



Engraving 30° / 45° / 60° / 90°

This is a revolutionary new concept of engraving tools with *indexable carbide inserts*. They offer you the ability to produce HIGH QUALITY ENGRAVING in most materials. The latest coated carbide grades help you to obtain higher speed and feed rate, dramatically reducing your cycle time.

1

Features

Engraving Tool

► High Positive Rake Angle

- Indexable insert.
- Suitable for engraving all types of materials, such as plastic, non-ferrous metal, aluminum, copper, carbon steel and stainless steel.

► Multi-Side Grinding

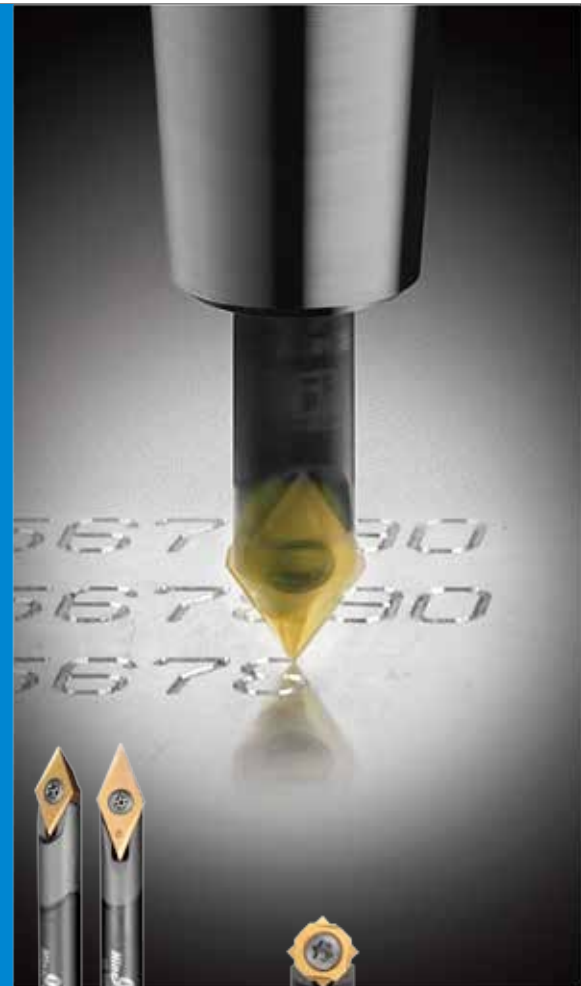
- Full peripherally ground insert to ensure efficient repeatability.
- It performs excellently without producing any burrs, especially in copper, aluminum and stainless steel.

► High Speed, High Feed Rate

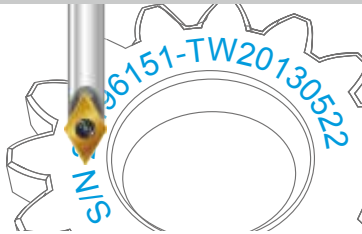
- Designed to run at high speed, up to 40,000 r.p.m.
- Feed rate 0.08mm (0.003") / rev. apply to aluminum; 0.05mm (0.002") / rev. apply to stainless steel.
- Reduces engraving cycle time!

► Economical

- Each indexable insert has 2 cutting edges.
- No resharpener required. Tool length is unchanged.
- No need to reset after changing insert or cutting edge.
- Excellent repeatability!



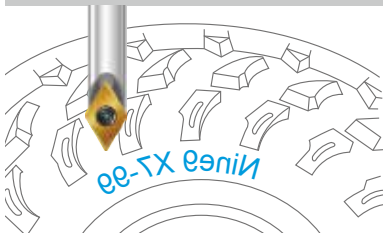
Serial number



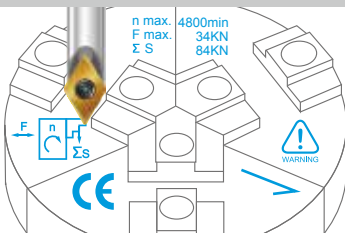
Logo outlines



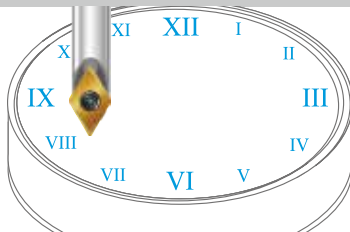
Mold & Die



Product info



Dial scales



► Applications

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



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

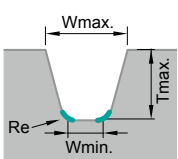
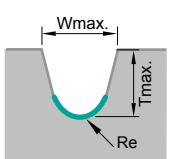
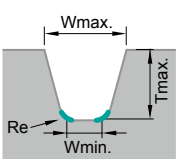
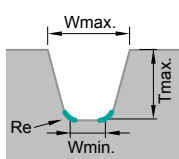
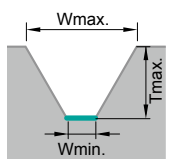
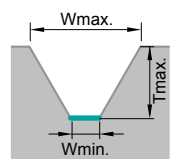
Quick Pick

▲ Holder is also using for deburring tool. (See page 1-54)

● Holder is also using for NC Spot Drill. (See page 1-15)

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Engraving Tool

	▲ X060 Series						V045 / V060 Series						W060 Series			● N9MT-W Series	
Features	▪ Fine engraving 0.2mm bottom width with narrow angle 30° / 45° / 60°. ▪ Two type of forms- radius angled and radius.						▪ Depth of per cutting Ap up to 0.8mm for carbon steel, 0.5mm for stainless steel. See page 1-51 / 1-52.						▪ Limited design, simply for thin or light engraving, used on engraving machine			▪ Engraving inserts can be used for small diameter spotting.	
																	
Form																	
	Radius Angled			Radius			Radius Angled			Radius Angled			Angled			Angled	
Angle	30°	45°	60°	30°	45°	60°	45°		60°		60°			60°	90°		
Wmin.	0.2			Re: 0.2			0.45	0.65	0.25	0.45	0.65	0.1	0.2	0.3	0.2		
Wmax.	0.74	1.03	1.36	0.84	1.1	1.39	2.1		1.1	2.7		0.33	0.66	0.99	1.1	2.0	
Tmax.	1.0			1.0			2.0		0.8	2.0		0.2	0.4	0.6	0.8	0.9	
Edges per insert	2			2			2		2		2			4			
Work material	P M K N H						P M K N H S						P K			P K N	
Holder	99619-X060... Ø6						99619-V045... Ø6		99619-V060... Ø4 / Ø6		99619-W060-04 Ø4			99616-10 Ø10			
Ø4	-						-		30 mm		40 mm			-			
Ø6	40 / 60 mm						40 / 60 / 100 mm		40 / 60 / 100 mm		-			-			
Ø10	-						-		-		-			90 mm			
Page	1-42 ~ 1-43						1-44		1-45		1-46			1-47			

Engraving 30°/45°/60° - Radius Angled Form

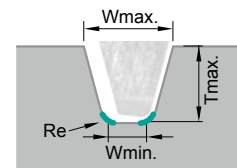


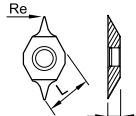
► Insert >>

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: • Mirror polished, for non-ferrous metal, aluminum, brass, copper, plastic, acrylic.



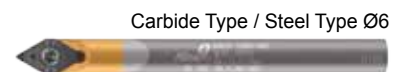
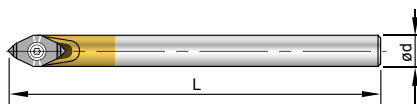
Angle	Code	Parts No.		Coating	Grade		Dimensions			Wmin.	Wmax.	Tmax.
							L	S	Re			
30°	01X0140	X060A30W020R	NC2032	TiAlN	K20F							
	01X0141		ALDURA	6			2.05	0.04	0.20	0.74	1.0	
	01X0142		Polished									
45°	01X0021	X060A45W020R	NC2032	TiAlN	K20F							
	01X0153		ALDURA	6			2.05	0.04	0.20	1.03	1.0	
	01X0154		Polished									
60°	01X0063	X060A60W020R	NC2032	TiAlN	K20F							
	01X0165		ALDURA	6			2.05	0.04	0.20	1.36	1.0	
	01X0166		Polished									

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Engraving Tool

► Holder >>

- One holder supports the entire X060 series of engraving inserts.
- Also using for deburring tool, see page 1-54.

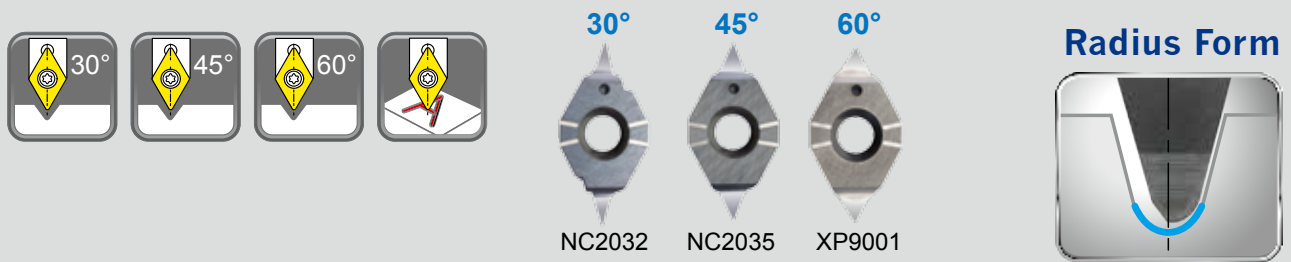


Code	Parts No.	Shank	Ød	L	Screw	Key
69X001	00-99619-X060-06	Steel	6	40		
69X002	00-99619-X060-06L	Carbide	6	60		
69X003	00-99619-X060-06LS	Steel	6			

*Torque screwdriver is recommended, see page 6-4.

X060

Engraving 30°/45°/60° - Radius Form

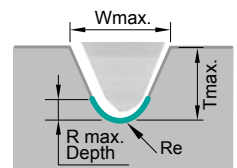


► Insert >>

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.

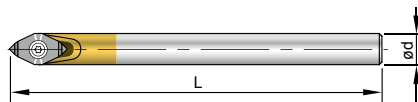
XP9001: • Mirror polished, for non-ferrous metal, aluminum, brass, copper, plastic, acrylic.



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	0.84	1.0
	01X0132		NC2035	ALDURA		6	2.05	0.2	0.12	1.1	1.0
	01X0134		XP9001	Polished		6	2.05	0.2	0.10	1.39	1.0
45°	01X0013	X060A45R020	NC2032	TiAIN		6	2.05	0.2	0.12	1.1	1.0
	01X0149		NC2035	ALDURA		6	2.05	0.2	0.12	1.1	1.0
	01X0150		XP9001	Polished		6	2.05	0.2	0.10	1.39	1.0
60°	01X0117	X060A60R020	NC2032	TiAIN		6	2.05	0.2	0.10	1.39	1.0
	01X0158		NC2035	ALDURA		6	2.05	0.2	0.10	1.39	1.0
	01X0159		XP9001	Polished		6	2.05	0.2	0.10	1.39	1.0

► Holder >>

- One holder supports the entire X060 series of engraving inserts.
- Also using for deburring tool, see page 1-54.



Steel Type Ø6

Carbide Type / Steel Type Ø6



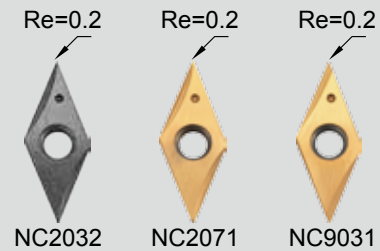
Code	Parts No.	Shank	Ød	L	Screw	Key
69X001	00-99619-X060-06	Steel	6	40		
69X002	00-99619-X060-06L	Carbide	6	60		
69X003	00-99619-X060-06LS	Steel	6			

*Torque screwdriver is recommended, see page 6-4.

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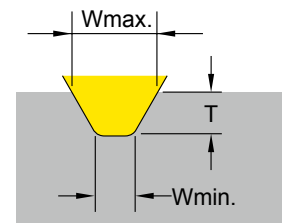
Engraving Tool

Engraving Tool 45°



► Inserts >>

- NC2032:**
- Long tool life
 - For all kinds of steel from 30~50 HRC, carbon steel, alloy steel, and cast iron.
- NC2071:**
- Strong edge on chip groove best suited for min. DOC 0.2 mm
 - Universal grade for all kinds of steel <30 HRC, non-ferrous metal and stainless steel.
- 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.



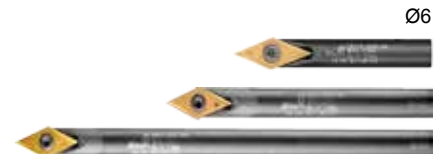
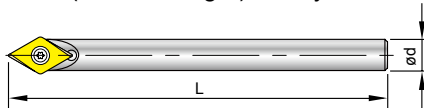
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Engraving Tool

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

► Holder >>

- ♦ Carbide shank holders designed for shrink-fit holder, engraving machines, high speed cutting.
- ♦ XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



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

Note: DC Slim chuck, see page 6-2.

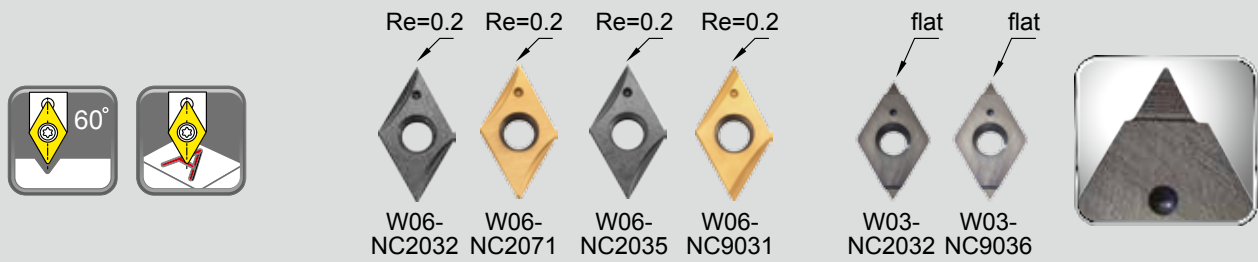
*Torque screwdriver is recommended, see page 6-4.

► 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	

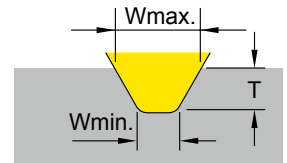
V060

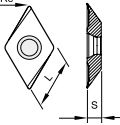
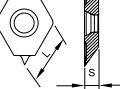
Engraving Tool 60°



► Inserts >>

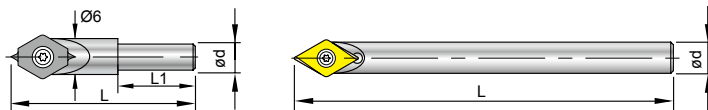
- NC2032:** • Long tool life
• For all kinds of steel from 30~50 HRC, carbon steel, alloy steel, and cast iron.
- NC2071:** • Strong edge on chip groove best suited for min. DOC 0.2 mm
• Universal grade for all kinds of steel <30HRC, non-ferrous metal and stainless steel.
- NC2035:** • ALDURA coating, 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 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	Wmin.	Wmax.	Tmin.	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			W		T	
							L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
60°	0106006	V06006T1W03	NC2032	TiAlN	K20F		6.35	2.0	---	0.25	1.1	0.05	0.8
	0106007		NC9036	DLC						0.25		0.05	

► Holder >>

- Carbide shank holders designed for shrink-fit holder, engraving machines, high speed cutting.
- XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.

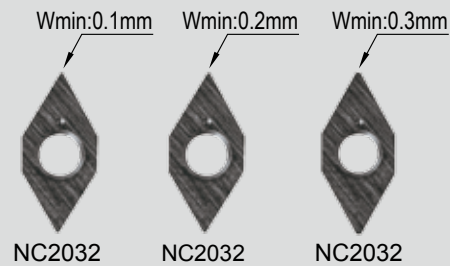
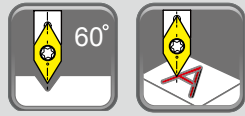


Angle	Code	Parts No.	Ød	L	L1	Screw	Key
60°	692004	00-99619-V060-04	4	30	12		NK-T7
	692001	00-99619-V060-06	6	40	---		
	♦ 692002	00-99619-V060-06L		60	---		
	♦ 692003	00-99619-V060-06XL		100	---		

Note: DC Slim chuck, see page 6-2.

*Torque screwdriver is recommended, see page 6-4.

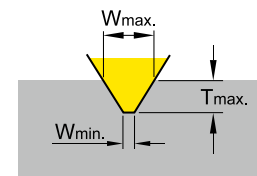
W060 Engraving Tools



► 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.



1

Engraving Tool

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				4.5	1.3	0.2	0.66	0.4
	01W2003	W06004S103-NC2032				4.5	1.3	0.3	0.99	0.6

► Holder >>

- Made from steel.



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

*Torque screwdriver is recommended, see page 6-4.

SW

Engraving 60°/90° N9MT080201W



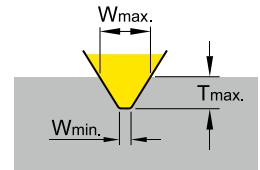
Inserts >>

- 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	60-NC40	TiN	K20F		8	2.38	0.2	1.1	0.8
90°	013405	N9MT080201W NC40	TiN	K20F		8	2.38	0.2	2.0	0.9
	013406	NC10	TiAlN	K20F		8	2.38	0.2	2.0	0.9

Holder >>

- For SW engraving using **NC Spot Drill** shank.



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		

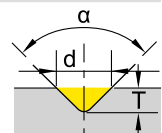
Cutting Data

Engraving : Width of engraving=diameter of cutting="d"
Depth of engraving=depth of cutting="T"

- Tool shank runout should be below 0.01mm

Engraving

- For $\alpha = 90^\circ$ insert, $d=2 \times T$
- For $\alpha = 60^\circ$ insert, $d=1.73 \times T$



Mini spotting	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert	Depth of cut			
					1st	2nd	3th	Finishing
	All Kind of Steel, unhardened, Cast iron	20~80	0.008~0.02	NC40	0.3	0.2	0.2	0.1
	Non-Ferrous Metal (Al, Cu)	20~100	0.008~0.02	NC10	0.3	0.2	0.2	0.1

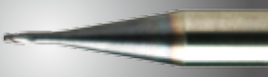
Attention: The calculated result "d" is only for calculation of spindle speed.

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Engraving Tool

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 A_p	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	SKD 51	SS	SKD 61 (50HRC)
Spindle speed r.p.m.	10000	10000	10000
Feed rate mm/min.	300	300	100
Cutting depth A_p	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 >>

► Selecting the speed and feed rate

- Select the spindle speed and feed rate according to the selected material's cutting data.
- The downward feed rate of the Z-axis should be reduced to **50%** of the table feed rate.

► Cutting fluid and cooling condition

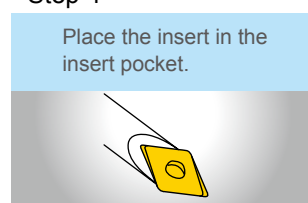
- Emulsion is recommended for engraving on steel, stainless steel, Al and Al-alloy.
- Blown cooled air is recommended for engraving on cast iron and plastic.

► Setting-up the tool holder

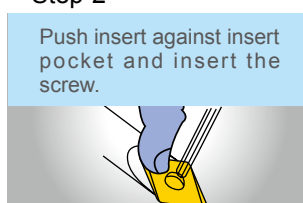
- The tool shank runout should be below 0.01 mm.
- Shrink fit chucks, hydraulic chuck and high precision spring collet chucks are recommended.
- Pre-balance the tool holder minimum G6.3/10,000 R.P.M. is necessary.

► Clamping the engraving insert

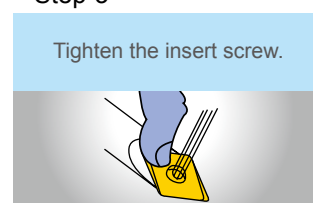
- Place and hold the insert in the insert pocket against the positioning side.
- See illustration below:
- Step-1



• Step-2



• Step-3



1

Engraving Tool

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



1

Engraving Tool

Cutting Data

⚠ Before you start, please pay attention the following conditions

- The downward feed rate of the Z-axis should be reduced to 50% of the table feed rate.
- Cutting fluid emulsion is recommended for engraving on steel, stainless steel, Al and Al-alloy; blown cooled air is recommended for engraving on cast iron and plastic.
- The tool shank runout should be below 0.01 mm.
- Shrink fit chuck, hydraulic chuck and high precision spring collet chuck are recommended.
- Pre-balance the tool holder minimum G6.3/10,000 R.P.M. is necessary.

► 30° Engraving X060 Insert >>

Work Material	S (r.p.m.)	f (mm/rev.)		Grade of Insert
		Radius Angled Form	Radius Form	
		X060A30W020R	X060A30R020	
Carbon steel C<0.3%	8000 ~ 40000	0.001 ~ 0.010	0.002 ~ 0.015	NC2032
Carbon steel C>0.3%		0.001 ~ 0.008	0.002 ~ 0.012	NC2032
Alloy steel		0.001 ~ 0.006	0.002 ~ 0.010	NC2032, NC2035
Stainless Steel		0.001 ~ 0.006	0.002 ~ 0.010	NC2032
Casting iron		0.001 ~ 0.006	0.002 ~ 0.010	NC2032
Aluminum		0.001 ~ 0.012	0.002 ~ 0.020	XP9001
Copper, Brass		0.001 ~ 0.012	0.002 ~ 0.020	XP9001
Hardened Steel Up to 56 HRC		0.001 ~ 0.005	0.002 ~ 0.006	NC2035

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Engraving Tool

► 45° Engraving X060 Insert >>

Work Material	S (r.p.m.)	f (mm/rev.)		Grade of Insert
		Radius Angled Form	Radius Form	
		X060A45W020R	X060A45R020	
Carbon steel C<0.3%	8000 ~ 40000	0.002 ~ 0.012	0.002 ~ 0.015	NC2032
Carbon steel C>0.3%		0.002 ~ 0.010	0.002 ~ 0.012	NC2032
Alloy steel		0.002 ~ 0.010	0.002 ~ 0.010	NC2032, NC2035
Stainless Steel		0.002 ~ 0.008	0.002 ~ 0.010	NC2032
Casting iron		0.002 ~ 0.010	0.002 ~ 0.010	NC2032
Aluminum		0.002 ~ 0.015	0.002 ~ 0.020	XP9001
Copper, Brass		0.002 ~ 0.015	0.002 ~ 0.020	XP9001
Hardened Steel Up to 56 HRC		0.002 ~ 0.006	0.002 ~ 0.006	NC2035

► 60° Engraving X060 Insert >>

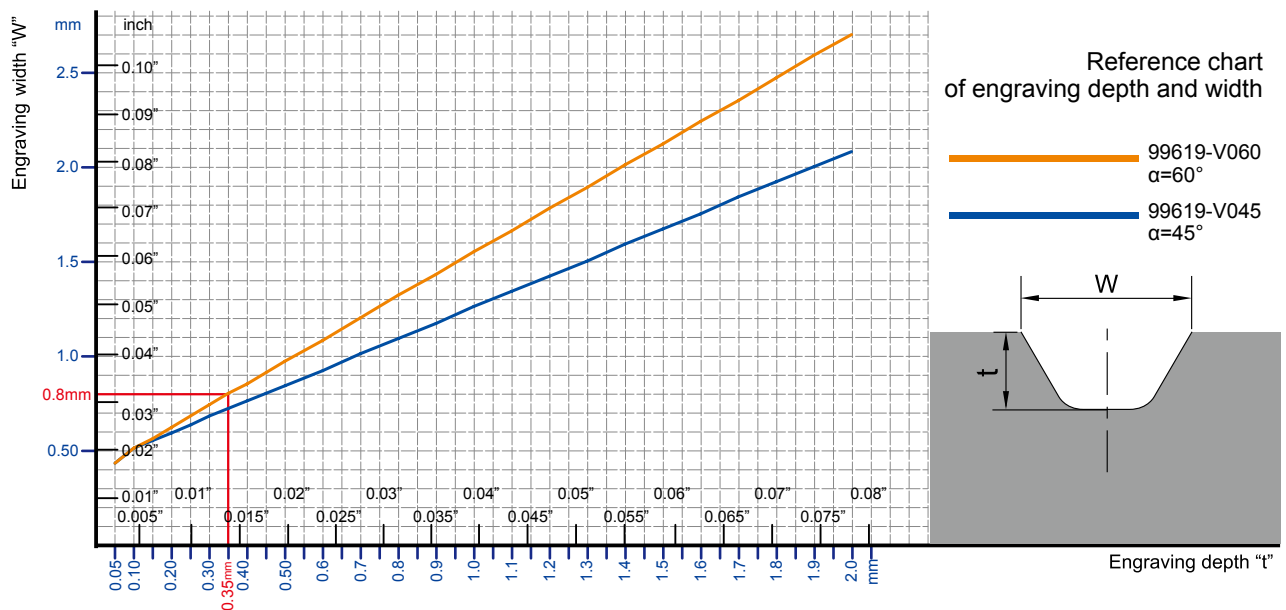
Work Material	S (r.p.m.)	f (mm/rev.)		Grade of Insert
		Radius Angled Form	Radius Form	
		X060A60W020R	X060A60R020	
Carbon steel C<0.3%	8000 ~ 40000	0.002 ~ 0.012	0.002 ~ 0.015	NC2032
Carbon steel C>0.3%		0.002 ~ 0.010	0.002 ~ 0.012	NC2032
Alloy steel		0.002 ~ 0.010	0.002 ~ 0.010	NC2032, NC2035
Stainless steel		0.002 ~ 0.008	0.002 ~ 0.010	NC2032
Casting iron		0.002 ~ 0.010	0.002 ~ 0.010	NC2032
Aluminum		0.002 ~ 0.015	0.002 ~ 0.020	XP9001
Copper, Brass		0.002 ~ 0.015	0.002 ~ 0.020	XP9001
Hardened Steel Up to 56 HRC		0.002 ~ 0.006	0.002 ~ 0.006	NC2035

Cutting Data

► Engraving Depth and Width Reference Chart

- 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 RPM	f (mm/rev.)	Grade of Insert
Carbon steel	5000~40000	0.008~0.05	NC2071,NC2032
Alloy steel	5000~40000	0.008~0.03	NC2032,NC2071
Stainless steel	5000~40000	0.008~0.05	NC2071,NC9031
Casting iron	5000~40000	0.008~0.03	NC2032
Aluminum $\geq$ Non-ferrous metal	5000~40000	0.008~0.08	NC2071,NC9031
Hardened steel up to 56 HRC	6000~35000	0.003~0.01	NC2035

Tmax.:2mm

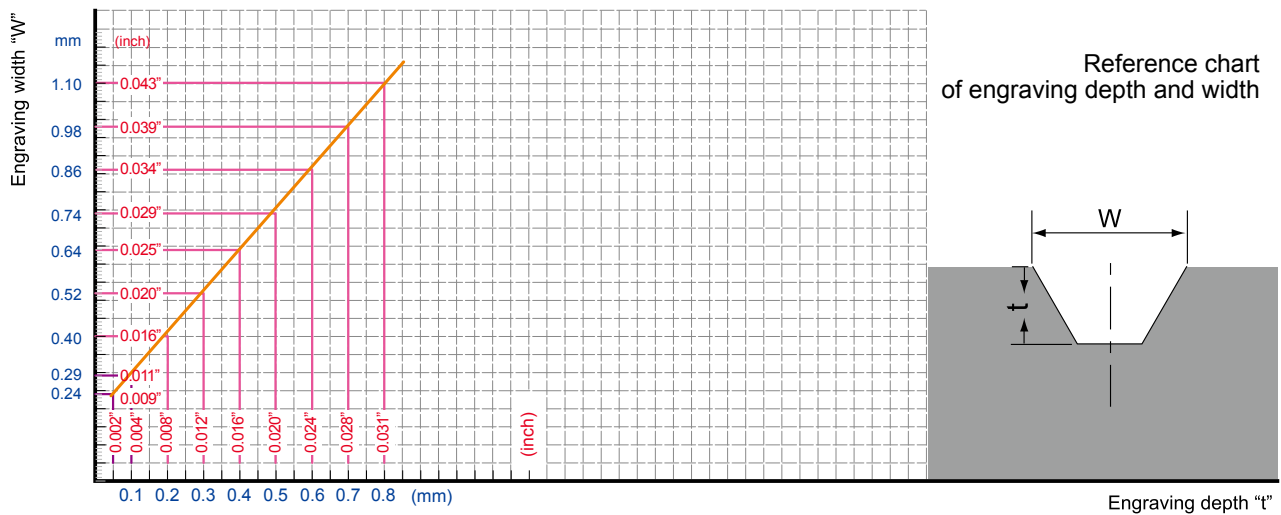
Material	Ap	1st	2nd	3rd	4th	5th	6th	~	Fine finishing
Carbon steel		0.8	0.6	0.3	0.2	0.1	~	~	0.1
Alloy steel		0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.1
Stainless steel		0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.05
Casting iron		0.8	0.6	0.3	0.2	0.1	~	~	0.1
Aluminum $\geq$ Non-ferrous metal		1.0	0.8	0.2	~	~	~	~	0.1
Hardened steel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

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Engraving Tool

Cutting Data

► V060 T1W03 >>



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Engraving Tool

Work Material	S RPM	f (mm/rev.)	Grade of Insert
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
Stainless steel	8000 ~ 35000	0.003 ~ 0.010	NC9036
Casting iron	6000 ~ 35000	0.005 ~ 0.015	NC2032
Aluminum	8000 ~ 40000	0.005 ~ 0.015	NC9036
Copper, Brass	8000 ~ 40000	0.005 ~ 0.010	NC9036
Titanium	6000 ~ 15000	0.003 ~ 0.010	NC9036

Tmax.:0.8mm

Material	Ap	1st	2nd	3rd	4th	5th	~	Fine finishing
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
Stainless steel		0.2	0.1	0.1	0.1	0.05	0.05	0.03
Casting iron		0.2	0.1	0.1	0.1	0.05	0.05	0.03
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
Titanium		0.2	0.1	0.1	0.1	0.05	0.05	0.03