



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.



► **No Need To Reset After Changing Insert Or Cutting Edge**

- 2 Cutting Edges.
- Excellent repeatability!



Features >>>

► **High Positive Rake Angle**

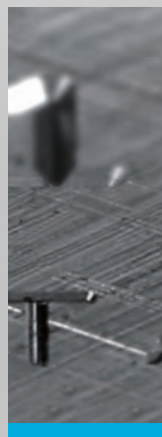
- Very sharp edge for shallow engraving.
- Suitable for all types of materials, such as plastic, non-ferrous metal, aluminum, copper, carbon steel and stainless steel.

► **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!





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

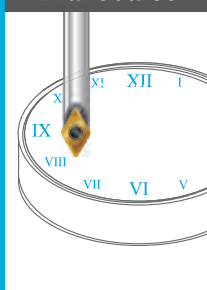


3

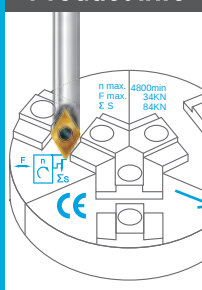
Engraving Tool

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

Dial scales



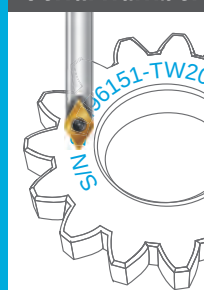
Product info



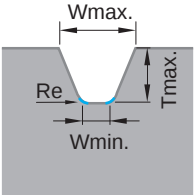
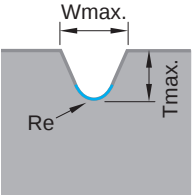
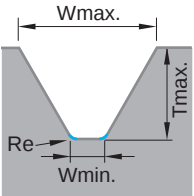
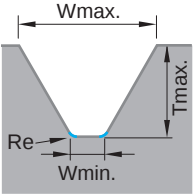
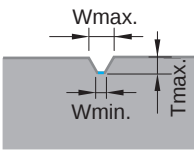
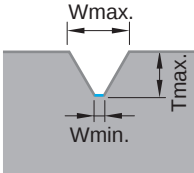
Logo outlines



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	 99619-V045... Ø6, Ø8
				0.65			
	 Radius Angled / Angled	60°	 V06006T1W	0.25	1.1	0.8	 99619-V060... 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°

30°

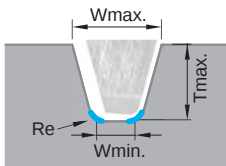


▶ Inserts >>

- NC2032:** • For all kinds of steel from < HRC 40, carbon steel, alloy steel, and cast iron.
- NC2035:** • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to HRC 50.
- XP9001:** • For non-ferrous metal, aluminum, brass, copper, plastic, acrylic.

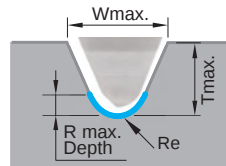
• Radius Angled Form

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



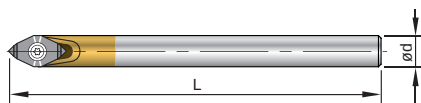
• Radius Form

Angle	Code	Parts No.	Coating	Grade		Dimensions			R max. Depth	Wmax.	Tmax.
						L	S	Re			
30°	01X0119	X060A30R020	NC2032	TiAIN		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.
- XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



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	60		
69X004	00-99619-X060-06XL	Carbide	6	100		
69X005	00-99619-X060-08	Steel	8	60		

*Torque screwdriver is recommended.

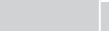
45° X060 Engraving Tool 45°

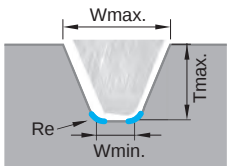


► Inserts >>

- NC2032:** • For all kinds of steel from < HRC 40, carbon steel, alloy steel, and cast iron.
- NC2035:** • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to HRC 50.
- XP9001:** • For non-ferrous metal, aluminum, brass, copper, plastic, acrylic.

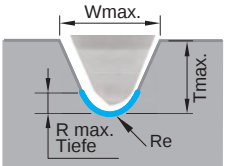
• Radius Angled Form

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



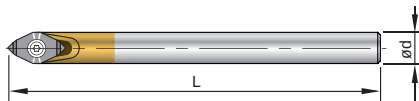
• Radius Form

Angle	Code	Parts No.	Coating	Grade		Dimensions			R max. Depth	Wmax.	Tmax.	
						L	S	Re				
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.
- XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



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	100		
69X004	00-99619-X060-06XL	Carbide	6	100		
69X005	00-99619-X060-08	Steel	8	60		

*Torque screwdriver is recommended.

X060 Engraving Tool 60°

60°



► Inserts >>

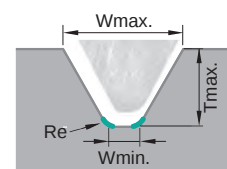
NC2032: • For all kinds of steel from < HRC 40, carbon steel, alloy steel, and cast iron.

NC2035: • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to HRC 50.

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			
60°	01X0063	X060A60W020R	NC2032	TiAlN		6	2.05	0.04	0.20	1.36	1.0
	01X0165		NC2035	ALDURA							
	01X0166		XP9001	Uncoated							

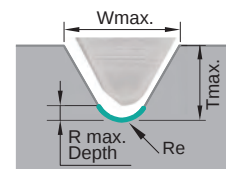


3

Engraving Tool

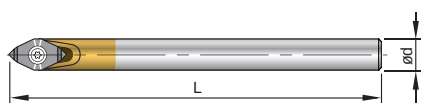
• Radius Form

Angle	Code	Parts No.	Coating	Grade		Dimensions			R max. Depth	Wmax.	Tmax.
						L	S	Re			
60°	01X0117	X060A60R020	NC2032	TiAlN		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.
- XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



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	100		
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°

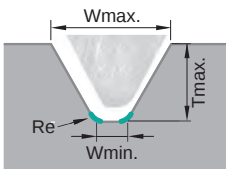


▶ Inserts >>

- NC2032:** • For all kinds of steel from < HRC 40, carbon steel, alloy steel, and cast iron.
- NC2035:** • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to HRC 50.
- XP9001:** • For non-ferrous metal, aluminum, brass, copper, plastic, acrylic.

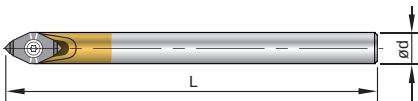
• Radius Angled Form

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



▶ Holder >>

- One holder supports the entire X060 series of carbide inserts.
- XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



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	60		
69X004	00-99619-X060-06XL	Carbide	6	100		
69X005	00-99619-X060-08	Steel	8	60		

*Torque screwdriver is recommended.

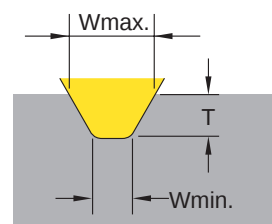
V045 Engraving Tool 45°

45°



► Inserts >>

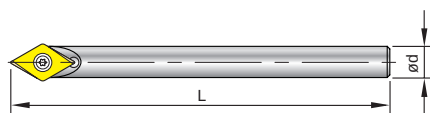
- NC2071:**
- Strong edge on chip-breaker, best suited for min. DOC 0.2mm.
 - Universal grade for all kinds of steel <HRC 30, non-ferrous metal and stainless steel.
- NC2032:**
- Long tool life.
 - For all kinds of steel from HRC 30~50, carbon steel, alloy steel, and cast iron.
- NC9031:**
- Fully positive 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 ±0.05	Wmin.	Wmax.	Tmin.	Tmax.
45°	0104501	NC2071	TiN	K20F		6.35	2.0	0.2	0.65		0.20	
	0104502	V04506T1W06	TiAlN						0.65	2.1	0.20	2.0
	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		40		
	691002	00-99619-V045-06L	Carbide	6	60	*NS-22044 0.9Nm	NK-T7
	691003	00-99619-V045-06XL	Carbide		100		
	691004	00-99619-V045-08	Steel	8	60		

*Torque screwdriver is recommended.

► Starter Kit >> V045 & V060

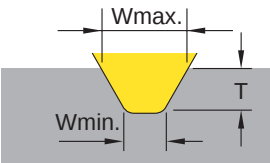
Angle	Code	Parts No.	Shank Ø	Insert included	Content
45°	691201-4501	00-99619-V045-03K-71	Ø6	V04506T1W06-NC2071	1 x Holder 1 x T7 Key 3 x inserts
	691201-4502	00-99619-V045-03K-32		V04506T1W06-NC2032	
	691201-4504	00-99619-V045-03K-31		V04506T1W06-NC9031	
60°	692201-6001	00-99619-V060-03K-71	Ø6	V06006T1W06-NC2071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

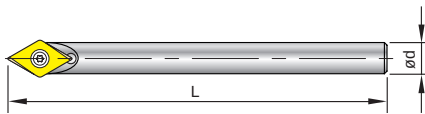
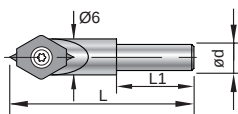
- NC2071:** • Strong edge on chip-breaker, best suited for min. DOC 0.2mm.
• Universal grade for all kinds of steel <HRC 30, non-ferrous metal and stainless steel.
- NC2032:** • Long tool life.
• For all kinds of steel from HRC 30~50, carbon steel, alloy steel, and cast iron.
- NC2035:** • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to HRC 56.
- NC9031:** • Fully positive ground rake angle very sharp edge for shallow engraving.
• 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			W		T	
						L	S	Re ±0.05	Wmin.	Wmax.	Tmin.	Tmax.
60°	0106001	V06006T1W06	NC2071	TiN		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			W		T	
60°	0106006	V06006T1W03	NC2032	TiAlN		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.

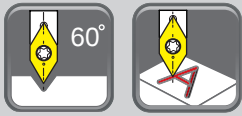


Angle	Code	Parts No.	Shank	Ød	L	L1	Screw	Key
60°	692004	00-99619-V060-04	Steel	4	30	12	*NS-22044 0.9Nm	NK-T7
	692001	00-99619-V060-06	Steel		40	---		
	692002	00-99619-V060-06L	Carbide	6	60	---		
	692003	00-99619-V060-06XL	Carbide		100	---		
	692005	00-99619-V060-08	Steel	8	60	---		

*Torque screwdriver is recommended.

W060 Engraving Tools

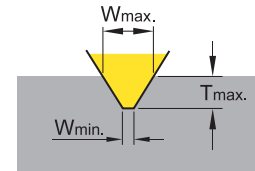
60°



► 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		Wmin.	Wmax.	Tmax.
						L	S			
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	Workpiece Material	S (r.p.m)	f (mm/rev.)	Depth of cut (mm)					Grade of Insert
				1st	2nd	3rd	~	Finishing	
Tmax.: 0.2mm	P Carbon steel	8000 ~ 40000	0.002 ~ 0.015	0.1	0.05	0.03	0.02	0.02	NC2032
	Alloy steel	8000 ~ 40000	0.002 ~ 0.010	0.08	0.03	0.03	0.02	0.02	
	M Stainless steel	8000 ~ 40000	0.002 ~ 0.010	0.08	0.03	0.03	0.02	0.02	
	K Cast Iron	8000 ~ 40000	0.002 ~ 0.010	0.1	0.05	0.03	0.02	0.02	
	N Non-ferrous metal	8000 ~ 40000	0.002 ~ 0.020	0.1	0.05	0.03	0.02	0.02	
S102	Workpiece Material	S (r.p.m)	f (mm/rev.)	Depth of cut (mm)					Grade of Insert
				1st	2nd	3rd	4th	~	
Tmax.: 0.4mm	P Carbon steel	8000 ~ 40000	0.002 ~ 0.015	0.15	0.1	0.05	0.03	0.03	NC2032
	Alloy steel	8000 ~ 40000	0.002 ~ 0.010	0.12	0.08	0.05	0.03	0.03	
	M Stainless steel	8000 ~ 40000	0.002 ~ 0.010	0.12	0.05	0.05	0.03	0.03	
	K Cast Iron	8000 ~ 40000	0.002 ~ 0.010	0.15	0.1	0.05	0.03	0.03	
	N Non-ferrous metal	8000 ~ 40000	0.002 ~ 0.020	0.2	0.1	0.1	0.05	0.03	
S103	Workpiece Material	S (r.p.m)	f (mm/rev.)	Depth of cut (mm)					Grade of Insert
				1st	2nd	3rd	4th	~	
Tmax.: 0.6mm	P Carbon steel	8000 ~ 40000	0.002 ~ 0.015	0.2	0.1	0.05	0.05	0.03	NC2032
	Alloy steel	8000 ~ 40000	0.002 ~ 0.010	0.15	0.1	0.05	0.03	0.03	
	M Stainless steel	8000 ~ 40000	0.002 ~ 0.010	0.15	0.05	0.05	0.03	0.03	
	K Cast Iron	8000 ~ 40000	0.002 ~ 0.010	0.2	0.1	0.05	0.05	0.03	
	N Non-ferrous metal	8000 ~ 40000	0.002 ~ 0.020	0.3	0.1	0.1	0.05	0.03	

60°
90°

N9MT080201W Engraving Tool 60° / 90°



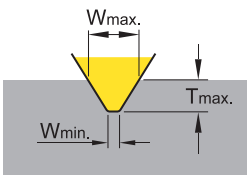
▸ Inserts >>

- 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.

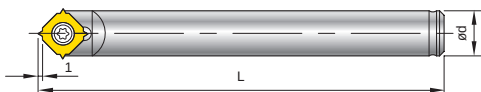
NC10: • Universal grade for non-ferrous metal and cast iron.



Angle	Code	Parts No.		Coating	Grade		Dimensions		Wmin.	Wmax.	Tmax.
							L	S			
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		

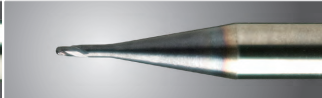
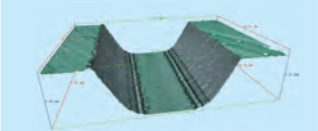
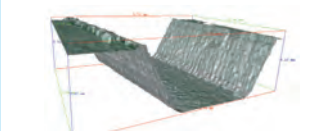
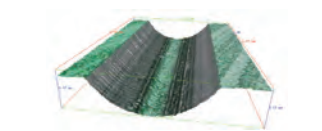
▸ Cutting Data >>

(Tmax.: 0.8 mm)

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

Performance

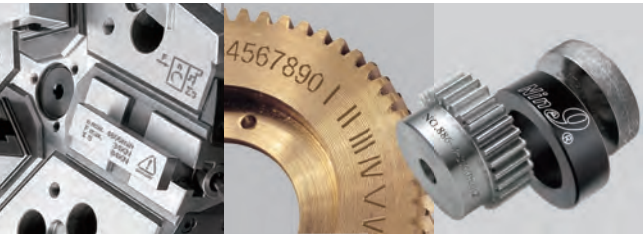
► Comparison >>

Tool			
Cutting data	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			

Tool	00-99619-V060-06 V06006T1W06-NC2071	00-99619-V060-06 V06006T1W06-NC2071	00-99619-V060-06 V06006T1W06-NC2035
Cutting data			
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

► Application >>

Components



Luxury goods



Mold & Die



Product

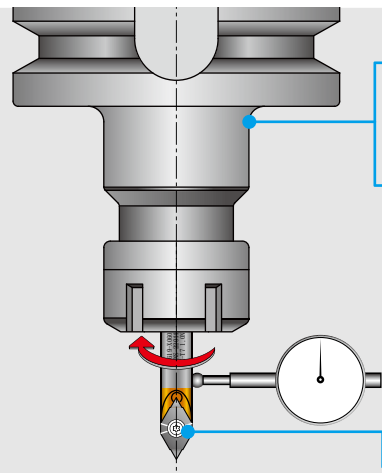


3

Engraving Tool

Technical guide

► Before you start, please pay attention the following conditions



- 1 Recommended of tool holders**
High precision spring collet chucks, precision milling 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

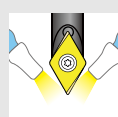
Emulsion / Oil



P Steel
S Titanium

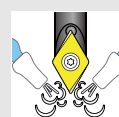
M Stainless Steel
H Hardened Steel

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.



► Tip >>

The Nine9 X060 Engraving Tool delivers precision with a fine 0.2mm bottom width and multiple angle options (30°, 45°, 60°, 90°). Its sharp, high-positive rake edge ensures clean, shallow engraving, while excellent repeatability eliminates the need for tool length resetting! A single holder supports the entire X060 insert series, making it a versatile choice for engraving plastic, aluminum, copper, non-ferrous metals, carbon steel, cast iron, hardened steel (HRC50) and stainless steel.

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.

Cutting Data >> X060 Engraving

▶ X060A30W020R / X060A30R020 (Tmax. : 0.6mm)

Workpiece Material	S (r.p.m)	f (mm/rev.)		Depth of cut (mm)						Grade of Insert
		Radius Angled	Radius	1st	2nd	3rd	4th	5th ~	Finishing	
P Carbon steel	8000 ~ 40000	0.001 ~ 0.010	0.002 ~ 0.015	0.15	0.1	0.05	0.05	0.05	0.02	NC2032
Alloy steel		0.001 ~ 0.006	0.002 ~ 0.010	0.15	0.1	0.05	0.05	0.03	0.02	NC2032, NC2035
M Stainless steel		0.001 ~ 0.006	0.002 ~ 0.010	0.1	0.05	0.05	0.03	0.03	0.02	NC2032
K Cast Iron		0.001 ~ 0.006	0.002 ~ 0.010	0.15	0.1	0.05	0.05	0.03	0.02	NC2032
N Non-ferrous metal		0.001 ~ 0.012	0.002 ~ 0.020	0.2	0.1	0.1	0.05	0.05	0.02	XP9001
H Hardened steel < HRC50		0.001 ~ 0.005	0.002 ~ 0.006	0.1	0.05	0.03	0.03	0.02	0.01	NC2035

▶ X060A45W020R / X060A45R020 (Tmax. : 0.8mm)

Workpiece Material	S (r.p.m)	f (mm/rev.)		Depth of cut (mm)						Grade of Insert
		Radius Angled	Radius	1st	2nd	3rd	4th	5th ~	Finishing	
P Carbon steel	8000 ~ 40000	0.002 ~ 0.012	0.002 ~ 0.015	0.25	0.15	0.1	0.05	0.05	0.03	NC2032
Alloy steel		0.002 ~ 0.010	0.002 ~ 0.010	0.2	0.1	0.05	0.05	0.05	0.03	NC2032, NC2035
M Stainless steel		0.002 ~ 0.008	0.002 ~ 0.010	0.2	0.1	0.05	0.05	0.05	0.03	NC2032
K Cast Iron		0.002 ~ 0.010	0.002 ~ 0.010	0.2	0.1	0.1	0.05	0.05	0.03	NC2032
N Non-ferrous metal		0.002 ~ 0.015	0.002 ~ 0.020	0.3	0.2	0.1	0.1	0.05	0.03	XP9001
H Hardened steel < HRC50		0.002 ~ 0.006	0.002 ~ 0.006	0.15	0.1	0.05	0.05	0.03	0.02	NC2035

▶ X060A60W020R / X060A60R020 (Tmax. : 1.0mm)

Workpiece Material	S (r.p.m)	f (mm/rev.)		Depth of cut (mm)						Grade of Insert
		Radius Angled	Radius	1st	2nd	3rd	4th	5th ~	Finishing	
P Carbon steel	8000 ~ 40000	0.002 ~ 0.012	0.002 ~ 0.015	0.3	0.2	0.1	0.1	0.05	0.03	NC2032
Alloy steel		0.002 ~ 0.010	0.002 ~ 0.010	0.3	0.1	0.1	0.05	0.05	0.03	NC2032, NC2035
M Stainless steel		0.002 ~ 0.008	0.002 ~ 0.010	0.2	0.1	0.1	0.05	0.05	0.03	NC2032
K Cast Iron		0.002 ~ 0.010	0.002 ~ 0.010	0.3	0.1	0.1	0.05	0.05	0.03	NC2032
N Non-ferrous metal		0.002 ~ 0.015	0.002 ~ 0.020	0.3	0.2	0.1	0.1	0.05	0.03	XP9001
H Hardened steel < HRC50		0.002 ~ 0.006	0.002 ~ 0.006	0.2	0.1	0.05	0.05	0.03	0.02	NC2035

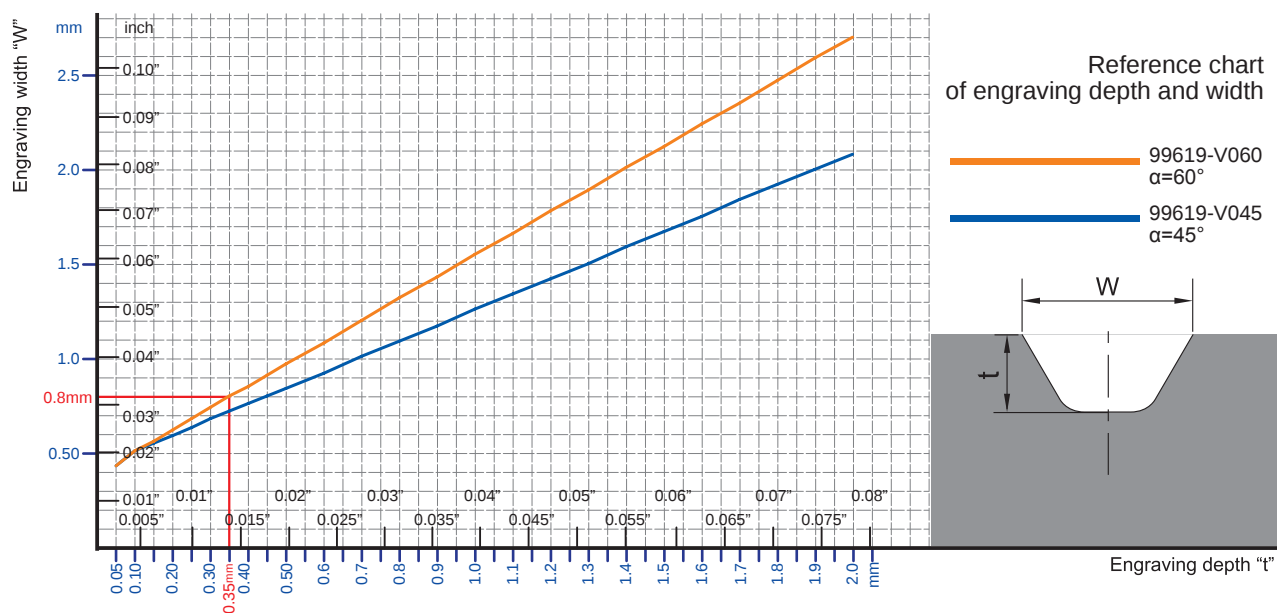
▶ X060A90W020R (Tmax. : 1.0mm)

Workpiece Material	S (r.p.m)	f (mm/rev.)	Depth of cut (mm)						Grade of Insert
			1st	2nd	3rd	4th	5th ~	Finishing	
P Carbon steel	8000 ~ 40000	0.002 ~ 0.015	0.3	0.2	0.1	0.1	0.05	0.03	NC2032
Alloy steel		0.002 ~ 0.010	0.3	0.1	0.1	0.05	0.05	0.03	NC2032, NC2035
M Stainless steel		0.002 ~ 0.010	0.2	0.1	0.1	0.05	0.05	0.03	NC2032
K Cast Iron		0.002 ~ 0.010	0.3	0.1	0.1	0.05	0.05	0.03	NC2032
N Non-ferrous metal		0.002 ~ 0.020	0.4	0.3	0.2	0.1	0.05	0.03	XP9001
H Hardened steel < HRC50		0.002 ~ 0.006	0.2	0.1	0.05	0.05	0.03	0.02	NC2035

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

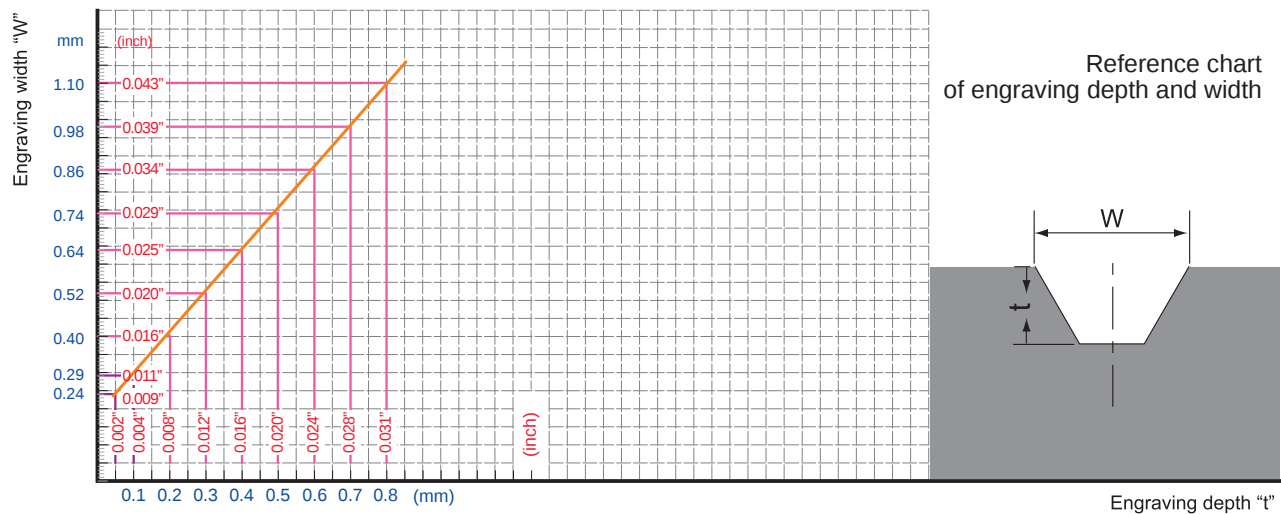


Work Material		S (r.p.m)	f (mm/rev.)	Grade of Insert
P	Carbon steel	5000~40000	0.008~0.05	NC2071,NC2032
	Alloy steel	5000~40000	0.008~0.03	NC2032,NC2071
M	Stainless steel	5000~40000	0.008~0.05	NC2071,NC9031
K	Cast Iron	5000~40000	0.008~0.03	NC2032
N	Non-ferrous metal	5000~40000	0.008~0.08	NC2071,NC9031
H	Hardened steel < HRC56	6000~35000	0.003~0.01	NC2035

(Tmax. : 2.0mm)

Ap		1st	2nd	3rd	4th	5th	6th	—	Fine finishing
P	Carbon steel	0.8	0.6	0.3	0.2	0.1	—	—	0.05
	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	Cast Iron	0.8	0.6	0.3	0.2	0.1	—	—	0.05
N	Non-ferrous metal	1.0	0.8	0.2	—	—	—	—	0.05
H	Hardened steel < HRC56	0.2	0.2	0.15	0.15	0.1	0.1	0.1	0.05

► V060 T1W03



	Workpiece Material	S (r.p.m)	f (mm/rev.)	Grade of Insert
P	Carbon steel	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	Cast Iron	6000 ~ 35000	0.005 ~ 0.015	NC2032
N	Non-ferrous metal	8000 ~ 40000	0.005 ~ 0.015	NC9036
S	Ti, Ti-alloy	6000 ~ 15000	0.003 ~ 0.010	NC9036

		(Tmax. : 0.8mm)						
Material	Ap	1st	2nd	3rd	4th	5th	~	Fine finishing
P	Carbon steel	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	Cast Iron	0.2	0.1	0.1	0.1	0.05	0.05	0.03
N	Non-ferrous metal	0.2	0.1	0.1	0.1	0.05	0.05	0.03
S	Ti, Ti-alloy	0.2	0.1	0.1	0.1	0.05	0.05	0.03