Engraving Tool >>>

30° / 45° / 60° / 90°

This is a revolutionary new concept of engraving tools with indexable carbide insert.
Provide HIGH QUALITY ENGRAVING in most kinds of material.
Higher speed and feed rate, dramatically reducing your cycle time.

P M K N H S

No Need To Reset After Changing Insert Or Cutting Edge

- 2 Cutting Edges.
- Excellent repeatability!

Features >>>

High Positive Rake Angle

- Very sharp edge for shallow engraving.
- Suitable for all types of materials, such as plastic, non-ferrous metal, aluminum, copper, carbon steel and stainless steel.

Multi-Side Grinding

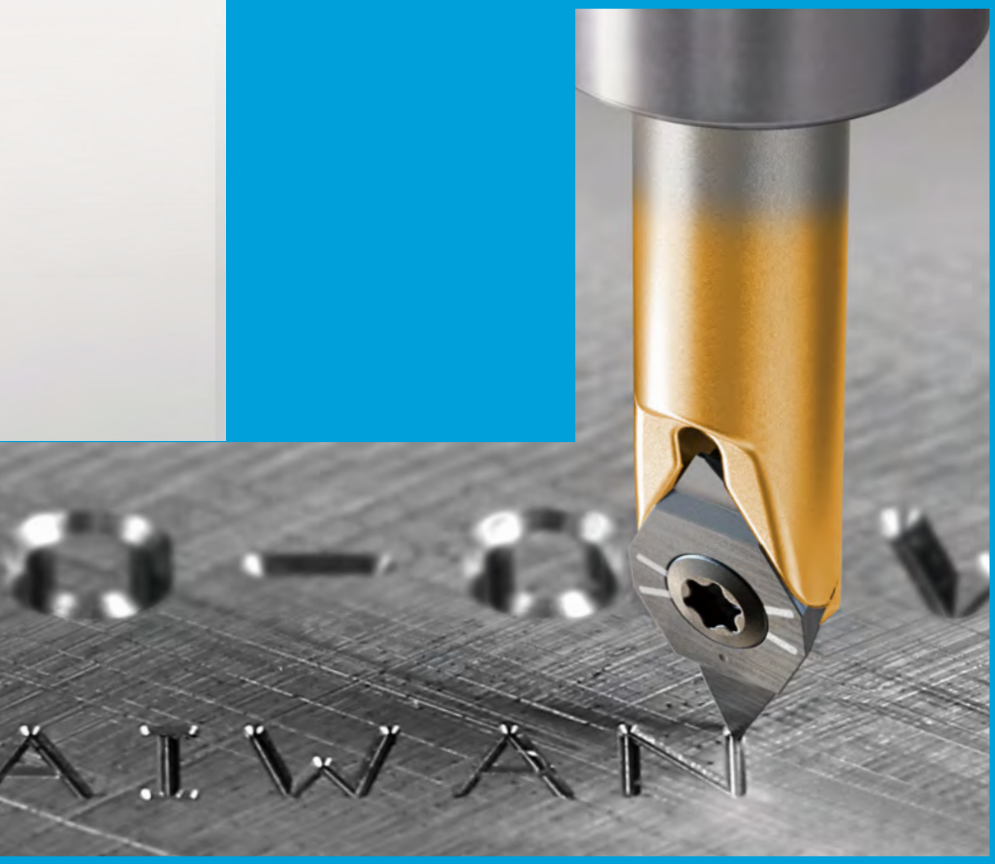
- Full peripherally ground insert to ensure efficient repeatability.
- It performs excellently without producing any burrs, especially in copper, aluminum and stainless steel.

High Speed, High Feed Rate

- Designed to run at high speed, up to 40,000 r.p.m.
- Feed rate 0.08mm (0.003") / rev. apply to aluminum; 0.05mm (0.002") / rev. apply to stainless steel.
- Reduces engraving cycle time!

Special forms are available on request

Applications



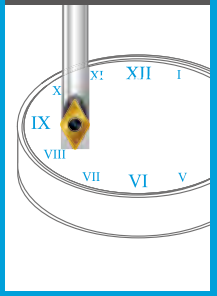
- Serial numbers, product codes, dial scales, signs, logo, graph and almost any character which can be created by the NC programming system.

Ultrasonic welding drum

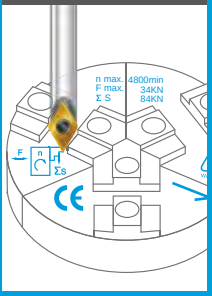
Mold & Die

> "Widely be used for marking on machine components, medical components, gun components, mold and die, automotive parts, gears, bearings and luxury goods."

Dial scales

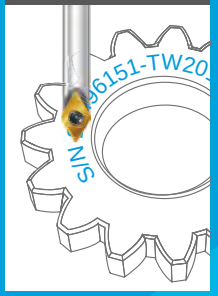


Product info

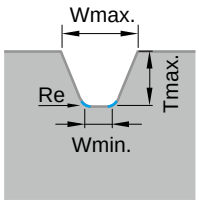
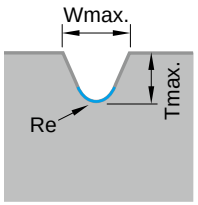
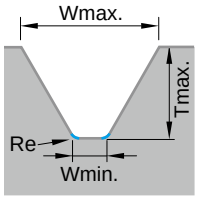
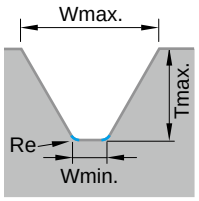
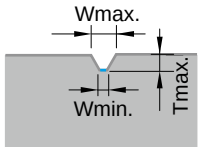
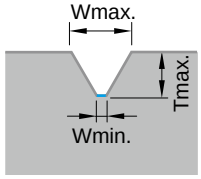


Logo outlines

Serial number



Engraving Tool System

Type	Form	Angle	Insert	Wmin.	Wmax.	Tmax.	Holder
X060 Series	 Radius Angled	**30°**	 X060A30W...	0.2	0.52	0.6	 99619-X060... Ø6, Ø8
		45°	 X060A45W...		0.86	0.8	
		60°	 X060A60W...		1.36	1.0	
		90°	 X060A90W...		2.2	1.0	
	 Radius	**30°**	 X060A30R...	Re: 0.2	0.63	0.6	
		45°	 X060A45R...		0.93	0.8	
		60°	 X060A60R...		1.39	1.0	
V045 V060 Series	 Radius Angled	**45°**	 V04506T1W	0.45	2.1	2.0	 V04506T1W Ø6, Ø8
				0.65			
	 Radius Angled / Angled	**60°**	 V06006T1W	0.25	1.1	0.8	 V06006T1W Ø4, Ø6, Ø8
				0.45	2.7	2.0	
				0.65	2.7	2.0	
W060 Series	 Angled	**60°**	 W06004S	0.1	0.33	0.2	 99619-W060... Ø4
				0.2	0.66	0.4	
				0.3	0.99	0.6	
N9MT-W Series	 Angled	**60°**	 N9MT080201W -60-NC40	0.2	1.1	0.8	 99616-10...SW Ø10, Ø3/8"
		90°	 N9MT080201W	0.2	2.0	0.9	

X060 Engraving Tool 30°

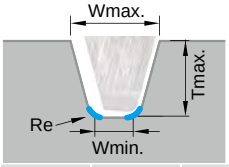
Inserts >>

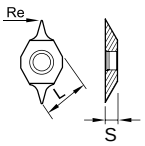
NC2032: • For all kinds of steel from < 40 HRC, carbon steel, alloy steel,and cast iron.

NC2035: • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.

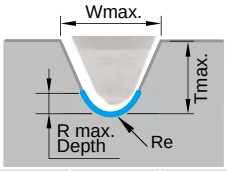
XP9001: • For non-ferrous metal, aluminum, brass, copper, plastic, acrylic.

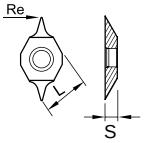
• Radius Angled Form



Angle	Code	Parts No.		Coating	Grade		Dimensions L	S	Re	Wmin.	Wmax.	Tmax.
30°	01X0140	X060A30W020R	NC2032	TiAlN	K20F		6	2.05	0.04	0.20	0.52	0.6
	01X0141		NC2035	ALDURA								
	01X0142		XP9001	Uncoated								

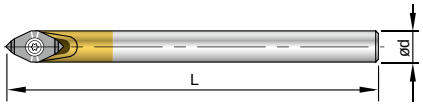
• Radius Form



Angle	Code	Parts No.		Coating	Grade		Dimensions L	S	Re	R max. Depth	Wmax.	Tmax.
30°	01X0119	X060A30R020	NC2032	TiAlN	K20F		6	2.05	0.2	0.15	0.63	0.6
	01X0132		NC2035	ALDURA								
	01X0134		XP9001	Uncoated								

Holder >>

• One holder supports the entire X060 series of carbide inserts.



Code	Parts No.	Shank	Ød	L	Screw	Key
69X001	00-99619-X060-06	Steel	6	40	*NS-22044 0.9Nm	NK-T7
69X002	00-99619-X060-06L	Carbide	6	60		
69X003	00-99619-X060-06LS	Steel	6			
69X004	00-99619-X060-06XL	Carbide	6	100		
69X005	00-99619-X060-08	Steel	8	60		

*Torque screwdriver is recommended.

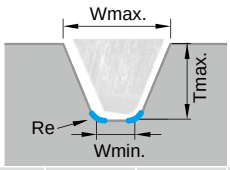
45° X060 Engraving Tool 45°

Inserts >>

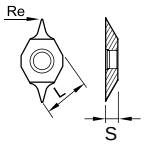
NC2032: • For all kinds of steel from < 40 HRC, carbon steel, alloy steel,and cast iron.

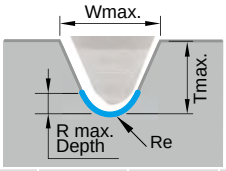
NC2035: • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.

XP9001: • For non-ferrous metal, aluminum, brass, copper, plastic, acrylic.

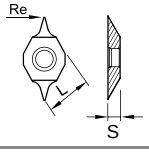


• Radius Angled Form

Angle	Code	Parts No.		Coating	Grade		Dimensions L	S	Re	Wmin.	Wmax.	Tmax.
45°	01X0021	X060A45W020R	NC2032	TiAlN	K20F		6	2.05	0.04	0.20	0.86	0.8
	01X0153		NC2035	ALDURA								
	01X0154		XP9001	Uncoated								



• Radius Form

Angle	Code	Parts No.		Coating	Grade		Dimensions L	S	Re	R max. Depth	Wmax.	Tmax.
45°	01X0013	X060A45R020	NC2032	TiAlN	K20F		6	2.05	0.2	0.12	0.93	0.8
	01X0149		NC2035	ALDURA								
	01X0150		XP9001	Uncoated								

Holder >>

• One holder supports the entire X060 series of carbide inserts.

Code	Parts No.	Shank	Ød	L	Screw	Key
69X001	00-99619-X060-06	Steel	6	40	*NS-22044 0.9Nm	NK-T7
69X002	00-99619-X060-06L	Carbide	6	60		
69X003	00-99619-X060-06LS	Steel	6			
69X004	00-99619-X060-06XL	Carbide	6	100		
69X005	00-99619-X060-08	Steel	8	60		

*Torque screwdriver is recommended.

X060 Engraving Tool 60°

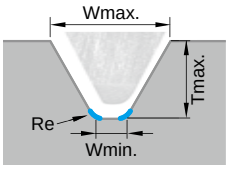
Inserts >>

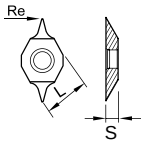
NC2032: • For all kinds of steel from < 40 HRC, carbon steel, alloy steel,and cast iron.

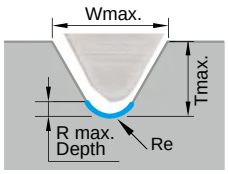
NC2035: • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.

XP9001: • For non-ferrous metal, aluminum, brass, copper, plastic, acrylic.

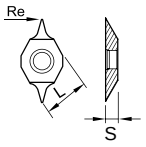
• Radius Angled Form



Angle	Code	Parts No.		Coating	Grade		Dimensions L	S	Re	Wmin.	Wmax.	Tmax.
60°	01X0063	X060A60W020R	NC2032	TiAlN	K20F		6	2.05	0.04	0.20	1.36	1.0
	01X0165		NC2035	ALDURA								
	01X0166		XP9001	Uncoated								



• Radius Form

Angle	Code	Parts No.		Coating	Grade		Dimensions L	S	Re	R max. Depth	Wmax.	Tmax.
60°	01X0117	X060A60R020	NC2032	TiAlN	K20F		6	2.05	0.2	0.10	1.39	1.0
	01X0158		NC2035	ALDURA								
	01X0159		XP9001	Uncoated								

Holder >>

• One holder supports the entire X060 series of carbide inserts.

Code	Parts No.	Shank	Ød	L	Screw	Key
69X001	00-99619-X060-06	Steel	6	40	*NS-22044 0.9Nm	NK-T7
69X002	00-99619-X060-06L	Carbide	6	60		
69X003	00-99619-X060-06LS	Steel	6			
69X004	00-99619-X060-06XL	Carbide	6	100		
69X005	00-99619-X060-08	Steel	8	60		

*Torque screwdriver is recommended.

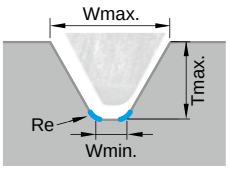
90° X060 Engraving Tool 90°

Inserts >>

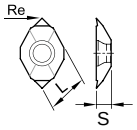
NC2032: • For all kinds of steel from < 40 HRC, carbon steel, alloy steel,and cast iron.

NC2035: • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.

XP9001: • For non-ferrous metal, aluminum, brass, copper, plastic, acrylic.

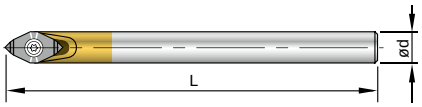


• Radius Angled Form

Angle	Code	Parts No.		Coating	Grade		Dimensions			Wmin.	Wmax.	Tmax.
							L	S	Re			
90°	01X0207	X060A90W020R	NC2032	TiAlN	K20F		6	2.05	0.04	0.2	2.2	1.0
	01X0208		NC2035	ALDURA								
	01X0209		XP9001	Uncoated								

Holder >>

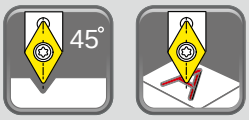
• One holder supports the entire X060 series of carbide inserts.



Code	Parts No.	Shank	Ød	L	Screw	Key
69X001	00-99619-X060-06	Steel	6	40	*NS-22044 0.9Nm	NK-T7
69X002	00-99619-X060-06L	Carbide	6	60		
69X003	00-99619-X060-06LS	Steel	6			
69X004	00-99619-X060-06XL	Carbide	6	100		
69X005	00-99619-X060-08	Steel	8	60		

*Torque screwdriver is recommended.

V045 Engraving Tool 45°

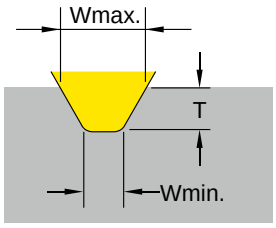


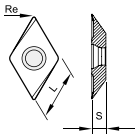
Inserts >>

NC2071: • Strong edge on chip-breaker, best suited for min. DOC 0.2mm.
• Universal grade for all kinds of steel <30 HRC, non-ferrous metal and stainless steel.

NC2032: • Long tool life.
• For all kinds of steel from 30~50 HRC, carbon steel, alloy steel, and cast iron.

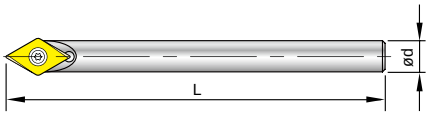
NC9031: • Fully positive ground rake angle, very sharp edge for shallow engraving.
• For non-ferrous metal such as aluminum, brass, copper, titanium, plastic and acrylic.



Angle	Code	Parts No.		Coating	Grade		Dimensions			W		T	
							L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
45°	0104501	V04506T1W06	NC2071	TiN	K20F		6.35	2.0	0.2	0.65	2.1	0.20	2.0
	0104502		NC2032	TiAlN						0.65		0.20	
	0104504		NC9031	TiN						0.45		0.05	

Holder >>

• Carbide shank holders for high speed cutting.
• XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



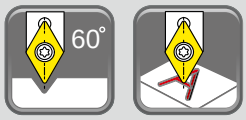
Angle	Code	Parts No.	Shank	Ød	L	Screw	Key
45°	691001	00-99619-V045-06	Steel	6	40	*NS-22044 0.9Nm	NK-T7
	691002	00-99619-V045-06L	Carbide		60		
	691003	00-99619-V045-06XL	Carbide		100		
	691004	00-99619-V045-08	Steel	8	60		

*Torque screwdriver is recommended.

Starter Kit >> V045 & V060

Angle	Code	Parts No.	Shank Ø	Insert included	Content
45°	691201-4501	00-99619-V045-03K-71	Ø6 99619-V045-06	V04506T1W06-NC2071	1 x Holder 1 x T7 Key 3 x inserts
	691201-4502	00-99619-V045-03K-32		V04506T1W06-NC2032	
	691201-4504	00-99619-V045-03K-31		V04506T1W06-NC9031	
60°	692201-6001	00-99619-V060-03K-71	Ø6 99619-V060-06	V06006T1W06-NC2071	
	692201-6002	00-99619-V060-03K-32		V06006T1W06-NC2032	
	692201-6003	00-99619-V060-03K-35		V06006T1W06-NC2035	
	692201-6004	00-99619-V060-03K-31		V06006T1W06-NC9031	

60° V060 Engraving Tool 60°



Inserts >>

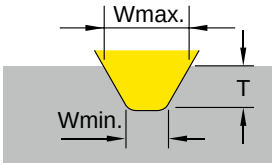
NC2071: • Strong edge on chip-breaker, best suited for min. DOC 0.2mm.
• Universal grade for all kinds of steel <30HRC, non-ferrous metal and stainless steel.

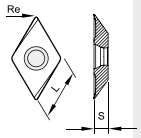
NC2032: • Long tool life.
• For all kinds of steel from 30~50 HRC, carbon steel, alloy steel,and cast iron.

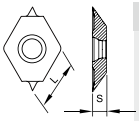
NC2035: • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.

NC9031: • Fully positive ground rake angle very sharp edge for shallow engraing.
• For non-ferrous metals such as aluminum, brass, copper, titanium, plastic and acrylic.

NC9036: • DLC coating, very sharp edge produces excellent surface finish.
• For non ferrous metals such as aluminum, brass, copper, titanium, plastic and acrylic.

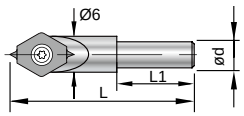


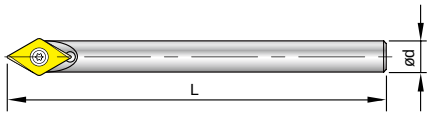
Angle	Code	Parts No.	Coating	Grade		Dimensions L	S	Re	W Wmin.	W Wmax.	T Tmin.	T Tmax.
60°	0106001	V06006T1W06	NC2071 TiN	K20F		6.35	2.0	0.2	0.65	2.7	0.20	2.0
	0106002		NC2032 TiAlN						0.65		0.20	
	0106003		NC2035 ALDURA						0.65		0.20	
	0106004		NC9031 TiN						0.45		0.05	

Angle	Code	Parts No.	Coating	Grade		Dimensions L	S	Re	W Wmin.	W Wmax.	T Tmin.	T Tmax.
60°	0106006	V06006T1W03	NC2032 TiAlN	K20F		6.35	2.0	---	0.25	1.1	0.05	0.8
	0106007		NC9036 DLC									

Holder >>

• Carbide shank holders for high speed cutting.
• XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



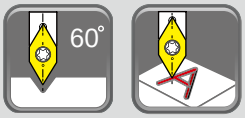


Angle	Code	Parts No.	Shank	Ød	L	L1	Screw	Key
60°	692004	00-99619-V060-04	Steel	4	30	12	*NS-22044 0.9Nm	NK-T7
	692001	00-99619-V060-06	Steel	6	40	---		
	692002	00-99619-V060-06L	Carbide		60	---		
	692003	00-99619-V060-06XL	Carbide		100	---		
	692005	00-99619-V060-08	Steel	8	60	---		

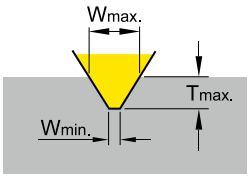
*Torque screwdriver is recommended.

W060 Engraving Tools

60°

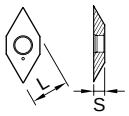


Inserts >>



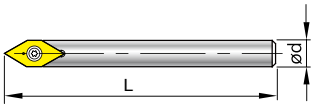
- Limited design, simply for thin or light engraving, used on engraving machine .
- Shank diameter 4mm is same as insert's size. Slim fits!
- Each insert has 2 cutting edges.

NC2032: • Universal grade for all unhardened steel.

Angle	Code	Parts No.	Coating	Grade		Dimensions L	Dimensions S	Wmin.	Wmax.	Tmax.
60°	01W2001	W06004S101-NC2032	TiAlN	K20F		4.5	1.3	0.1	0.33	0.2
	01W2002	W06004S102-NC2032						0.2	0.66	0.4
	01W2003	W06004S103-NC2032						0.3	0.99	0.6

Holder >>

- Made from steel.



Angle	Code	Parts No.	Ød	L	Screw	Key
60°	69W001	00-99619-W060-04	4	40	*NS-18037 0.6Nm	NK-T6

*Torque screwdriver is recommended.

Cutting Data >>

S101 — **Tmax.: 0.2mm**

	Workpiece Meterial	S (r.p.m)	f (mm/rev.)	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	~	Finishing
P	Carbon steel C＜0.3%	8000 ~ 40000	0.002 ~ 0.015	NC2032	0.1	0.05	0.03	0.02	0.02
P	Carbon steel C＞0.3%	8000 ~ 40000	0.002 ~ 0.012	NC2032	0.1	0.05	0.03	0.02	0.02
P	Alloy steel	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.08	0.03	0.03	0.02	0.02
M	Stainless Steel	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.08	0.03	0.03	0.02	0.02
K	Cast iron	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.1	0.05	0.03	0.02	0.02
N	Aluminum ≧ Non-Ferrous Metal	8000 ~ 40000	0.002 ~ 0.020	NC2032	0.1	0.05	0.03	0.02	0.02

S102 — **Tmax.: 0.4mm**

	Workpiece Meterial	S (r.p.m)	f (mm/rev.)	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	4th	~	Finishing
P	Carbon steel C＜0.3%	8000 ~ 40000	0.002 ~ 0.015	NC2032	0.2	0.1	0.05	0.03	0.03	0.02
P	Carbon steel C＞0.3%	8000 ~ 40000	0.002 ~ 0.012	NC2032	0.15	0.1	0.05	0.03	0.03	0.02
P	Alloy steel	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.12	0.08	0.05	0.03	0.03	0.02
M	Stainless Steel	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.12	0.05	0.05	0.03	0.03	0.02
K	Cast iron	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.15	0.1	0.05	0.03	0.03	0.02
N	Aluminum ≧ Non-Ferrous Metal	8000 ~ 40000	0.002 ~ 0.020	NC2032	0.2	0.1	0.1	0.05	0.03	0.02

S103 — **Tmax.: 0.6mm**

	Workpiece Meterial	S (r.p.m)	f (mm/rev.)	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	4th	~	Finishing
P	Carbon steel C＜0.3%	8000 ~ 40000	0.002 ~ 0.015	NC2032	0.25	0.1	0.05	0.05	0.03	0.02
P	Carbon steel C＞0.3%	8000 ~ 40000	0.002 ~ 0.012	NC2032	0.2	0.1	0.05	0.05	0.03	0.02
P	Alloy steel	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.15	0.1	0.05	0.03	0.03	0.02
M	Stainless Steel	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.15	0.05	0.05	0.03	0.03	0.02
K	Cast iron	8000 ~ 40000	0.002 ~ 0.010	NC2032	0.2	0.1	0.05	0.05	0.03	0.02
N	Aluminum ≧ Non-Ferrous Metal	8000 ~ 40000	0.002 ~ 0.020	NC2032	0.3	0.1	0.1	0.05	0.03	0.02

N9MT080201W Engraving Tool 60° / 90°

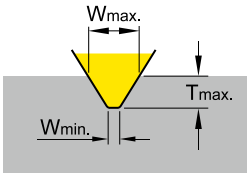
Inserts >>

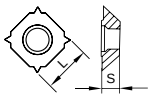
- No need to reset tool length after changing insert or cutting edge.
- The inserts can be used for small diameter spotting.
- Each insert has 4 cutting edges.

60-NC40: • Very positive angle for 60° engraving for all kind of unhardened steel and cast iron.

NC40: • Universal grade for all unhardened steel.

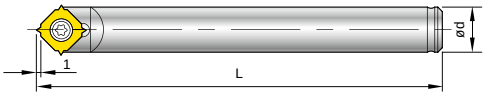
NC10: • Universal grade for non-ferrous metal and cast iron.



Angle	Code	Parts No.		Coating	Grade		Dimensions L	Dimensions S	Wmin.	Wmax.	Tmax.
60°	013404	N9MT080201W	60-NC40	TiN	K20F		8	2.38	0.2	1.1	0.8
90°	013405		NC40	TiN	K20F				0.2	2.0	0.9
	013406		NC10	TiAlN	K20F				0.2	2.0	0.9

Holder >>

- For SW engraving using NC Spot Drill basic holder.



Code	Parts No.	Ød	L	Screw	Key
603001	00-99616-10	10	90	NS-30055 2.0 Nm	NK-T8
613001	00-99616-3/8	3/8”	90		

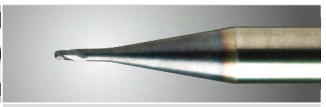
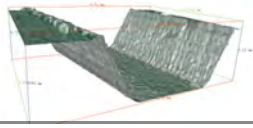
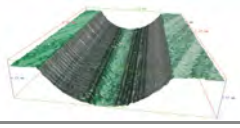
Cutting Data >>

(Tmax.: 0.8 mm)

Workpiece Meterial	S (r.p.m)	f (mm/rev.)	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	Finishing
P All unhardened steel	5000 ~ 20000	0.008 ~ 0.02	60-NC40,NC40	0.3	0.2	0.2	0.05
K Cast iron	5000 ~ 20000	0.008 ~ 0.02	60-NC40, NC10	0.3	0.2	0.2	0.05
N Non-Ferrous Metal	5000 ~ 20000	0.008 ~ 0.02	NC10	0.3	0.2	0.2	0.05

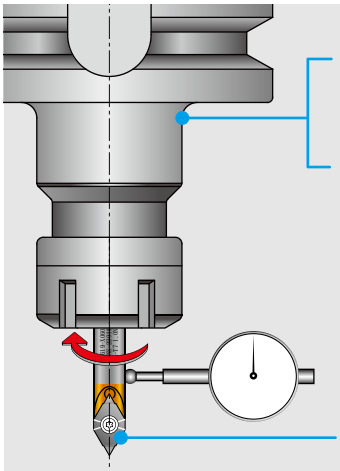
Performance

Comparison >>

Cutting data \ Tool			
	00-99619-V060-06 V06006T1W06-NC2071	Engraving tool	Ball nose end mill Radius 0.4 mm
Workpiece material	Tool steel SKD 61 (JIS G 4404), Hardness: HRB92~93 (HB 200)		
Spindle speed r.p.m.	10000	10000	10000
Feed rate mm/min.	100	100	300
Cutting depth Ap	0.2 mm	0.2 mm	0.05 mm, 4 times to cut to 0.2 mm
Roughness of bottom Ra	0.36 μm	0.83 μm	0.46 μm
Change and resetting	No need	Need	Need
Tool life	Long	Short	Short
Measured result by Alicona IFM system			

Cutting data \ Tool	00-99619-V060-06 V06006T1W06-NC2071	00-99619-V060-06 V06006T1W06-NC2071	00-99619-V060-06 V06006T1W06-NC2035
Workpiece material	P SKD 51	M SS	H SKD 61 (50HRC)
Spindle speed r.p.m.	10000	10000	10000
Feed rate mm/min.	300	300	100
Cutting depth Ap	0.1 mm	0.35 mm	0.2 mm
Change and resetting	No need	No need	No need
Tool life	24 min.(1440 sec.)	7.2 meters	3.5 meters

Attention >>



1 Recommended of tool holders
High precision spring collet chucks, shrink fit chucks, hydraulic chuck.

2 Pre-balance the tool holder
minimum **G6.3/10,000 r.p.m.** is necessary.

3 The downward feed rate of the Z-axis
should be **reduced to 50%** of the table feed rate.

4 Tool shank runout:
below 0.01 mm.

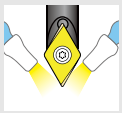
5 Torque screwdriver is recommended

6 Cutting fluid and cooling condition

Emusion / Oil

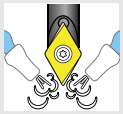
P Steel
M Stainless Steel
S Titanium
H Hardened Steel

Oil



N Non-Ferrous

Air



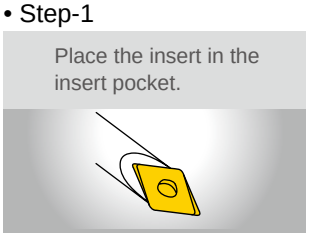
K Cast Iron

Clamping the engraving insert

• Place and hold the insert in the insert pocket against the positioning side.

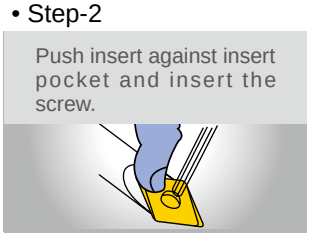
• Step-1

Place the insert in the insert pocket.



• Step-2

Push insert against insert pocket and insert the screw.



• Step-3

Tighten the insert screw.

Engraving Applications

Tip >>

Use the V045 and V060 style engravers in materials that tend to push burrs such as stainless steels and high temp. alloys. These inserts have a 0.2mm(0.008”) radius with a very sharp cutting edge and cut very freely. Character widths start around 0.45mm(0.017”).
This tool best replaces ball nose endmills. This tool is considered to be first choice for all but fine engraving width below 0.25mm.

Components

Luxury goods

Mold & Die

Product

Cutting Data >> X060 Engraving

X060A30W020R / X060A30R020

(Tmax. : 0.6mm)

Workpiece Material	S (r.p.m)	f (mm/rev.) Radius Angled	f (mm/rev.) Radius	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	4th	5th ~	Finishing
P Carbon steel C<0.3%	8000 ~ 40000	0.001 ~ 0.010	0.002 ~ 0.015	NC2032	0.2	0.1	0.05	0.05	0.05	0.02
P Carbon steel C>0.3%		0.001 ~ 0.008	0.002 ~ 0.012	NC2032	0.15	0.1	0.05	0.05	0.05	0.02
P Alloy steel		0.001 ~ 0.006	0.002 ~ 0.010	NC2032, NC2035	0.15	0.1	0.05	0.05	0.03	0.02
M Stainless Steel		0.001 ~ 0.006	0.002 ~ 0.010	NC2032	0.1	0.05	0.05	0.03	0.03	0.02
K Cast iron		0.001 ~ 0.006	0.002 ~ 0.010	NC2032	0.15	0.1	0.05	0.05	0.03	0.02
N Aluminum		0.001 ~ 0.012	0.002 ~ 0.020	XP9001	0.2	0.1	0.1	0.05	0.05	0.02
N Copper, Brass		0.001 ~ 0.012	0.002 ~ 0.020	XP9001	0.2	0.1	0.1	0.05	0.05	0.02
H Hardened Steel Up to 56 HRC		0.001 ~ 0.005	0.002 ~ 0.006	NC2035	0.1	0.05	0.03	0.03	0.02	0.01

X060A45W020R / X060A45R020

(Tmax. : 0.8mm)

Workpiece Material	S (r.p.m)	f (mm/rev.) Radius Angled	f (mm/rev.) Radius	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	4th	5th ~	Finishing
P Carbon steel C<0.3%	8000 ~ 40000	0.002 ~ 0.012	0.002 ~ 0.015	NC2032	0.3	0.2	0.1	0.05	0.05	0.03
P Carbon steel C>0.3%		0.002 ~ 0.010	0.002 ~ 0.012	NC2032	0.25	0.15	0.1	0.05	0.05	0.03
P Alloy steel		0.002 ~ 0.010	0.002 ~ 0.010	NC2032, NC2035	0.2	0.1	0.05	0.05	0.05	0.03
M Stainless Steel		0.002 ~ 0.008	0.002 ~ 0.010	NC2032	0.2	0.1	0.05	0.05	0.05	0.03
K Cast iron		0.002 ~ 0.010	0.002 ~ 0.010	NC2032	0.2	0.1	0.1	0.05	0.05	0.03
N Aluminum		0.002 ~ 0.015	0.002 ~ 0.020	XP9001	0.3	0.2	0.1	0.1	0.05	0.03
N Copper, Brass		0.002 ~ 0.015	0.002 ~ 0.020	XP9001	0.3	0.2	0.1	0.1	0.05	0.03
H Hardened Steel Up to 56 HRC		0.002 ~ 0.006	0.002 ~ 0.006	NC2035	0.15	0.1	0.05	0.05	0.03	0.02

X060A60W020R / X060A60R020

(Tmax. : 1.0mm)

Workpiece Material	S (r.p.m)	f (mm/rev.) Radius Angled	f (mm/rev.) Radius	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	4th	5th ~	Finishing
P Carbon steel C<0.3%	8000 ~ 40000	0.002 ~ 0.012	0.002 ~ 0.015	NC2032	0.3	0.2	0.1	0.1	0.05	0.03
P Carbon steel C>0.3%		0.002 ~ 0.010	0.002 ~ 0.012	NC2032	0.3	0.2	0.1	0.1	0.05	0.03
P Alloy steel		0.002 ~ 0.010	0.002 ~ 0.010	NC2032, NC2035	0.3	0.1	0.1	0.05	0.05	0.03
M Stainless Steel		0.002 ~ 0.008	0.002 ~ 0.010	NC2032	0.2	0.1	0.1	0.05	0.05	0.03
K Cast iron		0.002 ~ 0.010	0.002 ~ 0.010	NC2032	0.3	0.1	0.1	0.05	0.05	0.03
N Aluminum		0.002 ~ 0.015	0.002 ~ 0.020	XP9001	0.3	0.2	0.1	0.1	0.05	0.03
N Copper, Brass		0.002 ~ 0.015	0.002 ~ 0.020	XP9001	0.3	0.2	0.1	0.1	0.05	0.03
H Hardened Steel Up to 56 HRC		0.002 ~ 0.006	0.002 ~ 0.006	NC2035	0.2	0.1	0.05	0.05	0.03	0.02

X060A90W020R

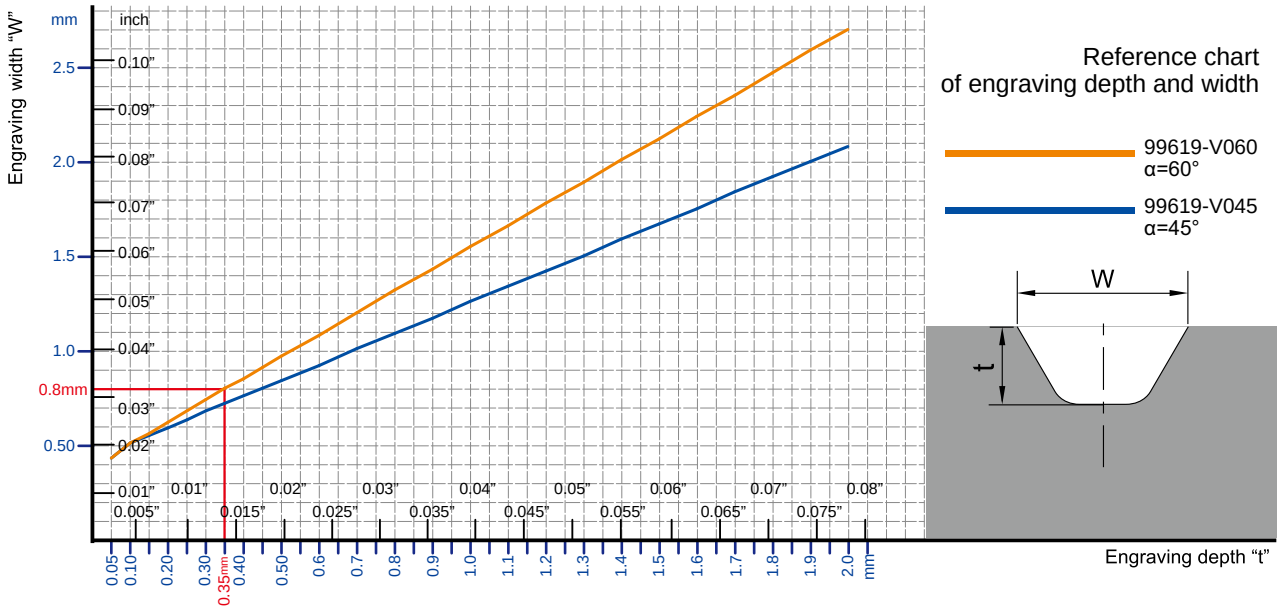
(Tmax. : 1.0mm)

Workpiece Material	S (r.p.m)	f (mm/rev.)	Grade of Insert	Depth of cut (mm) 1st	2nd	3rd	4th	5th ~	Finishing
P Carbon steel C<0.3%	8000 ~ 40000	0.002 ~ 0.015	NC2032	0.35	0.25	0.15	0.1	0.05	0.03
P Carbon steel C>0.3%		0.002 ~ 0.012	NC2032	0.3	0.2	0.1	0.1	0.05	0.03
P Alloy steel		0.002 ~ 0.010	NC2032, NC2035	0.3	0.1	0.1	0.05	0.05	0.03
M Stainless steel		0.002 ~ 0.010	NC2032	0.2	0.1	0.1	0.05	0.05	0.03
K Casting iron		0.002 ~ 0.010	NC2032	0.3	0.1	0.1	0.05	0.05	0.03
N Non-ferrous metal (Al, Cu)		0.002 ~ 0.020	XP9001	0.4	0.3	0.2	0.1	0.05	0.03
N Copper, Brass		0.002 ~ 0.020	XP9001	0.4	0.3	0.2	0.1	0.05	0.03
H Hardened steel up 56 HRC		0.002 ~ 0.006	NC2035	0.2	0.1	0.05	0.05	0.03	0.02

Cutting Data >> V045/V060 Engraving

- To use the engraving chart, select your engraving width (w) on the vertical axis. Select your engraving insert angle (45° or 60°), and follow the horizontal line from the (w) axis to the intersection with the insert angle.
- Follow the vertical line from this intersection point to the engraving depth (t) axis to determine the engraving depth.

V045/V060 T1W06

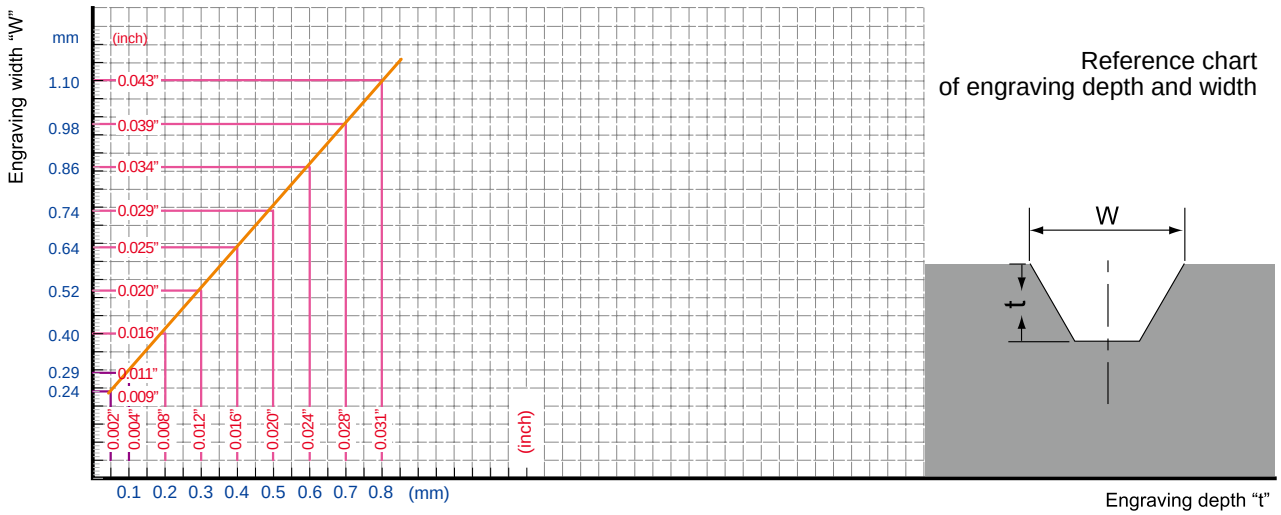


Work Material		S (r.p.m)	f (mm/rev.)	Grade of Insert
P	Carbon steel	5000~40000	0.008~0.05	NC2071,NC2032
P	Alloy steel	5000~40000	0.008~0.03	NC2032,NC2071
M	Stainless steel	5000~40000	0.008~0.05	NC2071,NC9031
K	Casting iron	5000~40000	0.008~0.03	NC2032
N	Aluminum≧Non-ferrous metal	5000~40000	0.008~0.08	NC2071,NC9031
H	Hardened steel up to 56 HRC	6000~35000	0.003~0.01	NC2035

(Tmax. : 2.0mm)

Material \ Ap		1st	2nd	3rd	4th	5th	6th	~	Fine finishing
P	Carbon steel	0.8	0.6	0.3	0.2	0.1	~	~	0.05
P	Alloy steel	0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.05
M	Stainless steel	0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.05
K	Casting iron	0.8	0.6	0.3	0.2	0.1	~	~	0.05
N	Aluminum≧Non-ferrous metal	1.0	0.8	0.2	~	~	~	~	0.05
H	Hardened steel up to 56 HRC	0.2	0.2	0.15	0.15	0.1	0.1	0.1	0.05

V060 T1W03



Workpiece Meterial		S (r.p.m)	f (mm/rev.)	Grade of Insert
P	Carbon steel C<0.3%	8000 ~ 40000	0.005 ~ 0.010	NC2032
	Carbon steel C>0.3%	8000 ~ 40000	0.005 ~ 0.015	NC2032
	Alloy steel	6000 ~ 35000	0.005 ~ 0.010	NC2032
M	Stainless steel	8000 ~ 35000	0.003 ~ 0.010	NC9036
K	Casting iron	6000 ~ 35000	0.005 ~ 0.015	NC2032
N	Aluminum	8000 ~ 40000	0.005 ~ 0.015	NC9036
	Copper, Brass	8000 ~ 40000	0.005 ~ 0.010	NC9036
S	Titanium	6000 ~ 15000	0.003 ~ 0.010	NC9036

(Tmax. : 0.8mm)

Material \ Ap		1st	2nd	3rd	4th	5th	~	Fine finishing
P	Carbon steel C<0.3%	0.3	0.2	0.1	0.1	0.05	0.05	0.03
	Carbon steel C>0.3%	0.3	0.2	0.1	0.1	0.05	0.05	0.03
	Alloy steel	0.3	0.1	0.1	0.05	0.05	0.05	0.03
M	Stainless steel	0.2	0.1	0.1	0.1	0.05	0.05	0.03
K	Casting iron	0.2	0.1	0.1	0.1	0.05	0.05	0.03
N	Aluminum	0.2	0.1	0.1	0.1	0.05	0.05	0.03
	Copper, Brass	0.2	0.1	0.1	0.1	0.05	0.05	0.03
S	Titanium	0.2	0.1	0.1	0.1	0.05	0.05	0.03