.7	55	6
	060 2D(2.5D)	M6	1.00	5.0	4.75	6.6	13.7	16.7	36	1.0	60	8
	080 2D(2.5D)	M8	1.25	6.8	6.35	9.0	18.4	22.1	40	1.2	75	10
	100 2D(2.5D)	M10	1.50	8.5	7.95	11.0	22.2	26.7	45	1.5	80	12
	120 2D(2.5D)	M12	1.75	10.2	9.95	13.5	25.5	30.8	45	1.5	90	14
	140 2D(2.5D)	M14	2.00	12.0	11.2	15.5	31.2	39.2	48	1.5	100	16
	160 2D(2.5D)	M16	2.00	14.0	13.2	17.5	35.5	45.5	48	1.5	100	18

내부 급유형 (With coolant)

DTM	040C 2D(2.5D)	M4	0.70	3.3	3.25	4.5	8.7	10.8	36	0.6	50	6
	050C 2D(2.5D)	M5	0.80	4.2	4.0	5.5	10.9	13.33	36	0.7	55	6
	060C 2D(2.5D)	M6	1.00	5.0	4.75	6.6	13.7	16.7	36	1.0	60	8
	080C 2D(2.5D)	M8	1.25	6.8	6.35	9.0	18.4	22.1	40	1.2	75	10
	100C 2D(2.5D)	M10	1.50	8.5	7.95	11.0	22.2	26.7	45	1.5	80	12
	120C 2D(2.5D)	M12	1.75	10.2	9.95	13.5	25.5	30.8	45	1.5	90	14
	140C 2D(2.5D)	M14	2.00	12.0	11.2	15.5	31.2	39.2	48	1.5	100	16
	160C 2D(2.5D)	M16	2.00	14.0	13.2	17.5	35.5	45.5	48	1.5	100	18

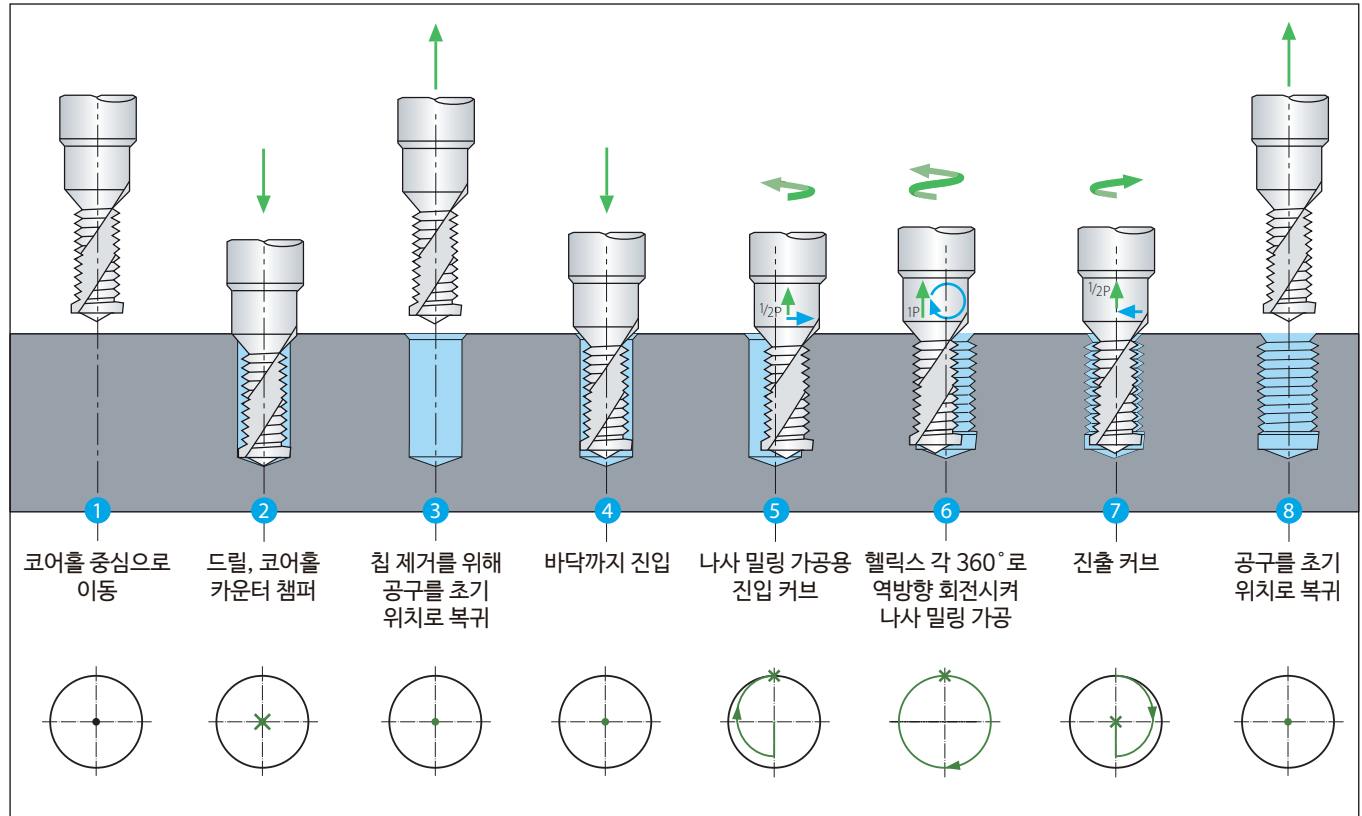
* 코팅은 알루미늄 전용(DLC) 추천하며 고객의 피삭재(두랄루민, 알루미늄) 요청에 따라 생산이 가능 합니다

* The coating is recommended for aluminum (DLC) and can be produced according to customer's request. (Duralumin, Aluminium)

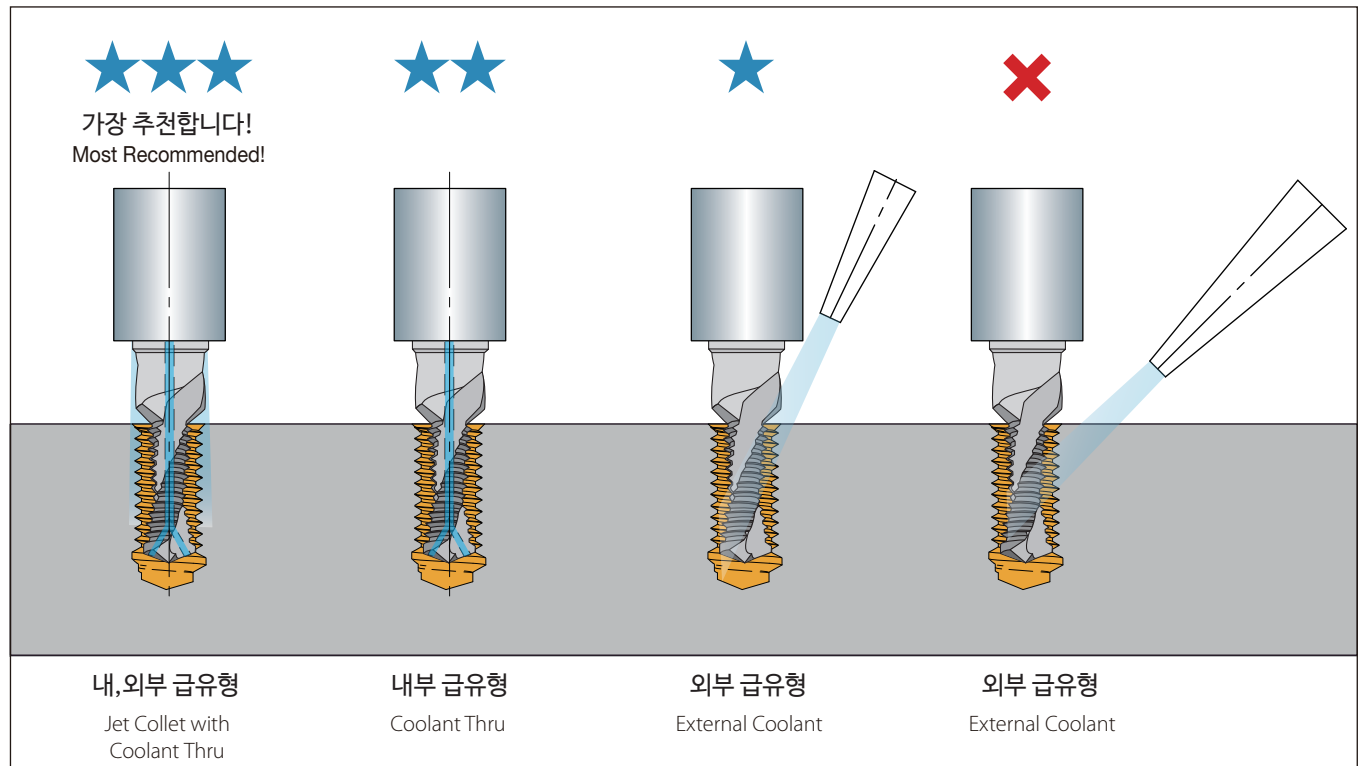
대응 피삭재표 (☆◎○ 순으로 추천) Material Applications (☆ Highly Recommended ◎ Recommended ○ Suggested)

피 삭 재 Work Material												
일반구조 압연강 Structural Steels SS400	탄소강 Carbon Steels S45C S55C	합금강 Alloy Steels SK / SCM SUS	프리하든강 Prehardened Steels NAK HPM	주철 Cast Iron	알루미늄합금 Aluminum Alloys	그래파이트 Graphite	동 Copper	플라스틱 Plastics	유리함유수지 Glass Filled Plastics	티타늄합금 Titanium Alloys	초내열합금 Heat Resistant Alloys	초경합금 Cemented Carbide
				◎	◎							

동작주기 Operating Cycle



최적의 칩 배출을 위한 냉각수 사용 Coolant Use for Best Chip Evacuation



내,외부 급유형
Jet Collet with
Coolant Thru

내부 급유형
Coolant Thru

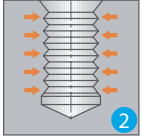
외부 급유형
External Coolant

외부 급유형
External Coolant



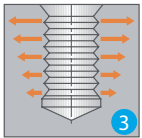
스레드 프로파일에 채워지거나 접착 된 칩 (Chips packed or glued at the thread profile)

- 열악한 냉각수 (poor coolant)
 - 냉각제 개선 (즉, 플러드 냉각제, 관통 구멍 용 측면 플루트 냉각제 공급 장치 추가)
improve coolant (i.e. add flood coolant, lateral flute coolant supply for through holes)
 - 냉각수 플루트를 샹크에 추가하십시오.
add coolant flutes on shank



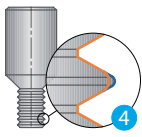
스레드 게이지는 피팅되지 않습니다. (Thread go-gage doesn't fit)

- 스레드가 너무 작음 (thread too small) → 오프셋 레지스터에서 공구 반경 감소 (reduce tool radius in offset register)
- 스레드에 칩이 있음 (chips in thread) → 냉각제 개선 (improve coolant)



스레드가 점점 가늘어지고 있습니다. (Thread is getting tapered)

- 열악한 공구 클램핑 (poor tool clamping)
 - 공구 홀딩 (즉, 수축 끼워 맞춤 홀더) 개선 improve tool holding (i.e. shrink fit holders)
- 나사산 밀링 피드가 너무 높음 (thread milling feed too high) → 나사산 밀링 피드 감소 (reduce thread milling feed)



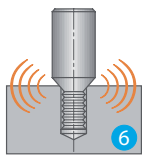
불규칙한 공구 마모 (erratic tool wear)

- 공구가 너무 많이 소모 됨 → 공구 홀더 (예 : 단축 장착 홀더)를 사용하십시오.
- tool run out too high → use better tool holders (i.e. shrink fit holders)



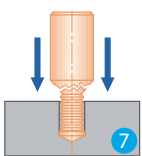
카운터 보어 칩이 공구 주변에 감겨 있습니다. (Counterbore chips are winding around the tool)

- 모따기 피드가 너무 낮음 (chamfer feed too low)
 - 모따기 피드가 증가합니다. (increase chamfer feed)



시끄러운 드릴링 노이즈 (특히 최종 드릴링 깊이 방향) Loud drilling noise (especially towards the final drilling depth)

- 칩 문제 (chip problem)
 - 드릴 이송 속도 감소 (reduce drill feed rate)
 - 절삭유가 들어간 공구를 사용하십시오. (use tool with coolant through)
 - 펍주기 추가 (add peck cycle)



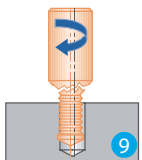
드릴링 중 공구 파손 (특히 긴 칩핑 소재에서) Tool breakage while drilling (especially in long chipping material)

- 칩 문제 (chip problem)
 - 드릴 이송 속도 감소 (reduce drill feed rate)
 - 절삭유가 들어간 공구를 사용하십시오. (use tool with coolant through)
 - 펍주기 추가 (add peck cycle (multiple pecks))



틈새에 붙어있는 칩 (Chips glued up in the flutes)

- 열악한 냉각수 (poor coolant)
 - 냉각제 상황 개선 (improve coolant situation)
 - 절삭유가 들어간 공구를 사용하십시오. (use tool with coolant through)
 - 코팅 공구 사용 (use coated tool)



스레드 밀링 중 공구 파손, 공구 파손 (Chippage, tool breakage while thread milling)

- 이송 속도 나사 밀링이 너무 높음 (feed rate thread milling too high)
 - 보링 작업 후 칩 그루브에 칩이 없음을 확인하십시오
(check that the chip grooves are free of chips after the boring operation)
- 진동 (vibrations)
 - 이송 속도 감소 (NC 피드가 중심점 또는 외부 트랙과 관련되는지 확인)
reduce feed rate (check whether NC feeds relate to centre point or external track)



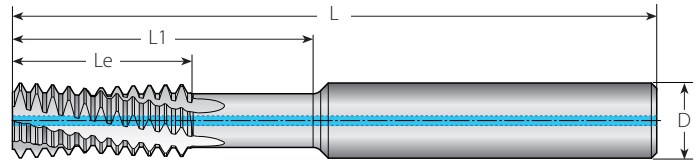
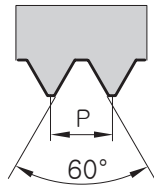
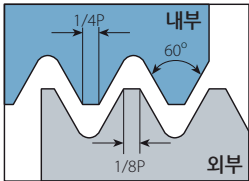
나사 표면이 좋지 않음 (고조파) Poor thread surface (harmonics)

- 진동 (vibrations)
 - 공구 홀더 확인 (모듈러 시스템을 사용하지 마십시오!)
(check tool holder (do not use modular systems !))
 - 공작물 클램핑 및 픽스처 확인. 클램핑 셋업이 불안정한 곳에서는 절삭력의 분포가 도입됩니다.
(check workpiece clamping and fixture. Where the clamping set-up is unstable introduce a distribution of the cutting force.)
 - 절단 속도 감소 (reduce cutting speed)
 - 치아 이송 속도 증가 (increase tooth feed rate)
 - 절삭력의 분포를 소개 (introduce distribution of cutting force)



- 더 깊은 나사가공을 위한 쿨런트 타입 헬릭컬 날
- 다중 날 구조
- 최대 나사가공 깊이 : 3xDo (나사가공 직경)
- 긴 나사 가공 시간의 단축

- Helical flutes with coolant thru for extra deep threading applications
- Multi-tooth geometry
- Maximum thread length: 3xDo (Thread Diameter)
- Reduced machining times for long threads



ISO 측정 항목

단위(Unit) : mm

주문 번호	피치 규격		기초홀 직경*	날 수	날 경	나사부 길이	유효 길이	전 장	생크
Order Number	Thread	Pitch (mm)	mm	Flutes	Diameter	Thread Length	Thread Length	Drill Length	Shank Dia
				Z	D2	Le	L1	L	D

외부 급유형 (Without coolant)

HTM	030	M3	0.50	2.5	4	2.40	4.7	9	45	4
	040	M4	0.70	3.3	4	3.15	6.6	12	45	4
	050	M5	0.80	4.2	4	3.90	7.6	15	50	4
	060	M6	1.00	5.0	4	4.80	9.5	18	60	6
	080	M8	1.25	6.8	4	6.50	13.1	24	65	8
	100	M10	1.50	8.5	4	8.20	15.7	30	75	10
	120	M12	1.75	10.2	4	9.90	18.4	36	85	10
	140	M14	2.00	12.0	4	11.60	21.0	42	90	12
	160	M16	2.00	14.0	4	13.60	25.0	48	100	14

내부 급유형 (With coolant)

HTM	060C	M6	1.00	5.0	4	4.80	9.5	18	60	6
	080C	M8	1.25	6.8	4	6.50	13.1	24	65	8
	100C	M10	1.50	8.5	4	8.20	15.7	30	75	10
	120C	M12	1.75	10.2	4	9.90	18.4	36	85	10
	140C	M14	2.00	12.0	4	11.60	21.0	42	90	12
	160C	M16	2.00	14.0	4	13.60	25.0	48	100	14

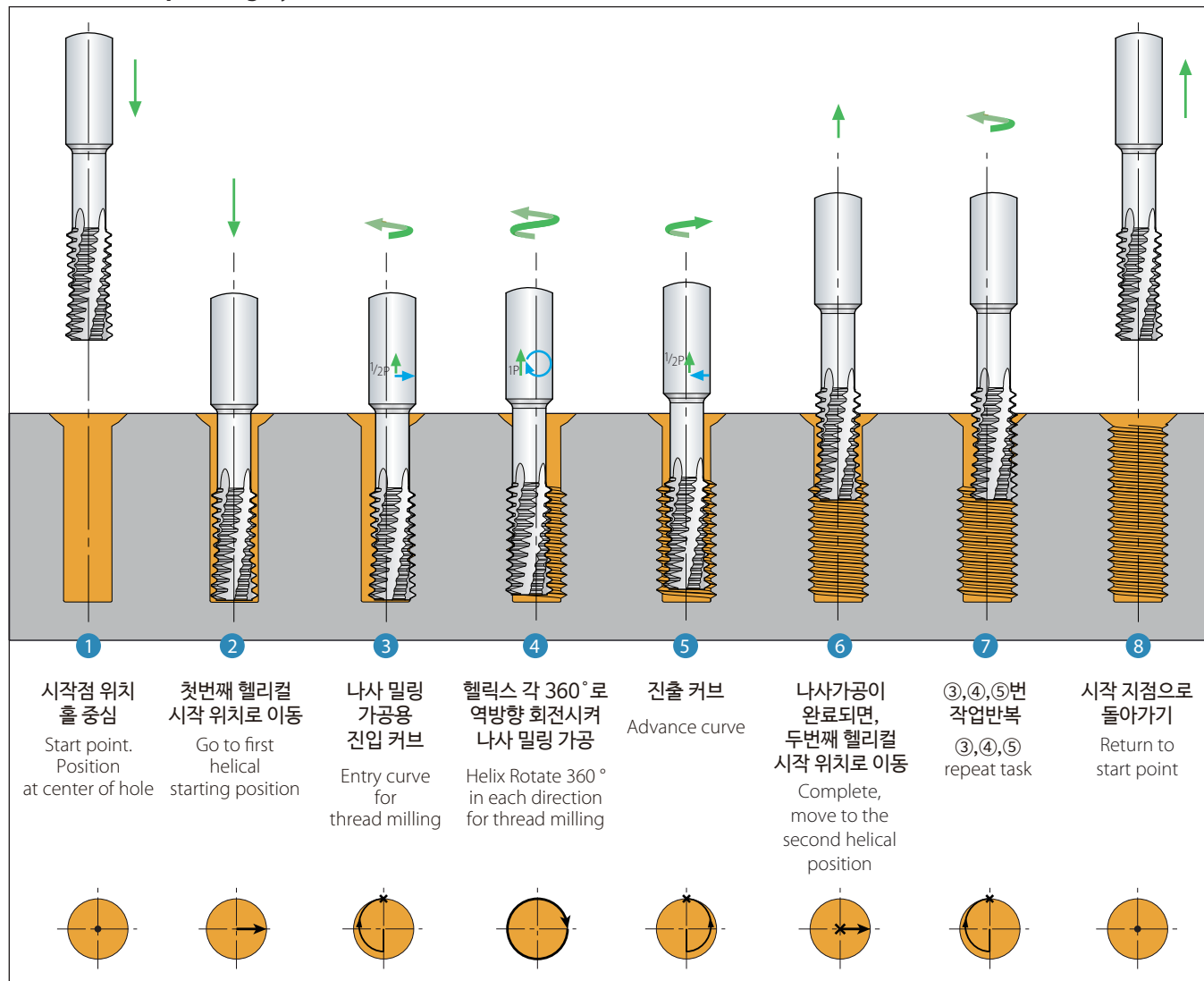
* 코팅은 알루미늄 전용(DLC), SUS(NACO3), 강용(N-PLUS) 추천하며, 고객의 피삭재 요청에 따라 생산이 가능 합니다

* The coating is recommended for aluminum (DLC), SUS (NACO3), steel (N-PLUS) and can be produced according to customer's request.

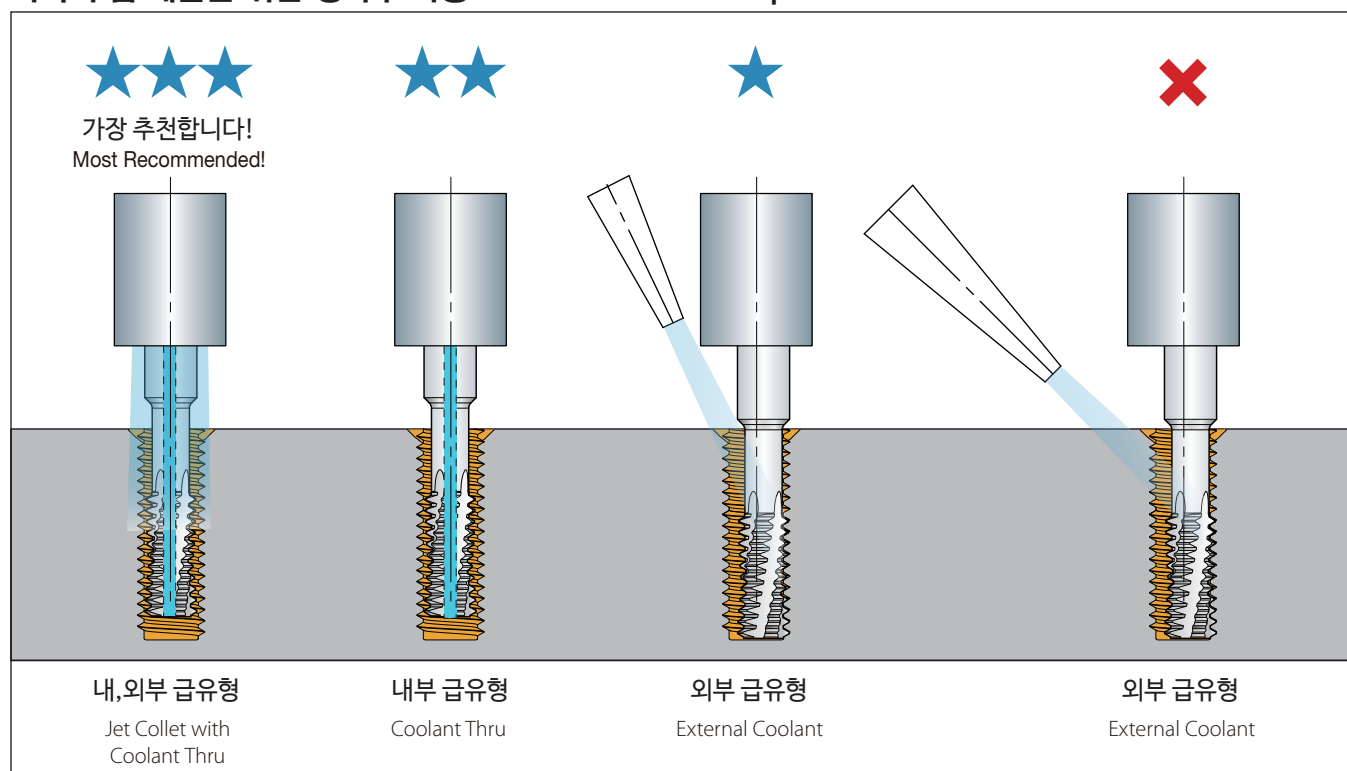
대응 피삭재표 (☆◎○ 순으로 추천) Material Applications (☆ Highly Recommended ◎ Recommended ○ Suggested)

피 삭 재 Work Material															
일반구조 압연강 Structural Steels SS400	탄소강 Carbon Steels S45C S55C	합금강 Alloy Steels SK / SCM SUS	프리하든강 Prehardened Steels NAK HPM	열처리강 Hardened Steels			주철 Cast Iron	알루미늄합금 Aluminum Alloys	그래파이트 Graphite	동 Copper	플라스틱 Plastics	유리함유수지 Glass Filled Plastics	티타늄합금 Titanium Alloys	초내열합금 Heat Resistant Alloys	초경합금 Cemented Carbide
				~48HRC	~52HRC	~62HRC									
◎	◎	◎	◎	◎	◎		◎	◎		◎	◎		○		

동작주기 Operating Cycle



최적의 칩 배출을 위한 냉각수 사용 Coolant Use for Best Chip Evacuation

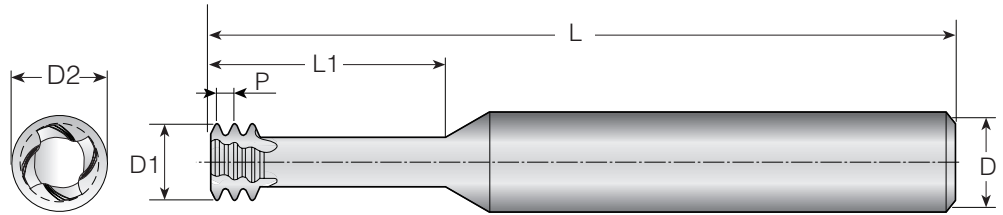
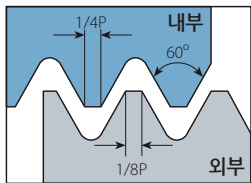




- 경화강 내 나사 가공을 위한 견고하고 강력한 날 디자인.
- 향상된 절삭 및 칩 제거를 제공하여 절삭 공구가 구멍 내부에서 끊어지는 위험을 줄입니다.
- 팁 형상은 절삭 저항을 줄이고 공구 구부림을 억제합니다.
- 공구 파손을 대폭 감소시킵니다.

◦ Tough and strong edge design for threading in hardened steels.

- deliver improved cutting and chip removal, reducing the risk of the cutting tool breaking off inside of the hole.
- Tip shape reduces cutting resistance and suppresses tool bending.
- Drastically reduces tool breakage



ISO 측정 항목

단위(Unit) : mm

주문 번호	피치 규격		날 수		날 경	유효 장(L1)		전 장	생크
Order Number	Thread	Pitch(P) (mm)	Flutes Z	Teeth Zt	Diameter D1	Effective Length		Overall Length L	Shank Dia D
						2D	2.5D		D

외부 급유형 (Without coolant)

ETM3	010 2D(2.5D)	M1	0.25	4	3	0.72	2	2.5	45	4
	012 2D(2.5D)	M1.2	0.25	4	3	0.9	2.4	3	45	4
	014 2D(2.5D)	M1.4	0.3	4	3	0.95	2.8	3.5	50	6
	016 2D(2.5D)	M1.6~M1.8	0.35	4	3	1.1	3.2	4	50	6
	020 2D(2.5D)	M2	0.4	4	3	1.4	4	5	50	6
	022 2D(2.5D)	M2.2	0.45	4	3	1.6	4.4	5.5	50	6
	025 2D(2.5D)	M2.5~M2.6	0.45	4	3	1.8	5	6.25	50	6
	030 2D(2.5D)	M3	0.5	4	3	2.4	6	7.5	50	6
	040 2D(2.5D)	M4	0.7	4	3	3.1	8	10	50	6
	050 2D(2.5D)	M5	0.8	4	3	3.8	10	12.5	50	6
	060 2D(2.5D)	M6	1	4	3	4.6	12	15	50	6
	080 2D(2.5D)	M8	1.25	4	3	6.2	16	20	70	10
	100 2D(2.5D)	M10	1.5	4	3	7.5	20	25	70	10
	120 2D(2.5D)	M12	1.75	4	3	9.0	24	30	80	10
	160 2D(2.5D)	M16	2	4	3	11.5	32	40	100	12
	180 2D(2.5D)	M18	2.5	4	3	14.0	36	45	135	16
	200 2D(2.5D)	M20	2.5	4	3	15.0	40	50	135	16

내부 급유형 (Without coolant)

ETM3	060C 2D(2.5D)	M6	1	4	3	4.6	12	15	50	6
	080C 2D(2.5D)	M8	1.25	4	3	6.2	16	20	70	10
	100C 2D(2.5D)	M10	1.5	4	3	7.5	20	25	70	10
	120C 2D(2.5D)	M12	1.75	4	3	9.0	24	30	80	10
	160C 2D(2.5D)	M16	2	4	3	11.5	32	40	100	12
	180C 2D(2.5D)	M18	2.5	4	3	14.0	36	45	135	16
	200C 2D(2.5D)	M20	2.5	4	3	15.0	40	50	135	16

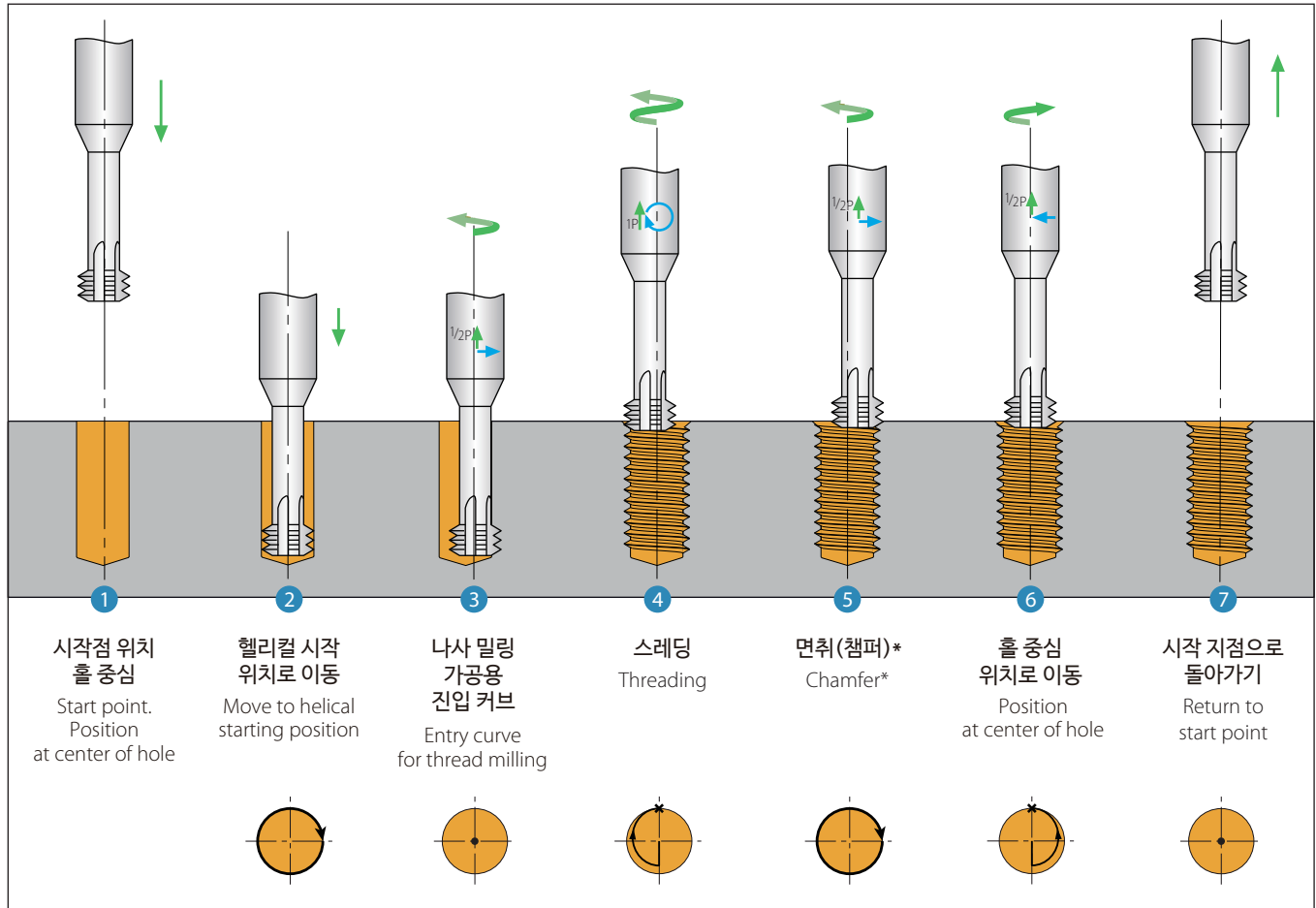
* 코팅은 알루미늄 전용(DLC), SUS(NACO3), 강용(N-PLUS) 추천하며, 고객의 피삭재 요청에 따라 생산이 가능합니다

* The coating is recommended for aluminum (DLC), SUS (NACO3), steel (N-PLUS) and can be produced according to customer's request.

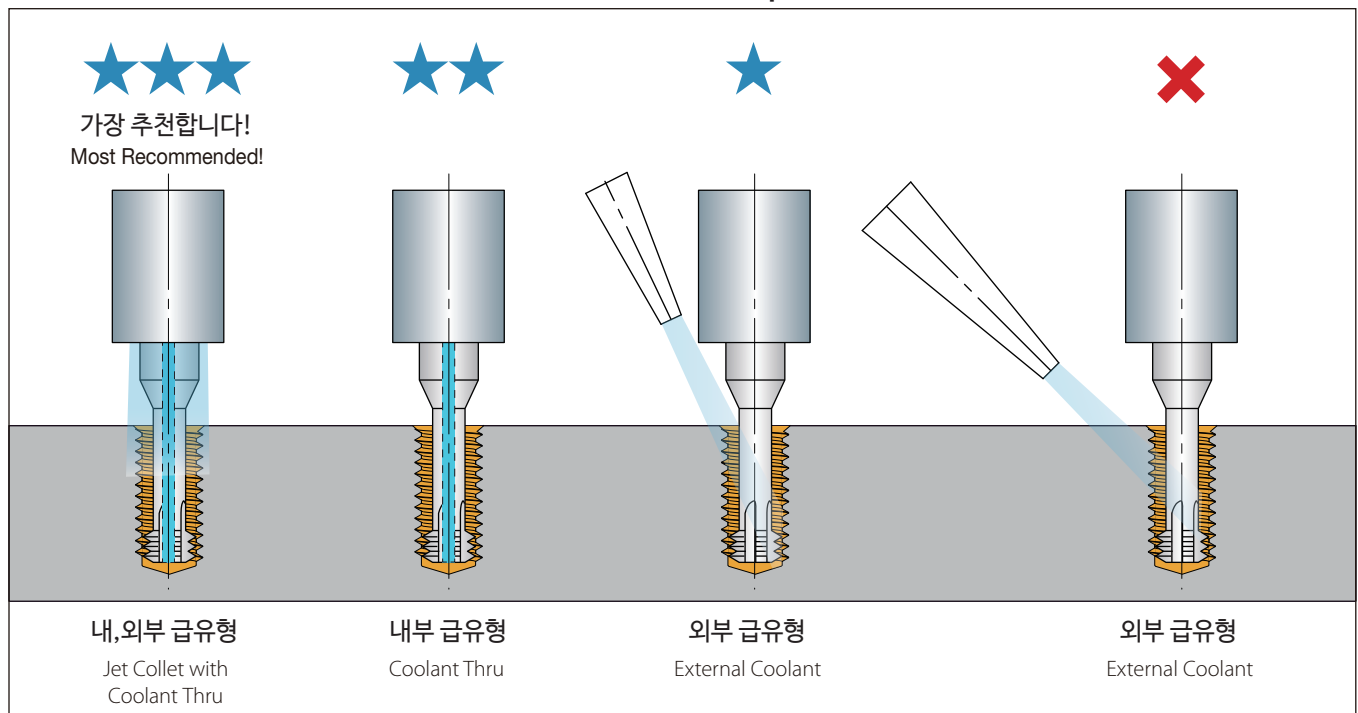
대응 피삭재표 (☆◎○ 순으로 추천) Material Applications (☆ Highly Recommended ◎ Recommended ○ Suggested)

피 삭 재 Work Material															
일반구조 압연강 Structural Steels SS400	탄소강 Carbon Steels S45C S55C	합금강 Alloy Steels SK / SCM SUS	프리하든강 Prehardened Steels NAK HPM	열처리강 Hardened Steels			주철 Cast Iron	알루미늄합금 Aluminum Alloys	그래파이트 Graphite	동 Copper	플라스틱 Plastics	유리함유수지 Glass Filled Plastics	티타늄합금 Titanium Alloys	초내열합금 Heat Resistant Alloys	초경합금 Cemented Carbide
				~48HRC	~52HRC	~62HRC									
◎	◎	◎	◎	◎	◎	◎	◎	◎		◎	◎		○		

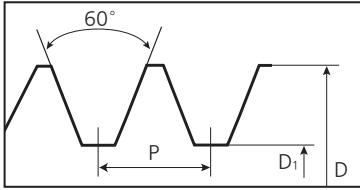
동작주기 Operating Cycle



최적의 칩 배출을 위한 냉각수 사용 Coolant Use for Best Chip Evacuation



ISO 미터법 나사산

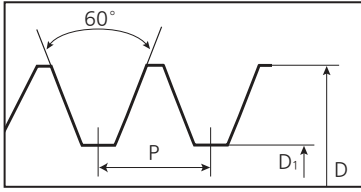


M 미터법 ISO 표준 나사산
DIN 13 및 DIN ISO 965-1

D		D ₁		 Ø mm
Ø	P (mm)	min. mm	max. mm 5H/6H	
M1*	0.25	0.729	0.785	0.75
M1.1*	0.25	0.829	0.885	0.85
M1.2*	0.25	0.929	0.985	0.95
M1.4*	0.30	1.075	1.142	1.10
M1.6	0.35	1.221	1.321	1.25
M1.7	0.35	1.321	1.421	1.35
M1.8	0.35	1.421	1.521	1.45
M2	0.40	1.567	1.679	1.60
M2.2	0.45	1.713	1.838	1.75
M2.3	0.40	1.813	1.938	1.85
M2.5	0.45	2.013	2.138	2.05
M2.6	0.45	2.113	2.238	2.15
M3	0.50	2.459	2.599	2.50
M3.5	0.60	2.850	3.010	2.90
M4	0.70	3.242	3.422	3.30
M4.5	0.75	3.688	3.878	3.70
M5	0.80	4.134	4.334	4.20
M6	1.00	4.917	5.153	5.00
M7	1.00	5.917	6.153	6.00
M8	1.25	6.647	6.912	6.80
M9	1.25	7.647	7.912	7.80
M10	1.50	8.376	8.676	8.50
M11	1.50	9.376	9.676	9.50
M12	1.75	10.106	10.441	10.20
M14	2.00	11.835	12.210	12.00
M16	2.00	13.835	14.210	14.00
M18	2.50	15.294	15.744	15.50
M20	2.50	17.294	17.744	17.50
M22	2.50	19.294	19.744	19.50
M24	3.00	20.752	21.252	21.00
M27	3.00	23.752	24.252	24.00
M30	3.50	26.211	26.771	26.50
M33	3.50	29.211	29.771	29.50
M36	4.00	31.670	32.270	32.00
M39	4.00	34.670	35.270	35.00
M42	4.50	37.129	37.799	37.50
M45	4.50	40.129	40.799	40.50
M48	5.00	42.587	43.297	43.00
M52	5.00	46.587	47.297	47.00
M56	5.50	50.046	50.796	50.50
M60	5.50	54.046	54.796	54.50
M64	6.00	57.505	58.305	58.00
M68	6.00	62.505	62.305	62.00

*5H max.

ISO 미터법 나사산

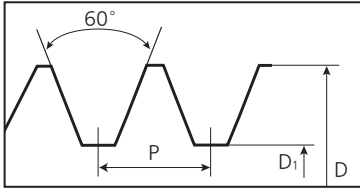


MF 미터법 ISO 미세 나사산 DIN 13 및 DIN ISO 965-1

D Ø × P	D ₁		Ø mm
	min. mm	max. mm 6H	
M2 × 0.25	1.729	1.785	1.75
M2.2 × 0.25	1.929	1.985	1.95
M2.3 × 0.25	2.029	2.085	2.05
M2.5 × 0.35	2.121	2.221	2.15
M3 × 0.25	2.729	2.785	2.75
M3 × 0.35	2.621	2.721	2.65
M3.5 × 0.35	3.121	3.221	3.15
M4 × 0.35	3.621	3.721	3.65
M4 × 0.5	3.459	3.599	3.50
M4.5 × 0.5	3.959	4.099	4.00
M5 × 0.35	4.621	4.721	4.65
M5 × 0.5	4.459	4.599	4.50
M5 × 0.75	4.188	4.378	4.20
M6 × 0.5	5.459	5.599	5.50
M6 × 0.75	5.188	5.378	5.25
M7 × 0.5	6.459	6.599	6.50
M7 × 0.75	6.188	6.378	6.25
M8 × 0.5	7.459	7.599	7.50
M8 × 0.75	7.188	7.378	7.25
M8 × 1	6.917	7.153	7.00
M9 × 0.75	8.188	8.378	8.25
M9 × 1	7.917	8.153	8.00
M10 × 0.5	9.459	9.599	9.50
M10 × 0.75	9.188	9.378	9.25
M10 × 1	8.917	9.153	9.00
M10 × 1.25	8.647	8.912	8.75
M11 × 1	9.917	10.153	10.00
M12 × 0.5	11.459	11.599	11.50
M12 × 1	10.917	11.153	11.00
M12 × 1.25	10.647	10.912	10.75
M12 × 1.5	10.376	10.676	10.50
M13 × 1	11.917	12.153	12.00
M14 × 0.75	13.188	13.378	13.20
M14 × 1	12.917	13.153	13.00
M14 × 1.25	12.647	12.912	12.75
M14 × 1.5	12.376	12.676	12.50
M15 × 1	13.917	14.153	14.00
M15 × 1.5	13.376	13.676	13.50
M16 × 0.75	15.188	15.378	15.20
M16 × 1	14.917	15.153	15.00
M16 × 1.25	14.647	14.912	14.80
M16 × 1.5	14.376	14.676	14.50
M17 × 1	15.917	16.153	16.00
M18 × 1	16.917	17.153	17.00
M18 × 1.5	16.376	16.676	16.50
M18 × 2	15.835	16.210	16.00
M20 × 1	18.917	19.153	19.00
M20 × 1.5	18.376	18.676	18.50
M20 × 2	17.835	18.210	18.00
M22 × 1	20.917	21.153	21.00
M22 × 1.5	20.376	20.676	20.50
M22 × 2	19.835	20.210	20.00

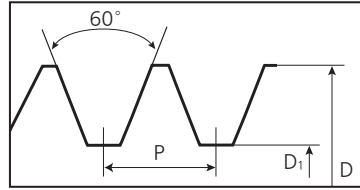
D Ø × P	D ₁		Ø mm
	min. mm	max. mm 6H	
M24 × 1.5	22.376	22.676	22.50
M24 × 2	21.835	22.210	22.00
M25 × 1	22.917	23.153	23.00
M25 × 1.5	23.376	23.676	23.50
M26 × 1.5	24.376	24.676	24.50
M27 × 1	25.917	26.153	26.00
M27 × 1.5	25.376	25.676	25.50
M27 × 2	24.835	25.210	25.00
M28 × 1.5	26.376	26.676	26.50
M28 × 2	25.835	26.210	26.00
M30 × 1	28.917	29.153	29.00
M30 × 1.5	28.376	28.676	28.50
M30 × 2	27.835	28.210	28.00
M32 × 1.5	30.376	30.676	30.50
M32 × 2	29.835	30.210	30.00
M33 × 1.5	31.376	31.676	31.50
M33 × 2	30.835	31.210	31.00
M34 × 1.5	32.376	32.676	32.50
M35 × 1.5	33.376	33.676	33.50
M36 × 1.5	34.376	34.676	34.50
M36 × 2	33.835	34.210	34.00
M36 × 3	32.752	33.252	33.00
M38 × 1.5	36.376	36.676	36.50
M39 × 1.5	37.376	37.676	37.50
M39 × 2	36.835	37.210	37.00
M39 × 3	35.752	36.252	36.00
M40 × 1.5	38.376	38.676	38.50
M40 × 2	37.835	38.210	38.00
M40 × 3	36.752	37.252	37.00
M42 × 1.5	40.376	40.676	40.50
M42 × 2	39.835	40.210	40.00
M42 × 3	38.752	39.252	39.00
M45 × 1.5	43.376	43.676	43.50
M45 × 2	42.835	43.210	43.00
M45 × 3	41.752	42.252	42.00
M48 × 1.5	46.376	46.676	46.50
M48 × 2	45.835	46.210	46.00
M48 × 3	44.752	45.252	45.00
M50 × 1.5	48.376	48.676	48.50
M50 × 2	47.835	48.210	48.00
M50 × 3	46.752	47.252	47.00
M52 × 1.5	50.376	50.676	50.50
M52 × 2	49.835	50.210	50.00
M52 × 3	46.587	47.087	49.00
M56 × 1.5	54.376	54.676	54.50
M56 × 2	53.835	54.210	54.00
M56 × 3	52.752	53.252	53.00
M58 × 1.5	56.376	56.676	56.50
M60 × 1.5	58.376	58.676	58.50
M60 × 2	57.835	58.210	58.00
M60 × 3	56.752	57.252	57.00

미국 나사산



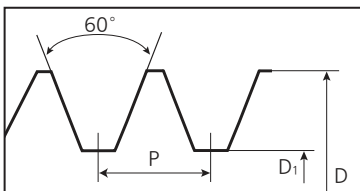
UN ASME B1.1에 따른
8 스레드 시리즈

D	D ₁		 Ø mm
Ø P Gg/1"	min. mm 2B/3B	max. mm 2B	
1 1/8-8 UN	25.138	25.962	25.40
1 1/4-8 UN	28.313	29.126	28.50
1 3/8-8 UN	31.488	32.123	32.00
1 1/2-8 UN	34.663	35.456	35.00
1 5/8-8 UN	37.838	38.623	38.10
1 3/4-8 UN	41.013	41.790	41.50
1 7/8-8 UN	44.188	44.957	44.45
2-8 UN	47.363	48.125	48.00
2 1/4-8 UN	53.713	54.462	54.00



UNC ASME B1.1에 따른
보통 나사산

D	D ₁		 Ø mm
Ø P Gg/1"	min. mm 2B/3B	max. mm 2B	
1-64 UNC	1.425	1.582	1.55
2-56 UNC	1.694	1.872	1.85
3-48 UNC	1.941	2.146	2.10
4-40 UNC	2.156	2.385	2.35
5-40 UNC	2.487	2.697	2.65
6-32 UNC	2.642	2.896	2.85
8-32 UNC	3.302	3.531	3.50
10-24 UNC	3.683	3.962	3.90
12-24 UNC	4.343	4.597	4.50
1/4-20 UNC	4.976	5.268	5.10
5/16-18 UNC	6.411	6.734	6.60
3/8-16 UNC	7.805	8.164	8.00
7/16-14 UNC	9.149	9.550	9.40
1/2-13 UNC	10.584	11.013	10.80
9/16-12 UNC	11.996	12.456	12.20
5/8-11 UNC	13.376	13.868	13.50
3/4-10 UNC	16.299	16.833	16.50
7/8-9 UNC	19.169	19.748	19.50
1-8 UNC	21.963	22.598	22.25
1 1/8-7 UNC	24.648	25.348	25.00
1 1/4-7 UNC	27.823	28.524	28.00
1 1/2-6 UNC	33.518	34.295	34.00
1 3/4-5 UNC	38.951	39.814	39.50
2-4,5 UNC	44.689	45.598	45.00



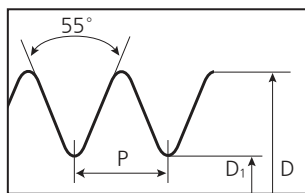
UNF ASME B1.1에 따른
미세 나사산

D	D ₁		 Ø mm
Ø P Gg/1"	min. mm 2B/3B	max. mm 2B	
0-80 UNF	1.181	1.306	1.25
1-72 UNF	1.473	1.613	1.55
2-64 UNF	1.755	1.913	1.85
3-56 UNF	2.024	2.197	2.15
4-48 UNF	2.271	2.459	2.40
5-44 UNF	2.550	2.741	2.70
6-40 UNF	2.819	3.023	2.95
8-36 UNF	3.404	3.607	3.50
10-32 UNF	3.962	4.166	4.10
12-28 UNF	4.496	4.724	4.60
1/4-28 UNF	5.367	5.580	5.50
5/16-24 UNF	6.792	7.038	6.90
3/8-24 UNF	8.379	8.626	8.50
7/16-20 UNF	9.738	10.030	9.90
1/2-20 UNF	11.326	11.618	11.50
9/16-18 UNF	12.761	13.084	12.90
5/8-18 UNF	14.348	14.671	14.50
3/4-16 UNF	17.330	17.689	17.50
7/8-14 UNF	20.262	20.663	20.40
1-12 UNF	23.109	23.569	23.25
1 1/8-12 UNF	26.284	26.744	26.50
1 1/4-12 UNF	29.459	29.919	29.50
1 3/8-12 UNF	32.634	33.094	33.00
1 1/2-12 UNF	35.809	36.269	36.10

나사산 예비 가공 홀 직경 - 탭 가공 / 스레드 밀링

Thread pre-machining hole diameter - Tapping / thread milling

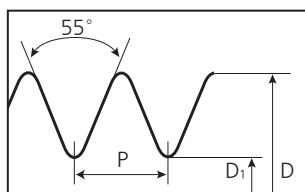
파이프 나사산



G DIN EN ISO 228에 따른
관용 나사산

D Ø P Gg/1"	D ₁		 Ø mm DIN 336 / ISO 2306
	min. mm	max. mm	
G 1/16-28	6.561	6.843	6.80
G 1/8-28	8.566	8.848	8.80
G 1/4-19	11.445	11.890	11.80
G 3/8-19	14.950	15.395	15.25
G 1/2-14	18.632	19.173	19.00
G 5/8-14	20.588	21.129	21.00
G 3/4-14	24.118	24.659	24.50
G 7/8-14	27.878	28.419	28.25
G 1-11	30.292	30.932	30.75
G 1 1/8-11	34.940	35.580	35.50
G 1 1/4-11	38.953	39.593	39.50
G 1 3/8-11	41.366	42.006	41.90
G 1 1/2-11	44.846	45.486	45.25
G 1 3/4-11	50.789	51.429	51.00
G 2-11	56.657	57.297	57.00
G 2 1/4-11	62.753	63.393	63.00
G 2 1/2-11	72.227	72.867	72.60
G 3-11	84.927	85.567	85.00

Whitworth 나사산



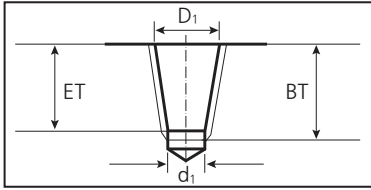
Rp DIN EN 10226-1에 따른
Whitworth 관용 나사산

D Ø P Gg/1"	D ₁		 Ø mm DIN 336 / ISO 2306
	min. mm	max. mm	
Rp 1/16-28	6.490	6.632	6.55
Rp 1/8-28	8.495	8.637	8.60
Rp 1/4-19	11.341	11.549	11.50
Rp 3/8-19	14.846	15.054	15.00
Rp 1/2-14	18.490	18.774	18.50
Rp 5/8-14	20.446	20.730	20.50
Rp 3/4-14	23.976	24.260	24.00
Rp 1-11	30.112	30.472	30.25
Rp 1 1/4-11	38.773	39.133	39.00
Rp 1 1/2-11	44.629	45.063	45.00
Rp 2-11	56.440	56.874	56.50
Rp 2 1/2-11	72.010	72.444	72.20
Rp 3-11	84.710	85.144	85.00

나사산 예비 가공 홀 직경 - 탭 가공 / 스레드 밀링

Thread pre-machining hole diameter - Tapping / thread milling

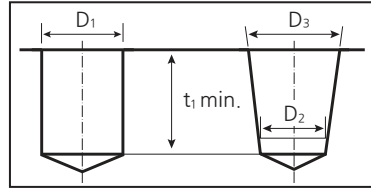
Whitworth 나사산



Rc DIN EN 10226-2에 따른 관용 테이퍼 나사산, 테이퍼 1:16

$\varnothing$ P Gg/1"	d_1 mm	D_1 mm	ET mm	min. BT mm
Rc 1/16-28	6.3	6.49	8.31	10.0
Rc 1/8-28	8.3	8.50	8.31	10.1
Rc 1/4-19	11.0	11.35	12.37	15.0
Rc 3/8-19	14.5	14.85	12.77	15.4
Rc 1/2-14	18.1	18.49	16.83	20.5
Rc 3/4-14	23.5	23.98	18.13	21.8
Rc 1-11	29.6	30.11	21.42	26.0
Rc 1 1/4-11	38.1	38.78	23.72	28.3
Rc 1 1/2-11	44.0	44.67	23.72	28.3
Rc 2-11	55.6	56.48	28.02	32.6
Rc 2 1/2-11	71.1	72.00	31.32	37.1
Rc 3-11	83.6	84.71	34.42	40.2

미국 파이프 나사산



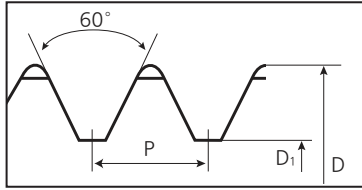
NPT ASME B1.20.1에 따른 미국 관용 표준 나사산, 테이퍼 1:16

$\varnothing$ P Gg/1"	D_1 mm	D_2 mm	D_3 mm	t_1 mm
1/16-27 NPT	6.15	5.95	6.39	10.7
1/8-27 NPT	8.40	8.31	8.74	10.8
1/4-18 NPT	11.10	10.73	11.36	15.6
3/8-18 NPT	14.30	14.15	14.80	16.0
1/2-14 NPT	17.90	17.47	18.32	20.8
3/4-14 NPT	23.30	22.79	23.67	21.3
1-11.5 NPT	29.00	28.64	29.69	25.6
1 1/4-11.5 NPT	37.70	37.37	38.45	26.1
1 1/2-11.5 NPT	43.70	43.44	44.52	26.1
2-11.5 NPT	55.60	55.45	56.56	26.5
2 1/2-8 NPT	66.30	66.14	67.62	36.3
3-8 NPT	82.30	81.90	83.52	38.5

NPTF ASME B1.20.3에 따른 미국 관용 표준 나사산, 테이퍼 1:16

$\varnothing$ P Gg/1"	D_1 mm	D_2 mm	D_3 mm	t_1 mm
1/16-27 NPTF	6.1	5.97	6.41	10.3
1/8-27 NPTF	8.4	8.33	8.77	10.3
1/4-18 NPTF	11.0	10.77	11.40	15.0
3/8-18 NPTF	14.5	14.19	14.84	15.3
1/2-14 NPTF	17.5	17.48	18.33	19.9
3/4-14 NPTF	23.0	22.84	23.72	20.4
1-11 1/2 NPTF	29.0	28.62	29.76	24.5
1 1/4-11.5 NPTF	37.5	37.44	38.52	25.0
1 1/2-11.5 NPTF	43.5	43.50	44.59	25.0
2-11.5 NPTF	56.0	55.51	56.62	25.4
2 1/2-8 NPTF	66.0	66.03	67.71	38.0
3-8 NPTF	82.0	81.80	83.62	40.0

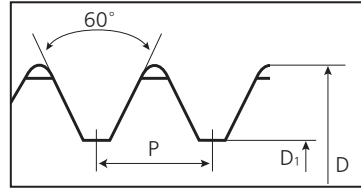
ISO 미터법 나사산



MJ DIN ISO 5855에 따른
표준 나사산

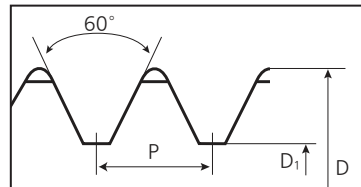
D Ø × P	D ₁		 Ø mm
	min. mm	max. mm	
MJ3 × 0.5	2.513	2.653	2.60
MJ4 × 0.7	3.318	3.498	3.40
MJ5 × 0.8	4.221	4.421	4.30
MJ6 × 1	5.026	5.215	5.10
MJ8 × 1.25	6.782	6.994	6.90
MJ10 × 1.5	8.539	8.779	8.70
MJ12 × 1.75	10.295	10.563	10.50
MJ16 × 2	14.051	14.351	14.30

미국 나사산



UNJC AASME B1.15 및 ISO 3161에 따른
보통 나사산

D Ø × P	D ₁		 Ø mm
	min. mm 3B	max. mm 3B	
1-64 UNJC	1.467	1.570	1.50
2-56 UNJC	1.742	1.860	1.80
3-48 UNJC	1.999	2.137	2.05
4-40 UNJC	2.226	2.391	2.30
5-40 UNJC	2.556	2.721	2.65
6-32 UNJC	2.732	2.938	2.80
8-32 UNJC	3.393	3.599	3.50
10-24 UNJC	3.795	4.064	3.90
12-24 UNJC	4.455	4.704	4.60
1/4-20 UNJC	5.113	5.387	5.20
5/16-18 UNJC	6.563	6.833	6.70
3/8-16 UNJC	7.978	8.255	8.10
7/16-14 UNJC	9.344	9.637	9.50
1/2-13 UNJC	10.796	11.093	10.90
9/16-12 UNJC	12.226	12.480	12.30
5/8-11 UNJC	13.625	13.902	13.70
3/4-10 UNJC	16.575	16.880	16.75



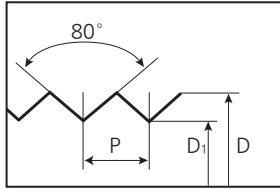
UNJF ASME B1.15 및 ISO 3161 에 따른
미세 나사산

D Ø × P	D ₁		 Ø mm
	min. mm 3B	max. mm 3B	
0-80 UNJF	1.215	1.297	1.25
1-72 UNJF	1.510	1.602	1.55
2-64 UNJF	1.797	1.900	1.85
3-56 UNJF	2.073	2.191	2.10
4-48 UNJF	2.329	2.467	2.40
5-44 UNJF	2.613	2.763	2.70
6-40 UNJF	2.886	3.051	2.95
8-36 UNJF	3.479	3.662	3.60
10-32 UNJF	4.053	4.253	4.15
12-28 UNJF	4.602	4.815	4.70
1/4-28 UNJF	5.466	5.662	5.60
5/16-24 UNJF	6.907	7.110	7.00
3/8-24 UNJF	8.494	8.680	8.60
7/16-20 UNJF	9.875	10.083	10.00
1/2-20 UNJF	11.463	11.660	11.50
9/16-18 UNJF	12.913	13.123	13.00
5/8-18 UNJF	14.500	14.702	14.50

나사산 예비 가공 홀 직경 - 탭 가공 / 스레드 밀링

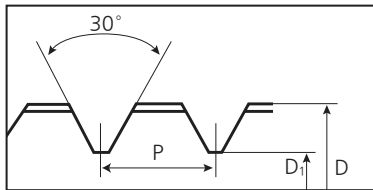
Thread pre-machining hole diameter - Tapping / thread milling

기타



Pg DIN 40 430에 따른
강재 전선관 나사산

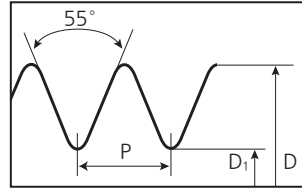
D Ø P Gg/1"	D ₁		Ø mm
	min. mm	max. mm	
Pg 7 × 20	11.29	11.43	11.40
Pg 9 × 18	13.85	14.01	14.00
Pg 11 × 18	17.25	17.41	17.25
Pg 13.5 × 18	19.05	19.21	19.00
Pg 16 × 18	21.15	21.31	21.25
Pg 21 × 16	26.79	27.03	27.00
Pg 29 × 16	35.49	35.73	35.50
Pg 36 × 16	45.49	45.73	45.50
Pg 42 × 16	52.49	52.73	52.50
Pg 48 × 16	57.79	58.03	58.00



Tr 미터법
ISO 사다리꼴 나사산

D Ø P Gg/1"	D ₁		Ø mm
	min. mm	max. mm	
8 × 1.5	6.5	6.69	6.60
9 × 2	7.0	7.236	7.20
10 × 2	8.0	8.236	8.20
11 × 3	8.0	8.315	8.25
12 × 3	9.0	9.315	9.25
14 × 3	11.0	11.315	11.25
16 × 4	12.0	12.375	12.25
18 × 4	14.0	14.375	14.25
20 × 4	16.0	16.375	16.25
22 × 5	17.0	17.45	17.25
24 × 5	19.0	19.45	19.25
26 × 5	21.0	21.45	21.25
28 × 5	23.0	23.45	23.25
30 × 6	24.0	24.5	24.25
32 × 6	26.0	26.5	26.25
34 × 6	28.0	28.5	28.25
36 × 6	30.0	30.5	30.25
38 × 7	31.0	31.56	31.50
40 × 7	33.0	33.56	33.50
42 × 7	35.0	35.56	35.50
44 × 7	37.0	37.56	37.50
46 × 8	38.0	38.63	38.50
48 × 8	40.0	40.63	40.50
50 × 8	42.0	42.63	42.50
52 × 8	44.0	44.63	44.50

Whitworth 나사산



BSW BS 84에 따른
Whitworth 나사산

D Ø P Gg/1"	D ₁		Ø mm
	Medium min. mm	Class max. mm	
1/16-60	1.045	1.231	1.20
3/32-48	1.703	1.911	1.90
1/8-40	2.362	2.590	2.50
5/32-32	2.952	3.213	3.10
3/16-24	3.407	3.745	3.60
7/32-24	4.201	4.539	4.50
1/4-20	4.724	5.155	5.00
5/16-18	6.131	6.591	6.50
3/8-16	7.493	7.988	7.90
7/16-14	8.790	9.330	9.20
1/2-12	9.989	10.590	10.50
9/16-12	11.577	12.178	12.00
5/8-11	12.919	13.558	13.40
3/4-10	15.798	16.484	16.40
7/8-9	18.612	19.354	19.25
1-8	21.335	22.148	22.00
1 1/8-7	23.929	24.833	24.75
1 1/4-7	27.104	28.008	27.50
1 3/8-6	29.505	30.529	30.00
1 1/2-6	32.680	33.704	33.50
1 5/8-5	34.771	35.965	35.50
1 3/4-5	37.946	39.140	39.00
1 7/8-4.5	40.398	41.705	41.50
2-4 1/2	43.573	44.880	44.50
2 1/4-4	49.020	50.468	50.00
2 1/2-4	55.370	56.818	56.00