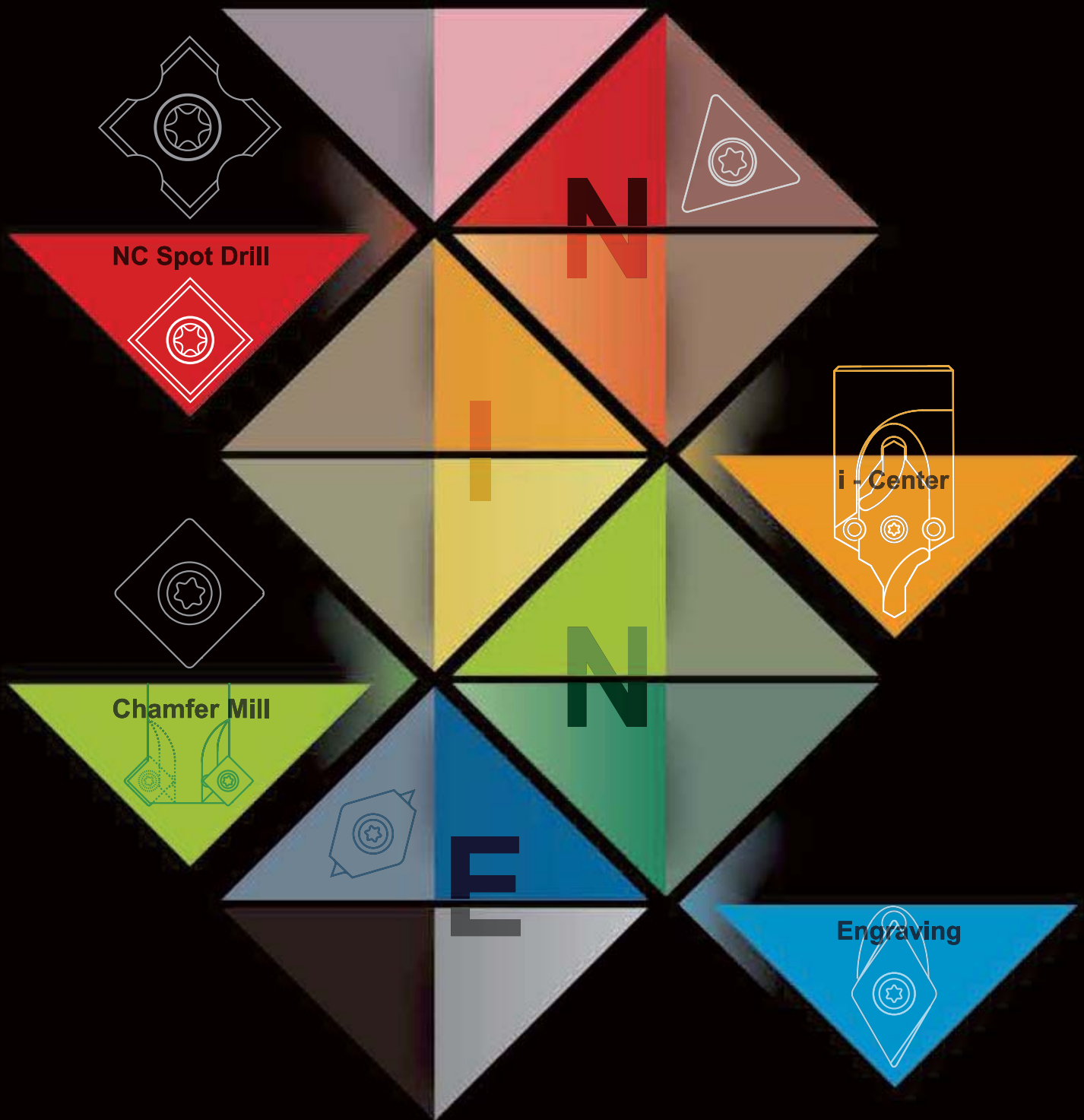
CUTTING TOOLS & TOOL HOLDERS

Nine9®

Nine9.jic-tools.com.tw

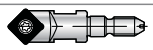
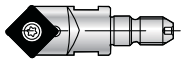
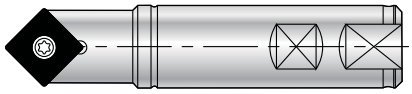
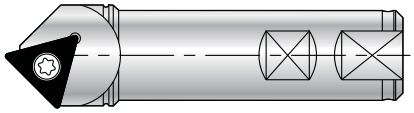
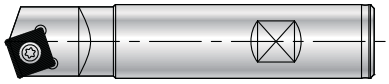
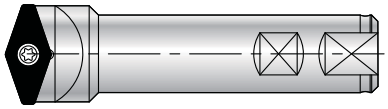
Cat.16

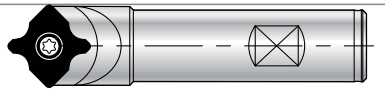
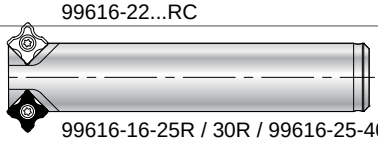
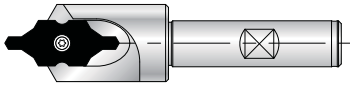
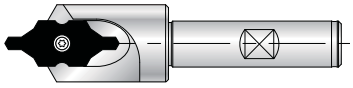
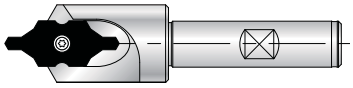
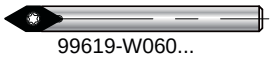
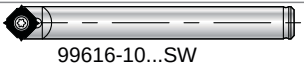
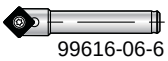
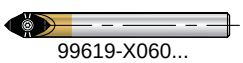
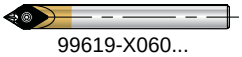
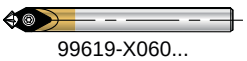


Productivity, Creativity & Infinity

Nine9 company began in 1994 and with the development of special tools, boring heads and accessories.
The Nine9 logo was commissioned in 1999.
It comes from the Chinese characters meaning “long life and durability” – words which aptly describe all Nine9 tools. 99 is the largest 2 digit number, indicating maximum product endurance.
Nine9 tools whilst being ”special” in the indrustry, are standard in our product range. NC Spot Drills , super power drills , boring tools , engraving tools , i-Center , NC helix drills , chamfer mill. Those established Nine9 as a market leader and innovator in the cutting tool field.

Contents >>

Angle	Holder	Inserts	D min.	D max.	Spotting	Chamfering	Grooving	Engraving	Drilling	Page
	NC Spot Drill									
60°	 99616-09V	 V9MT0802	1	9	●	●	●	● Tmin=0.1		12
	 99616-13V	 V9MT12T3	2	13	●	●	●	● Tmin=0.1		
82°	 99619-V082-3/8	 V0820802	2	9	●	●	●	● Tmin=0.1		13
	 99619-V082-5/8	 V08212T3	2	14	●	●	●	● Tmin=0.1		
90°	 99616-06-6	 N9MT05T1	1	6	●	●		● Tmin=0.1		14
	 99616-08-8	N9MT0602	1	8	●	●	●	● Tmin=0.1		
	 99616-10...  99616-10-M5	 N9MT0802	2	10	●	●	●	● Tmin=0.1		15
	 99616-14...  99616-14-M8	 N9MT11T3	3	14	●	●	●	● Tmin=0.1 (2 Cutting edges) ● Tmin=1.0 (4 Cutting edges)		17
	 99616-22	 N9MT1704	3	22	●	●	●			19
	 99616-25-CT28	 N9MT2204	4	25	●	●				20
100°	 99616-20-100	 N9MT11T3	3	16	●	●				21
120°	 99616-20-120		3	17	●	●				
142°	 99616-20-142...		3	18	●	●				
	 99619-V142...	 V1421604	2	32	●					22
145° + 90°	 99616-10 / 14 / 22 ...	 WSP / M4~M16	3.3	20	●	●	●			23

Angle	Holder	Inserts	D min.	D max.	Spotting	Chamfering	Grooving	Engraving	Drilling	Page
	Corner Rounding									
RC	 99616-06..99616-14...RC	 N9MT05/N9MT11..RC (2 Cutting edges)	R0.5 R1.0	R1.0 R3.0		•				26
	 99616-22...RC	 N9MT1704RC (2 Cutting edges)	R4.0	R6.0		•				28
R	 99616-16-25R / 30R / 99616-25-40R	 N9MT11T3R (4 Cutting edges)	R1.0	R3.0		•				30
	Large 45° Chamfering									
45	 99616-18...LA	 N9MT11T308LA	6	28		•				32
	 99616-28...LA		16	28		•	* *Side grooving			
	Center Drilling / i-Center									
R	 99616-IC...	 DIN332 Form R	1.0	10					•	39
60° + 120°	 99616-IC...	 DIN332 Form A+B	1.0	10					•	
60°	 99616-IC...	 ANSI 60°	5/64”	3/8”					•	
PR	 99616-14-PR	 N9MT11T3PR	2.0	3.0					•	41
	Engraving Tools									
45°	 99619-V045...	 V04506T1W	0.45	2.1	•			•		50
60°	 99619-V060...	 V06006T1W	0.25	2.7	•			•		51
60°	 99619-W060...	 W06004S	0.1	1.1	•			•		52
60°	 99616-10...SW	 N9MT0802	0.1	1.1	•			•		52
90°	 99616-10...SW	 N9MT0802	0.1	2.0	•			•		
	 99616-06-6	 N9MT05T1	1.0	6.0	•	•		•		14
10° ~ 120°	 99619-X060...	 X060A	0.1	2.7				•		57
	NC Deburring									
60°	 99619-X060...	 X060A60T6	0.3	2.0		•				62
90°	 99619-X060...	 X060A90T6	0.5	3.5		•				

Nine9® Inserts >> Quick Pick

Nine9 inserts apply for modern machining by its special geometry which is able to run at higher speed and feed. In addition,
the indexable insert eliminates the tool's changing time.
Carbide insert with latest coating techology extends tool life dramatically.
Nine9-insert helps you to save money and increase productivity.

Products	Grade	Coating	P Steel	M Stainless Steel	K Cast Iron	N Non-Ferrous	H Hardened Steel Up to 56 HRC	S Titanium
NC Spot Drill	NC10	TiAlN		●	●	◎		
	NC40	TiN	●	○	◎			
	NC2071	TiN	●	◎	●	◎		
	NC9076	DLC		◎		●		◎
	NC60	Cermet	◎				●	
Corner Rounding	NC2071	TiN	●	○	●			
	NC9036	DLC		●		●		◎
i-Center	NC2033	TiAlN	●	○	●		○	
	NC5074	Helica	●	○	◎			
Engraving	NC2032	TiAlN	●	○	●			
	NC2071	TiN	◎	●		◎		
	NC9031	TiN		◎		●		
	NC2035	ALDURA	◎		○		●	
	NC9036	DLC		◎		●		◎
Chamfer Mill	NC2032	AlTiN	●	○	●		◎	
	NC9071	TiN	○	●		●		

● Best ◎ Suit ○ Possible

Features
Universal grade for non-ferrous metal, cast iron and stainless steel. General purpose, fully ground cutting edge and relief angle.
Universal grade for all unhardened steel, and tool steel up to 1200N/mm². General purpose, fully ground cutting edge and relief angle .
Universal grade for all unhardened steel, free cutting steel, tool steel up to 750N/mm² and cast iron. The cutting geometry has been designed to optimize the tool's performance and to use in high speed machining.
For non-ferrous material such as aluminum, acrylic, brass, copper, titanium and long cutting chip materials. High positive geometry and sharp edge produces excellent surface finish.
For hardened steel up to 56 HRC. Cermet insert reduces heat and low tool wearing at the cutting edge.
Universal grade for all unhardened steel and cast iron. The cutting geometry has been designed to optimize the tool's performance.
For non-ferrous material, aluminum, acrylic, brass, copper, stainless steel (low carbon contain) and titanium. High positive geometry and sharp edge produces excellent surface finish.
For carbon steel, alloy steel, high alloy steel and cast iron. 2 Cutting flutes design same as carbide center drill for high performance speed and feed rate.
Helica coating provides a smooth cutting and helps the cutting chip to be removed easily.
For all kind of steel from 30~50 HRC, carbon steel, alloy steel and cast iron. TiAlN coating provides a longer tool life.
Universal grade for all kind of steel<30 HRC, non-ferrous metal and stainless steel. The cutting geometry of this insert has been designed with strong cutting edge.
For non ferrous metal, aluminum, brass, copper, plastic, acrylic and stainless steel. Very sharp edge for shallow engraving.
For steel with heat treatment up to 56 HRC. Latest ALDURA coating to reduce heat and tool wear.
For non-ferrous material and titanium. Very sharp edge for shallow engraving.
For carbon steel, alloy steel, cast iron and hardened steel up to 56 HRC. Upgraded AlTiN coating provides a very long tool life.
For non-ferrous metal, aluminum, al-alloy, brass, copper and stainless steel. Very sharp produces excellent surface finish.

No Need To Choose Nine9 Does It All! >>

Cost Saving | Time Saving | Highly Efficient | Long Tool Life

Various inserts can fit on same holder

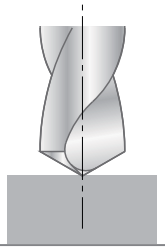
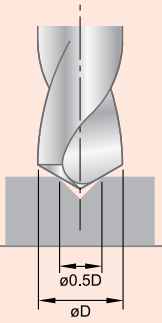
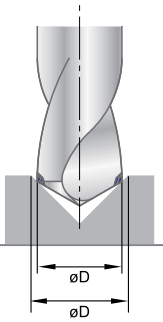
A New Drilling Concept!

0.5xD of spotting

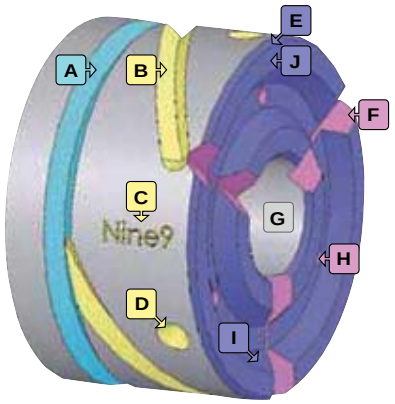
Many drill manufacturers and suppliers state that their drills start drilling on the solid material. You can look forward to the following benefits when using the NC Spot Drill to drill a spot that is half of the drilling diameter.

Drill Benefits >>

- **Higher feed rate.**
  Why? Because the drill is guided at the strongest part of cutting edge.
- **Better center position.**
  Why? Because the spotting is done by a single cutting edge which is out of center, and similar to boring operation.
- **Increased tool life.**

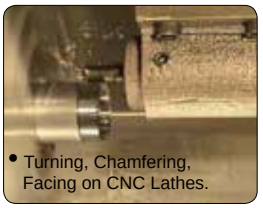
NC Spot Drill	Without Spotting	0.5xD Spotting	Larger Spotting
• Better center position! • Longer tool life!	• Drill has less position accuracy and diameter tolerance.	• Best result! • Higher speed and feed rate. • Better position accuracy and diameter tolerance.	• Longer spotting time! • Guided at the weakest corner of drill. • Shorter tool life
	 Unstable tool life		
			

Various Applications of NC Spot Drill >>

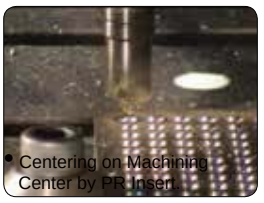
Turning Center	Fig	Applications	Multifunctional Cutting Tool
	A	Grooving	Use on CNC lathes CNC turning centers Machining centers Milling machines SPM machines .....
	B	Helical groove milling	
	C	Engraving	
	D	Spot drilling	
	E	Chamfer turning	
	F	Face groove milling	
	G	Internal turning	
	H	Spot drilling on end surface	
	I	Internal Chamfering	
	J	Face grooving	


• 45° and 60° Engraving Tools.


• Spotting, Grooving, Engraving on Machining Center.


• Turning, Chamfering, Facing on CNC Lathes.


• Cut a Serrated Workpiece.
• Single Pass Each Direction.


• Centering on Machining Center by PR Insert.


• Contour Chamfering on Machining Center.

NC Spot Drill >>

NC Spot Drill with indexable carbide insert.

High efficiency! Low cost!

CNC lathes, CNC turning centers and machining centers.

Features

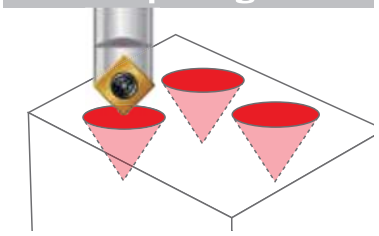
- **Spotting produces better hole position and geometrically uniform holes**
- **Available shank diameter-Ø5, Ø6, Ø10, Ø12, Ø16, Ø20, Ø25mm, Ø3/8'', Ø1/2'', Ø5/8'', Ø1/4", Ø3/4'', M5, M6 and M8.**
- **One tool will perform multiple applications**
  - Long tool life.
  - Each insert has 2 or 4 cutting edges.
  - Suitable for spotting, chamfering, grooving and engraving.
  - 45° / 60° / 82° / 90° / 100° / 120° / 142° angle for different applications.
  - Increase cutting speed with coated carbide inserts.

▲Machining Center

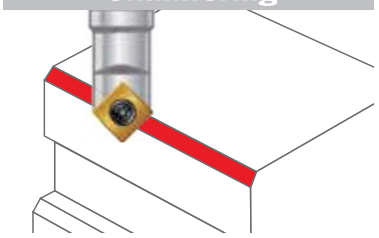
a Engraving
b Spotting
c Chamfering
d Grooving

▼ ALL IN ONE!!

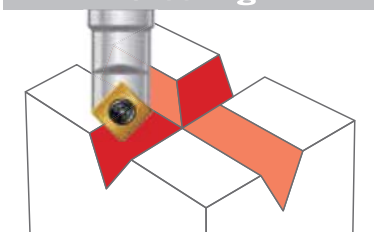
Spotting



Chamfering

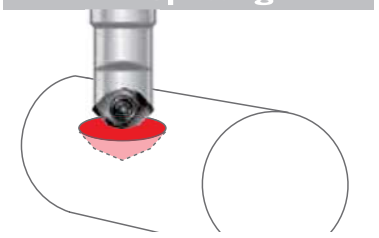


Grooving

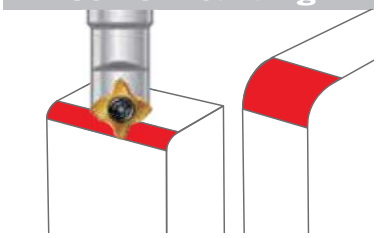


Engraving

W Spotting

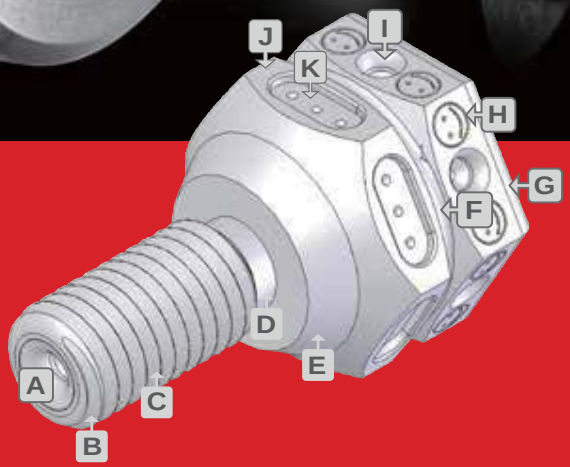


Corner Rounding



▲ **CNC Lathes**

- **a** External and internal chamfering
- **b** Grooving
- **c** Centering
- **d** Facing

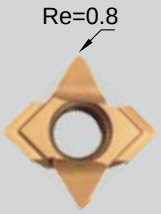


Multifunctional:

A I	Center Drilling	B G	Corner rounding
C	Thread turning	D	Grooving
E	Taper turning	F	V-grooving
H	Engraving	J	Face milling
K	Drilling & milling a groove		

* Some features produced with a special insert

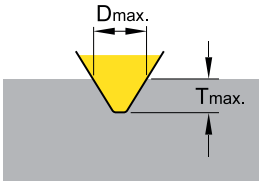
N9MT11T3P60

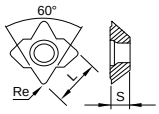


Inserts >>

• Fully ground spotting insert, for 60 degree spotting and engraving.

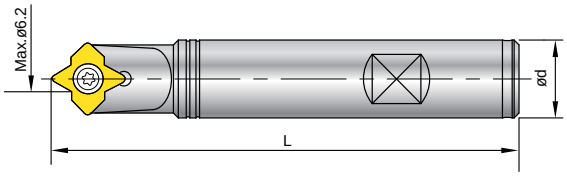
NC40: • Universal grade for all unhardened steel and cast iron.
• Each insert has 2 cutting edges.



Code	Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
					L	S	Re		
014204	N9MT11T3P60-NC40	TiN	P35		11	3.97	0.8	6.2	4

Holder >>

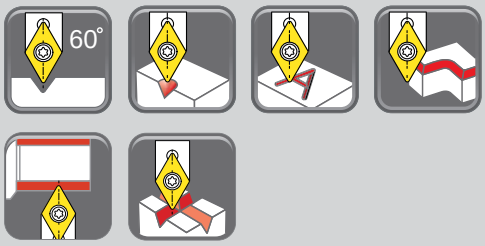
• A single cutting edge design creates higher precision and position when spotting.
• Applications: For spotting, engraving, small grooving on milling machines, machining centers.

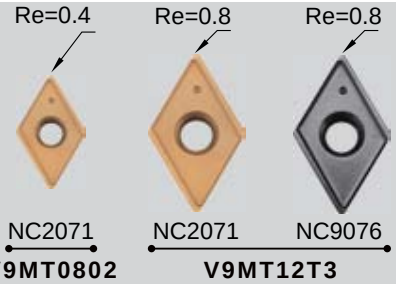


Ø16

Code	Parts No.	Ød	L	Screw	Key
604002	00-99616-14-12	12	100	 NS-35080 2.5 Nm	 NK-T15
604004	00-99616-14	16	100		

V9MT0802 / V9MT12T3



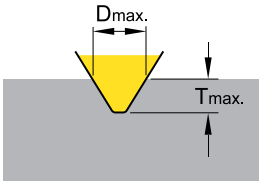


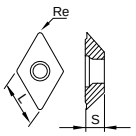
Inserts >>

- 60 degree indexable spotting insert, Dmax 13mm.
- Special geometry with supporting edges for using in high speed machining.
- Excellent tool for grooving. Saving machining time!

NC2071: • Universal grade for all unhardened steel and cast iron.
• Each insert has 2 cutting edges.

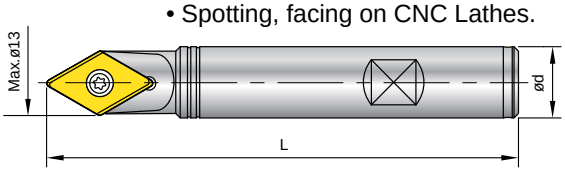
NC9076: • For non-ferrous material such as aluminum, al-alloy, titanium brass, copper and long cutting chip metal.
• Produces excellent surface finish on non-ferrous metal.
• Each insert has 2 cutting edges.



Code	Parts No.		Coating	Grade		Dimensions			Dmax.	Tmax.
						L	S	Re		
019201	V9MT0802CT	NC2071	TiN	K20F		8	2.38	0.4	9	7.3
015201	V9MT12T3CT	NC2071	TiN	K20F		12.7	3.97	0.8	13	10.3
015202		NC9076	DLC	K20F						

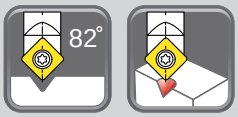
Holder >>

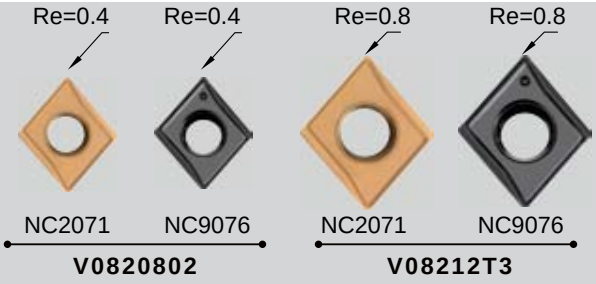
- A single cutting edge creates higher precision and position when spotting.
- Applications: • Spotting, engraving, grooving and chamfering on milling machines, machining centers.
  • Spotting, facing on CNC Lathes.



Code	Parts No.	Insert Type	Ød	L	Screw	Key
609001	00-99616-09V	V9MT08	8	60	NS-25045 0.9 Nm	NK-T7
605001	00-99616-13V	V9MT12	16	100	NS-35080 2.5 Nm	NK-T15
615001	00-99616-13V-5/8		5/8”	100		

V0820802 / V08212T3



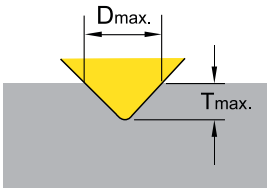


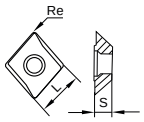
Inserts >>

- 82 degree indexable spotting insert, Dmax 14mm (0.551")
- Match the geometry of Amercian standard flat head screw hole.
- Special geometry with supporting edges for high speed machining.

NC2071:
- Universal grade for all unhardened steel and cast iron.
- Each insert has 2 cutting edges.

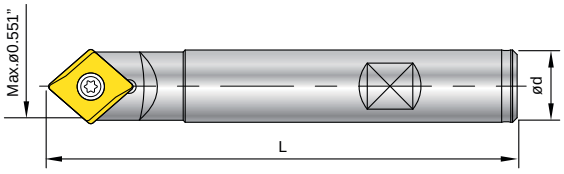
NC9076:
- For non-ferrous material such as aluminum, al-alloy, titanium brass, copper and long cutting chip metal.
- Produces excellent surface finish on non-ferrous metal.
- Each insert has 2 cutting edges.



Code	Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
0108201	V0820802	NC2071	TiN	K20F		8	2.38	0.4	9 (0.354")	4.8 (0.189")
0108202		NC9076	DLC							
0108211	V08212T3	NC2071	TiN	K20F		12.7	3.97	0.8	14 (0.551")	7.5 (0.295")
0108212		NC9076	DLC							

Holder >>

- Special cutting edge design gives higher precision and position when spotting.
- Applications :
  - Spotting, engraving, grooving and chamfering on milling machines, machining centers.
  - Spotting, facing on CNC Lathes.



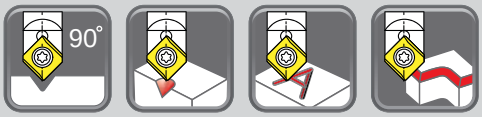
Ø3/8"

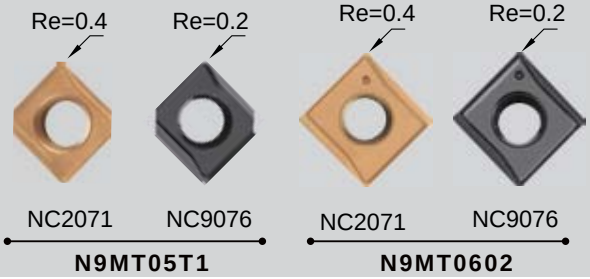
Ø5/8"

Code	Parts No.	Insert Type	Ød	L	Screw	Key
693001	00-99619-V082-3/8	V0820802	3/8"	90	NS-30055 2.0 Nm	NK-T8
693002	00-99619-V082-5/8	V08212T3	5/8"	100	NS-35080 2.5 Nm	NK-T15

N9MT05T1 / N9MT0602

NEW



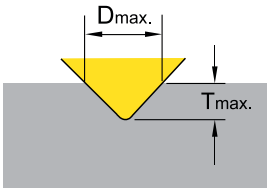


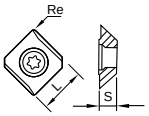
Inserts >>

- Mini spotting drill with indexable insert, low cutting power required.
- Especially good for Swiss type automatic lathes and CNC lathes.

NC2071:
- Universal grade for all unhardened steel and cast iron.
- Geometry with supporting edges to stabilize the cutting condition on low power machine.
- Each insert has 2 cutting edges.

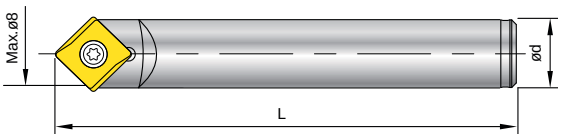
NC9076:
- For non-ferrous material such as aluminum, titanium, brass, copper and stainless steel.
- Produces excellent surface finish on non-ferrous metal.
- Each insert has 2 cutting edges.



Code	Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
011201	N9MT05T1CT	NC2071	TiN	K20F		5	1.8	0.4	6	2.8
011202		NC9076	DLC	K20F				0.2		
New 012201	N9MT0602CT	NC2071	TiN	K20F		6.35	2.38	0.4	8	3.8
012202		NC9076	DLC	K20F				0.2		

Holder >>

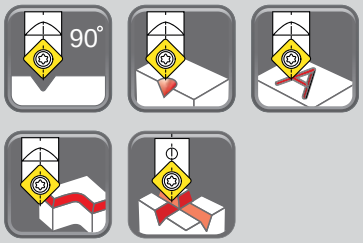
- Smallest indexable spotting drill holder.
- Single cutting edge design gives higher precision when spotting.
- Applications : • Spotting, engraving, and chamfering on milling machines, machining centers.
  • Spotting, facing on CNC Lathes.

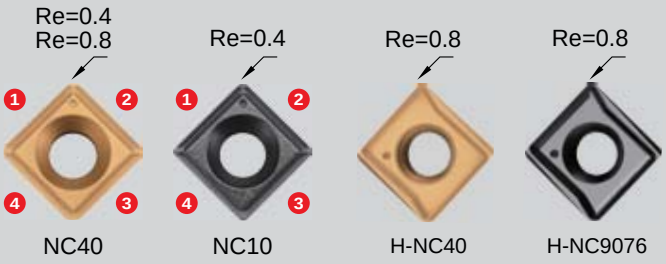


Code	Parts No.	Insert Type	Ød	L	Screw	Key
601001	00-99616-06-6	N9MT05	6	35	NS-20036 0.6 Nm	NK-T6
601002	00-99616-06-5		5	35		
601003	00-99616-06-6L		6	60		
New 602001	00-99616-08-8	N9MT06	8	60	NS-22044 0.9 Nm	NK-T7

Note:601003 is carbide shank holder.

N9MT0802





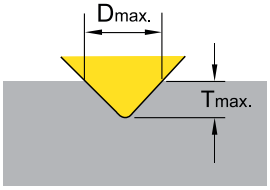
Inserts >>

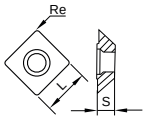
NC40:
- General purpose, universal grade for all unhardened steel.
- Each insert has 4 cutting edges.

NC10:
- High positive angle and fully ground cutting edge and relief angle.
- Universal grade for non-ferrous metal, cast iron and stainless steel.
- Each insert has 4 cutting edges.

H-NC40:
- Best choice for spotting application.
- Special geometry with supporting edges for use in high speed machining.
- Universal grade for all kind of steel and cast iron.
- Each insert has 2 cutting edges.

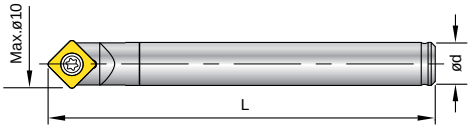
H-NC9076:
- High positive geometry and sharp edge.
- For non-ferrous material such as aluminum, titanium, brass, copper and long cutting chip metal.
- Produces excellent surface finish on non-ferrous metal.
- Each insert has 2 cutting edges.

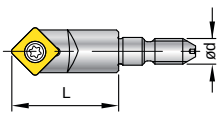


Code	Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
013401	N9MT080208CT	NC40	TiN	K20F		8.31	2.38	0.8	10	4.5
013402	N9MT080204CT	NC40	TiN	K20F		8.31	2.38	0.4		
013403		NC10	TiAlN			8.31	2.38	0.4		
013201	N9MT0802CT2T	H-NC40	TiN	K20F		8.31	2.38	0.8		
013202		H-NC9076	DLC			8.31	2.38	0.8		

Holder >>

- Single cutting edge design gives higher precision when spotting.
- Applications :
  - Spotting, engraving, grooving and chamfering on milling machines, machining centers.
  - Spotting, facing, turning on CNC Lathes.





Code	Parts No.	Ød	L	Screw	Key
603001	00-99616-10	10	90	 NS-30055 2.0 Nm	 NK-T8
603003	00-99616-10-SL10	10	90		
613001	00-99616-10-3/8	3/8"	90		
623001	00-99616-10-M5	M5	25		
623002	00-99616-10-M6	M6	25		

Note:
- 603003 with side lock flat on shank.
- Nine9 extension bar for M5,M6 screw fit holder, see page 69.

N9MT0802

Single Set >>

• User friendly, each set is fitted with one complimentary insert.

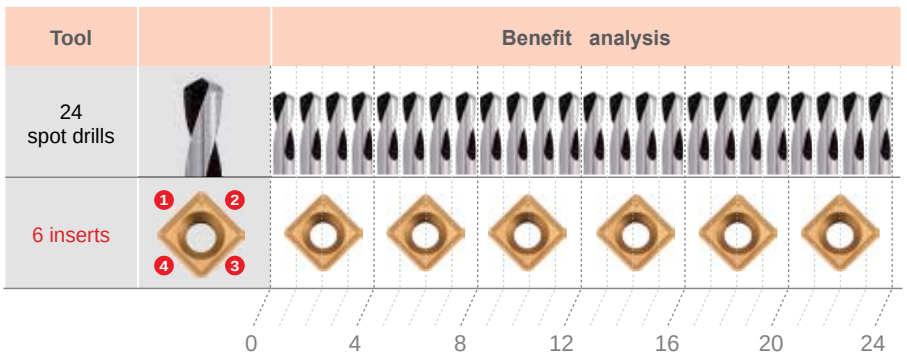
Code	Parts No.	Ød	Total Length	Insert fitted	Dmax.	Tmax.
603101-3401	00-99616-10-02S	10	90	N9MT080208CT-NC40	10	4.5
603101-3403	00-99616-10-02SAL	10	90	N9MT080204CT-NC10	10	4.5

Starter Package >>

• Selected package for starter who wants to try NC Spot Drill.
• Included one insert on tool holder and five inserts in the pocket.
• Total 6 inserts are equal to 24 spot drills.

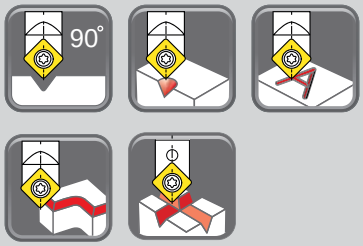
Code	Parts No.	Ød	Insert included	Content
603201-3401	00-99616-10-ME6	10	N9MT080208CT-NC40	1 tool holder + 6 inserts + 1 key
603201-3403	00-99616-10-ME6AL	10	N9MT080204CT-NC10	
613201-3401	00-99616-10-IN6	3/8”	N9MT080208CT-NC40	
613201-3403	00-99616-10-IN6AL	3/8”	N9MT080204CT-NC10	

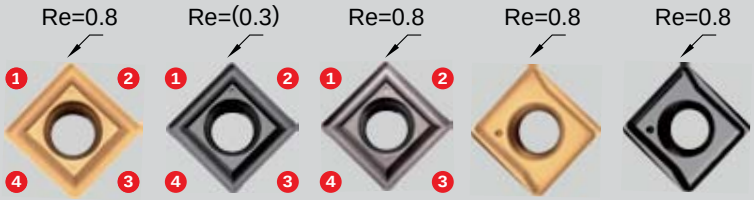
Comparison >>



Note: N9MT080201W Engraving , see page 52.

N9MT11T3





Inserts >>

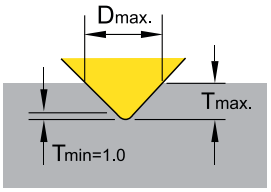
NC40: • Wiper design, universal grade for all unhardened steel.
• Each insert has 4 cutting edges.

NC10: • High positive angle and fully ground cutting edge and relief angle.
• Universal grade for non-ferrous metal, cast iron and stainless steel.
• Each insert has 4 cutting edges.

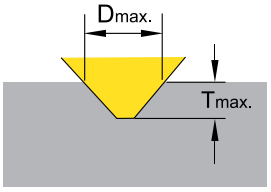
NC60: • Wiper design cermet insert, for hardened steel up to 56 HRC.
• Each insert has 4 cutting edges.

H-NC40: • Best choice for spotting application.
• Special geometry with supporting edges for use in high speed machining.
• Universal grade for all kind of steel and cast iron.
• Each insert has 2 cutting edges.

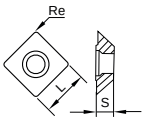
H-NC9076: • High positive geometry and sharp edge.
• For non-ferrous material such as aluminum, titanium, brass, copper and long cutting chip metal.
• Produces excellent surface finish on non-ferrous metal.
• Each insert has 2 cutting edges.



NC40 / Wiper design / NC60



Other grade

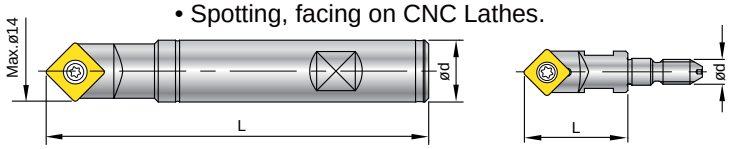
Code	Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
014401	N9MT11T3CT	NC40	TiN	P35		11.11	3.97	0.8	14	7
014402		NC10	TiAlN	K10F				(0.3)		
014403		NC60	CERMET					0.8		
014202	N9MT11T3CT2T	H-NC40	TiN	K20F				0.8		
014203		H-NC9076	DLC	K20F				0.8		

Holder >>

• Single cutting edge design gives higher precision when spotting.
• Applications : • Spotting, engraving, grooving and chamfering on milling machines, machining centers.
• Spotting, facing on CNC Lathes.

M8

Ø16



Code	Parts No.	Ød	L	Screw	Key
604002	00-99616-14-12	12	100	 NS-35080 2.5 Nm	 NK-T15
604004	00-99616-14	16	100		
604007	00-99616-14-150L	16	150		
604009	00-99616-14-220L	20	220		
614001	00-99616-14-1/2	1/2”	100		
614002	00-99616-14-5/8	5/8”	100		
624001	00-99616-14-M8	M8	30		

Note: • Nine9 extension bar for M8 screw fit holder, see page 69.

N9MT11T3

Single Set >>

• User friendly, each set is fitted with one complimentary insert.

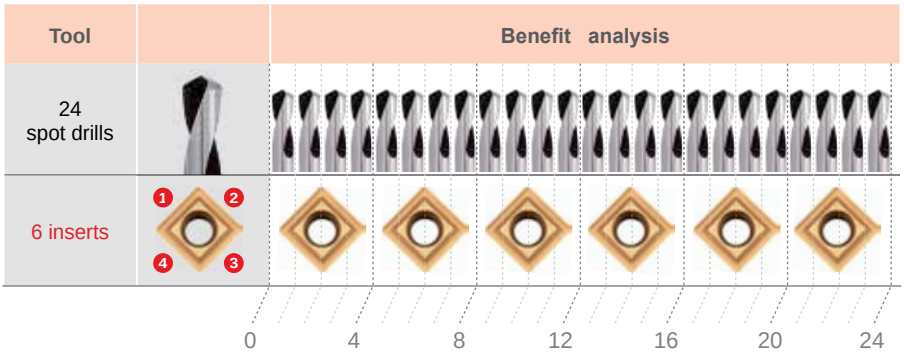
Code	Parts No.	Ød	Total Length	Insert fitted	Dmax.	Tmax.
604102-4401	00-99616-14-12-02S	12	100	N9MT11T3CT-NC40	14	7
604102-4402	00-99616-14-12-02SAL			N9MT11T3CT-NC10	14	7
604104-4401	00-99616-14-02S	16		N9MT11T3CT-NC40	14	7
604104-4402	00-99616-14-02SAL			N9MT11T3CT-NC10	14	7
614102-4401	00-99616-14-5/8-02S	5/8”		N9MT11T3CT-NC40	0.551”	0.276”
614102-4402	00-99616-14-5/8-02SAL			N9MT11T3CT-NC10	0.551”	0.276”

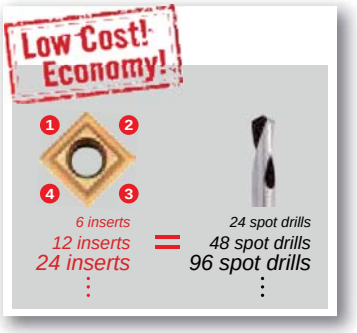
Starter Package >>

• Selected package for starter who wants to try NC Spot Drill.
• Included one insert on tool holder and five inserts in the pocket.
• Total 6 inserts are equal to 24 spot drills.

Code	Parts No.	Ød	Insert included	Content
604202-4401	00-99616-14-12-ME6	12	N9MT11T3CT-NC40	1 tool holder + 6 inserts + 1 key
604202-4402	00-99616-14-12-ME6AL		N9MT11T3CT-NC10	
604204-4401	00-99616-14-ME6	16	N9MT11T3CT-NC40	
604204-4402	00-99616-14-ME6AL		N9MT11T3CT-NC10	
614202-4401	00-99616-14-IN6	5/8”	N9MT11T3CT-NC40	
614202-4402	00-99616-14-IN6AL		N9MT11T3CT-NC10	

Comparison >>



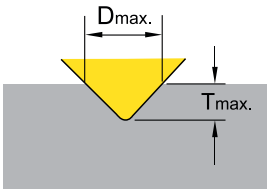


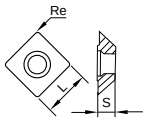
N9MT1704

Inserts >>

• 90 degree indexable spot drill insert, Dmax 22mm.

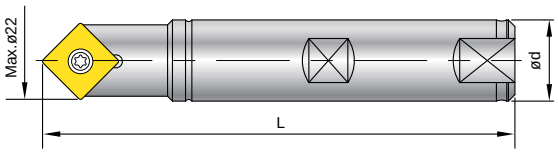
NC2071 : • High positive geometry,
fully ground cutting edge and relief angle.
• Universal grade for all unhardened steel and cast iron.
• Each insert has 2 cutting edges.



Code	Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
					L	S	Re		
016201	N9MT1704CT-NC2071	TiN	K20F		17	4.76	1.2	22	10.4

Holder >>

• Single cutting edge design gives high precision when spotting.
• Applications : • Spotting, engraving, grooving and chamfering on milling machines, machining centers.
• Spotting, facing on CNC Lathes.



Ø20

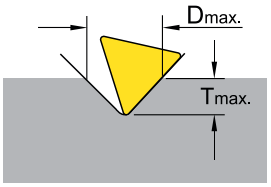
Code	Parts No.	Ød	L	Screw	Key
606001	00-99616-22	20	100	 NS-50125 5.5 Nm	 NK-T20
606002	00-99616-22-25	25	150		

N9MT220408

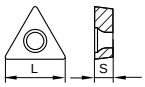
NC40

Inserts >>

- For spotting diameter up to 25mm.
- Fully ground cutting edge and relief angle.

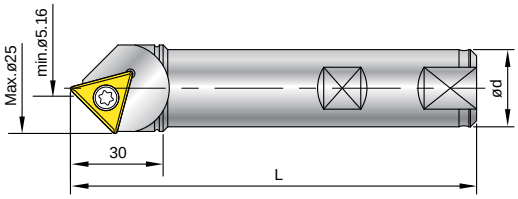


NC40:
- Universal grade for carbon steel, alloy steel and cast iron.
- Each insert has 3 cutting edges.

Code	Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
					L	S	Re		
017301	N9MT220408CT-NC40	TiN	P35		20.83	4.76	---	25	12.2

Holder >>

- Large spotting diameter with indexable insert.
- Single cutting edge design gives high precision when spotting.
- Applications : spotting and chamfering on milling machine, machining centers.



Ø25

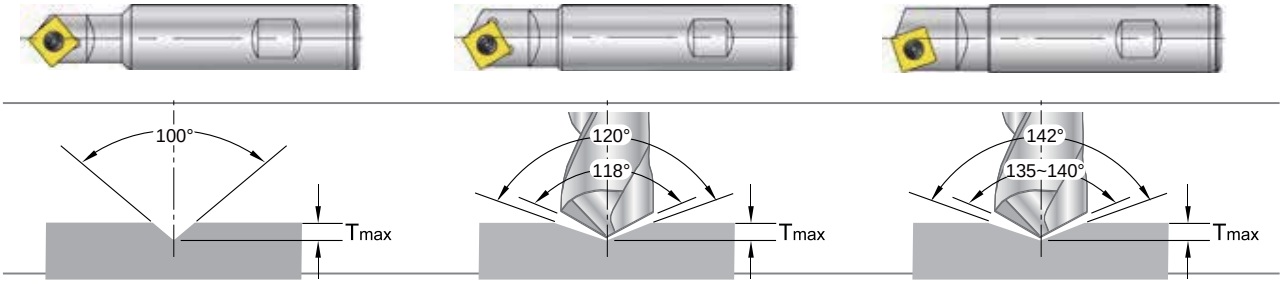
Code	Parts No.	Ød	L	Screw	Key
607001	00-99616-25-CT28	25	120	 NS-40100 3.5 Nm	 NK-T15
617001	00-99616-1-CT28	1”	120		

100°
120°
142°

N9MT11T3CT2T-H

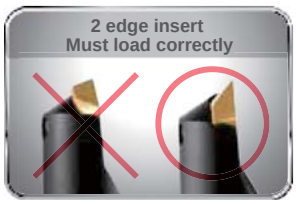
H-NC40

H-NC9076



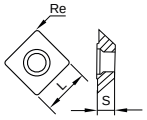
- For aircraft 100° normal rivet hole and screw hole.
- For spotting before drilling by 118° point angle drill.
- 60° chamfering.
- For spotting before drilling by 135°~140° point angle high performance drill.

Inserts >>



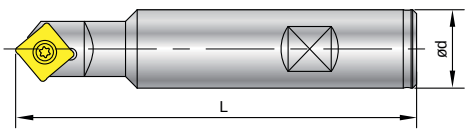
H-NC40:
- Universal grade for all kind of steel and cast iron.
- Each insert has 2 cutting edges.

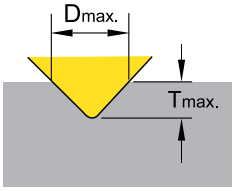
H-NC9076:
- High positive geometry and sharp edge.
- For non-ferrous material such as aluminum, titanium, brass, copper and long cutting chip metal.
- Produces excellent surface finish when chamfering non-ferrous metal.
- Each insert has 2 cutting edges.

Code	Parts No.		Coating	Grade		Dimensions		
						L	S	Re
014202	N9MT11T3CT2T	H-NC40	TiN	K20F		11	3.97	0.8
014203		H-NC9076	DLC					

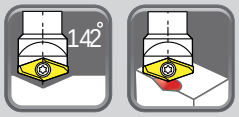
Holder >>

- Indexable insert spotting drill holders for 100°/120°/142° spotting.
- Spotting produces better hole position and geometrically uniform holes.
- Increase tool life of the next drilling operation.

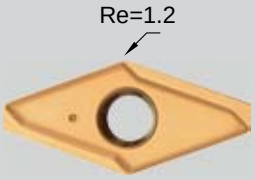


Code	Parts No.	Angle	Ød	L	Screw / Key	Dmax.	Tmax.	
604011	00-99616-20-100	100°	20	100	 NS-35080 2.5 Nm	16	6.3	
604013	00-99616-20-120	120°	20	100		17	4.76	
614003	00-99616-3/4-120	120°	3/4"	100	 NK-T15	0.669"	0.187"	
604014	00-99616-20-142	142°	20	100		18.5	3.16	
614004	00-99616-3/4-142	142°	3/4"	100		0.728"	0.124"	

V14208 / V14216



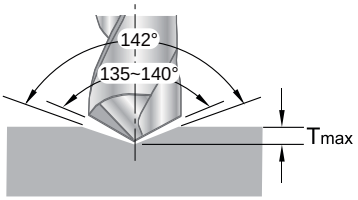
V1420803-NC2071



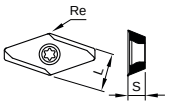
V1421604-NC2071

Inserts >>

- For spotting before drilling by 135° - 140° point angle high performance drill.
- 142 degree indexable spotting drills. Dmax 32mm.

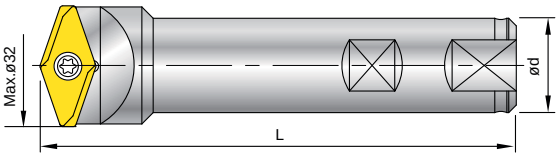


NC2071:
- High positive geometry, fully ground cutting edge and relief angle.
- Universal grade for all unhardened steel and cast iron.
- Each insert has 2 cutting edges.

Code	Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
					L	S	Re		
0114201	V1420803-NC2071	TiN	K20F		8	2.38	0.8	16	2.8
0114211	V1421604-NC2071				14	4.76	1.2	32	5.5

Holder >>

- Using spotting first may increase higher speed and feed rate of the after drills.
- Extend your drill life with 142° spotting. Reduce your drilling cost.
- Higher accuracy of positioning and diameter tolerance !



Ø16

Ø25

Code	Parts No.	Insert Type	Ød	L	Screw	Key
696001	00-99619-V142-16	V1420803	16	100	NS-30072 2.0 Nm	NK-T9
696002	00-99619-V142-32	V1421604	25	120	NS-50125 5.5 Nm	NK-T20

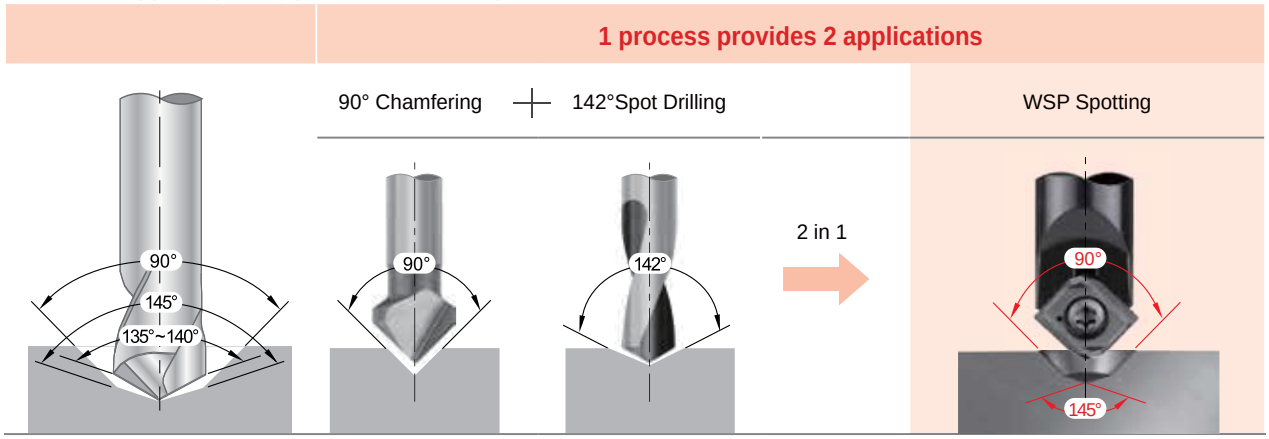
145°
+
90°

WSP Spotting New Geometry of Spotting Tool

NC2033

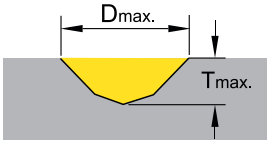
Combined spotting and chamfering 145° + 90° >>

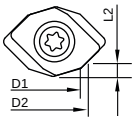
- Reduces process to one operation. Shortens cycle time.
- Use to spot prior to drilling with high performance drills for higher accuracy of hole position.
- Good support spotting process for round parts.



Inserts >>

NC2033:
- Fully ground cutting edge and relief angle.
- Universal grade for steel and cast iron.
- Each insert has 2 cutting edges.



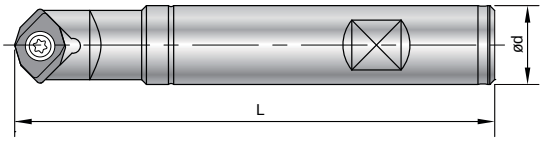
Code	Parts No.	Coating	Grade		Thread Size	*D1±0.05	D2	L2	Dmax.	Tmax.
013203	N9MT0802M04C-NC2033	TiAlN	K20F		M4x0.7	3.30	4.20	0.93	8	2.83
013204	N9MT0802M05C-NC2033				M5x0.8	4.20	5.25	1.14		2.52
013205	N9MT0802M06C-NC2033				M6x1.0	5.00	6.30	1.39		2.24
014219	N9MT11T3M08C-NC2033	TiAlN	K20F		M8x1.25	6.80	8.40	1.81	13	4.11
014220	N9MT11T3M10C-NC2033				M10x1.5	8.50	10.50	2.28		3.53
014221	N9MT11T3UNC25-NC2033	TiAlN	K20F		1/4-20 UNC	5.08	6.70	1.55	13	4.70
014222	N9MT11T3UNC31-NC2033				5/16-18 UNC	6.53	8.40	1.90		4.20
014223	N9MT11T3UNC38-NC2033				3/8-16 UNC	7.94	10.00	2.22		3.72
016205	N9MT1704M12C-NC2033	TiAlN	K20F		M12x1.75	10.25	12.60	2.91	20	6.61
016206	N9MT1704M14C-NC2033				M14x2.0	12.00	14.70	3.22		5.87
016207	N9MT1704M16C-NC2033				M16x2.0	14.00	16.80	3.51		5.11

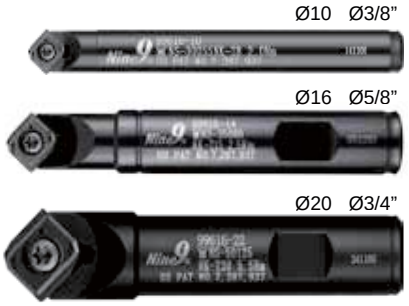
Note: * D1 refer to the Tap Pre-drilling sizes.
* Technical information, please refer to page 35.

WSP Spotting New Geometry of Spotting Tool

Holder >>

- Utilizes standard ***NC Spot Drill*** holders.
- Holders and inserts are interchangeable.
- Applications: Spotting, grooving and chamfering.

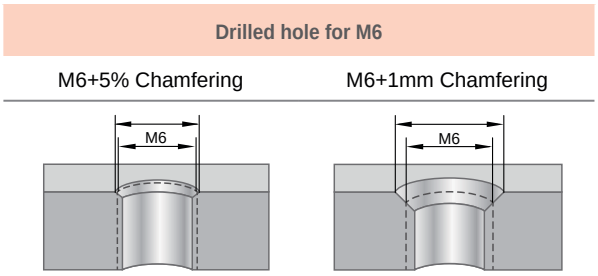




Code	Parts No.	Ød	Insert Type	Thread Size	L	Screw	Key
603001	00-99616-10	10	N9MT0802	M4~M6	89.08±0.29	NS-30055 2.0Nm	NK-T8
613001	00-99616-10-3/8	3/8”					
604004	00-99616-14	16	N9MT11T3	M8~M10	97.55±0.55	NS-35080 2.5Nm	NK-T15
614002	00-99616-14-5/8	5/8”		1/4~3/8 UNC			
606001	00-99616-22	20	N9MT1704	M12~M16	96.24±0.64	NS-50125 5.5Nm	NK-T20
616001	00-99616-22-3/4	3/4"					

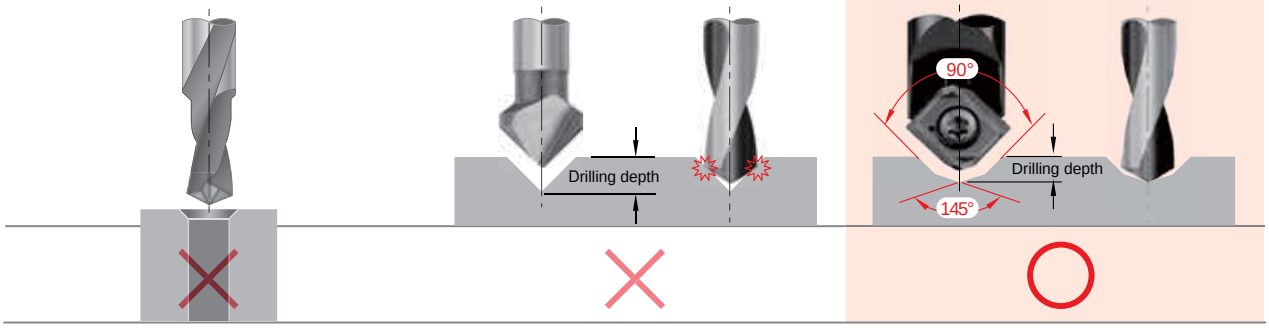
Example >>

- The recommended chamfering is 5% of the nominal diameter of the thread, for example 6.3 mm for M6 thread.
- If you need larger chamfer, it can be calculated the required depth of spotting. (see page 35)



Comparison >>

Carbide Step Drill	Spotting + Drill	WSP Spotting + Drill
• Tool cost is high • Shorter tool life • Can't drill directly from solid on round parts. Bad position accuracy.	• Longer drilling time • Guided at the weakest corner of drill • Shorter tool life	• Shorter drilling time • Guided at the strongest corner of drill • Longer tool life • Also for chamfering or grooving application

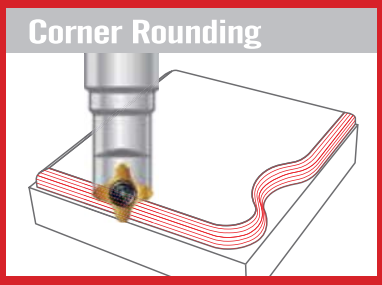


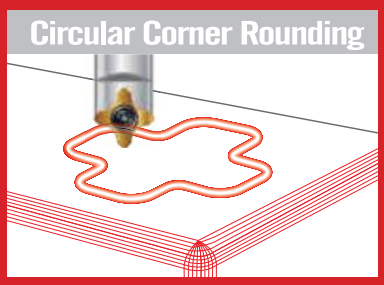
Corner Rounding » Type of RC

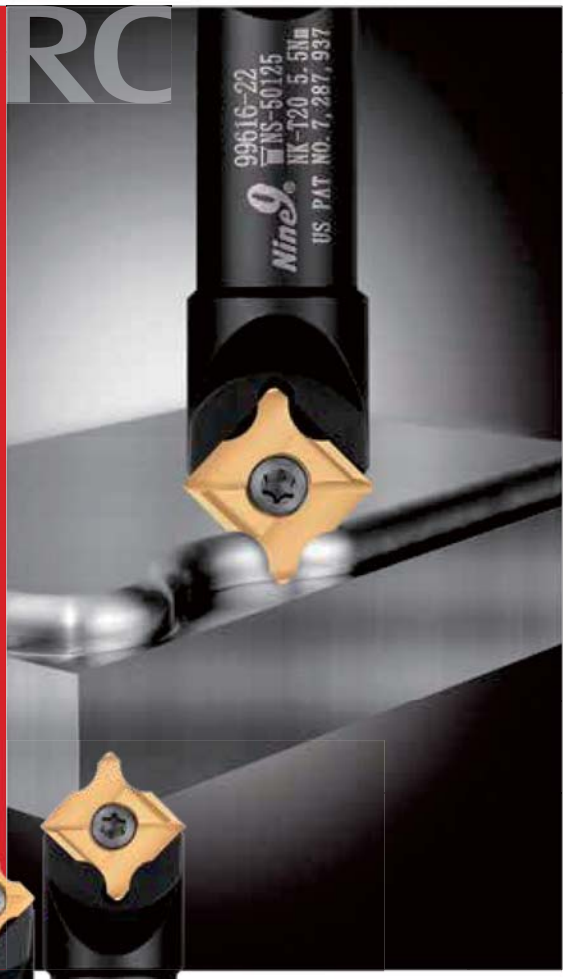
Various corner radius inserts can fit on same holder
Carbide insert can stand very long tool life
Produces smooth and excellent surface finish on workpiece.

Features

- Each insert has 2 cutting edges.
- Combination corner rounding and 45° chamfering application on same insert.
- Higher cutting speed and feed rate.
- Very small X offset, good for contour chamfering.
- Utilizes standard NC Spot Drill holders 99616-06, 99616-14 & 99616-22.







◀ Applications

a Radius 0.5
b Radius 1.0
c Radius 2.0

N9MT05T1RC

RC0.5~RC1.0
All are interchangeable
on same holder

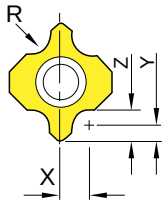
NC2071 NC9036

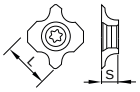
Inserts >>

- Various corner radius inserts can fit on same holder.
- Very small X offset 1.25mm for radius 0.5, the small x offset allows for profiling in small corners.

NC2071:
- Universal grade for all unhardened steel and cast iron.
- Inserts are CNC ground for precision radius location.
- Each insert has 2 cutting edges.

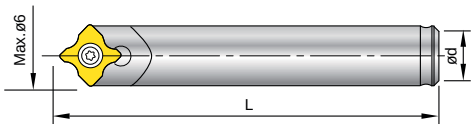
NC9036:
- For non-ferrous material such as aluminum, acrylic, titanium, brass, copper and stainless steel.
- High positive geometry and sharp edge produces excellent surface finish.
- Each insert has 2 cutting edges.



Insert Radius	Code	Parts No.		Coating	Grade	offset				Dimensions	
						X	Y	Z		L	S
0.5	011203	N9MT05T1RC05	NC2071	TiN	K20F	1.25	0.75	1.25		5	1.8
	011206		NC9036	DLC							
0.75	011204	N9MT05T1RC075	NC2071	TiN	K20F	1.50	0.75	1.50			
	011207		NC9036	DLC							
1.0	011205	N9MT05T1RC10	NC2071	TiN	K20F	1.75	0.75	1.75			
	011208		NC9036	DLC							

Holder >>

- For corner rounding using ***NC Spot Drill*** shank.



Ø5

Ø6

Ø6

Code	Parts No.	Ød	L	Screw	Key
601001	00-99616-06-6	6	35	 NS-20036 0.6 Nm	 NK-T6
601002	00-99616-06-5	5	35		
601003	00-99616-06-6L	6	60		

* 601003 is carbide shank holder

N9MT11T3RC

RC1.0~RC3.0
All are interchangeable
on same holder

NC40

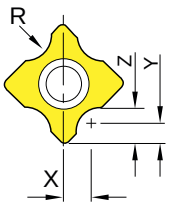
NC9036

Inserts >>

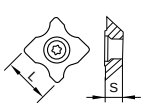
- Higher cutting speed and feed rate.
- Combination corner rounding and 45° chamfering application on same insert.
- Various corner radius inserts can fit on same holder.

NC40:
- Universal grade for all unhardened steel and cast iron.
- Inserts are CNC ground for precision radius location.
- Each insert has 2 cutting edges.

NC9036:
- For non-ferrous material such as aluminum, acrylic, titanium, brass, copper and stainless steel.
- High positive geometry and sharp edge produces excellent surface finish.
- Each insert has 2 cutting edges.



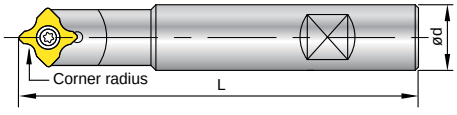
Insert Radius	Code	Parts No.		Coating	Grade	offset				Dimensions	
						X	Y	Z		L	S
1.0	014209	N9MT11T3RC10	NC40	TiN	K20F	2.75	1.5	2.5			
	014224		NC9036	DLC							
1.5	014210	N9MT11T3RC15	NC40	TiN	K20F	3.25	1.5	3			
	014225		NC9036	DLC							
2.0	014211	N9MT11T3RC20	NC40	TiN	K20F	3.75	1.5	3.5		11.11	3.97
	014226		NC9036	DLC							
2.5	014212	N9MT11T3RC25	NC40	TiN	K20F	4.25	1.5	4			
	014227		NC9036	DLC							
3.0	014213	N9MT11T3RC30	NC40	TiN	K20F	4.75	1.4	4.4			
	014228		NC9036	DLC							
1/64	014214	N9MT11T3RC1/64	NC40	TiN	K20F	0.086”	0.059”	0.0747”			
	014229		NC9036	DLC							
1/32	014215	N9MT11T3RC1/32	NC40	TiN	K20F	0.101”	0.059”	0.090”			
	014230		NC9036	DLC							
1/16	014216	N9MT11T3RC1/16	NC40	TiN	K20F	0.133”	0.059”	0.122”		0.437”	0.156”
	014231		NC9036	DLC							
3/32	014217	N9MT11T3RC3/32	NC40	TiN	K20F	0.164”	0.059”	0.153”			
	014232		NC9036	DLC							
1/8	014218	N9MT11T3RC 1/8	NC40	TiN	K20F	0.199”	0.055”	0.180”			
	014233		NC9036	DLC							



Holder >>

- For corner rounding using ***NC Spot Drill*** shank.

Code	Parts No.	Ød	L	Screw/ Key
604002	00-99616-14-12	12	100	NS-35080 2.5 Nm
604004	00-99616-14	16		
614001	00-99616-14-1/2	1/2”	100	NK-T15
614002	00-99616-14-5/8	5/8”		



Ø12, Ø16

N9MT1704RC

RC4.0~RC6.0
All are interchangeable
on same holder


NC2071

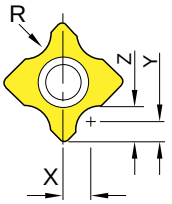

NC9036

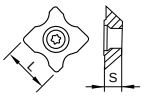
Inserts >>

- Higher cutting speed and feed rate.
- Combination corner rounding and 45° chamfering application on same insert.
- Various corner radius inserts can fit on same holder.

NC2071:
- Universal grade for all unhardened steel and cast iron.
- Inserts are CNC ground for precision radius location.
- Each insert has 2 cutting edges.

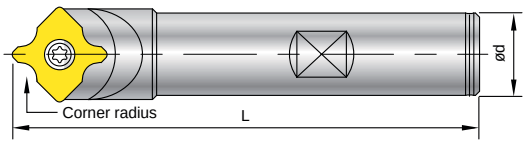
NC9036:
- For non-ferrous material such as aluminum, acrylic, titanium, brass, copper and stainless steel.
- High positive geometry and sharp edge produces excellent surface finish.
- Each insert has 2 cutting edges.



Corner radius(R)	Code	Parts No.		Coating	Grade	offset				Dimensions	
						X	Y	Z		L	S
4.0	016202	N9MT1704RC40	NC2071	TiN	K20F	6.15	2	6		17	4.76
	016208		NC9036	DLC							
5.0	016203	N9MT1704RC50	NC2071	TiN	K20F	7.1	2	7			
	016209		NC9036	DLC							
6.0	016204	N9MT1704RC60	NC2071	TiN	K20F	8.1	2	8			
	016210		NC9036	DLC							

Holder >>

- For corner rounding using ***NC Spot Drill*** shank.
- Good for small work pieces, which need large corner rounding.



Ø20 , Ø25

Code	Parts No.	Ød	L	Screw	Key
606001	00-99616-22	20	100	 NS-50125 5.5 Nm	 NK-T20
606002	00-99616-22-25	25	150		

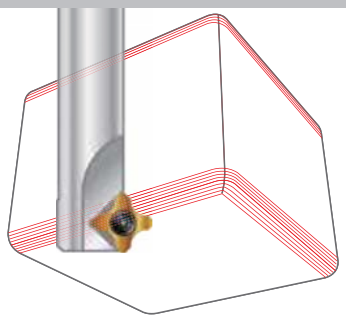
Corner Rounding >> Type of R

Various corner radius inserts can fit on same holder
Carbide insert can stand very long tool life
Produces smooth and excellent surface finish on workpiece.

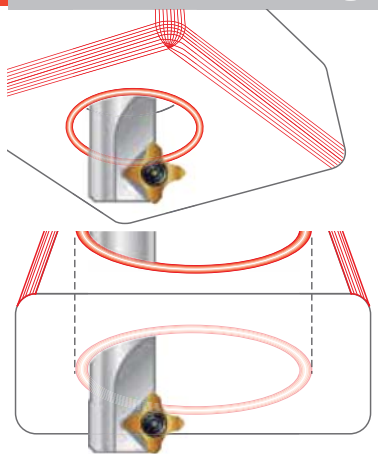
Features

- Each insert has 4 cutting edges.
- R1.0 ~ R3.0 inserts are interchangeable on same holder.
- For front and back chamfering.
- Tool offset can be set after measuring tool length by tool presetter or Z-Zero Setter.
- Inserts are CNC ground for precision radius and location.
- Optimizes the tool performance and reduces the cutting time.

Front & Back Corner Rounding



Back Circular Corner Rounding



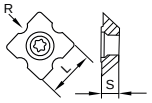
N9MT11T3R

R1.0~R3.0
All are interchangeable
on same holder

Inserts >>

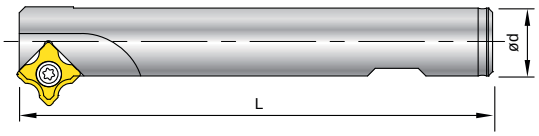
- For front and back corner rounding.
- Various corner radius inserts can fit on same holder.
- Coated carbide inserts for excellent tool life.
- Each insert has 4 cutting edges.

NC2071: • Universal grade for all unhardened steel and cast iron.
• Inserts are CNC ground for precision radius location.

Corner radius(R)	Code	Parts No.	Coating	Grade		Dimensions	
						L	S
1.0	014404	N9MT11T3R10-NC2071	TiN	P35		11.11	3.97
1.5	014405	N9MT11T3R15-NC2071	TiN	P35			
2.0	014406	N9MT11T3R20-NC2071	TiN	P35			
2.5	014407	N9MT11T3R25-NC2071	TiN	P35			
3.0	014408	N9MT11T3R30-NC2071	TiN	P35			

Holder >>

- Center of radius of each tool is dedicated.
- Tool offset can be set after measuring tool length by tool presetter or Z-Zero Setter.



Code	Parts No.	Ød	L	Z	Screw	Key
604015	00-99616-16-25R	16	100	1	 NS-35080 2.5 Nm	 NK-T15
604019	00-99616-16-30R	16	120	1		
604020	00-99616-25-40R	25	150	4		

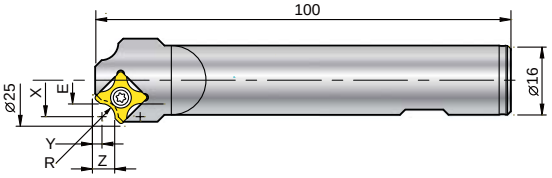
More >>

- Also can fit with N9MT11T308LA inserts for front and back chamfering. (Please see page 32)

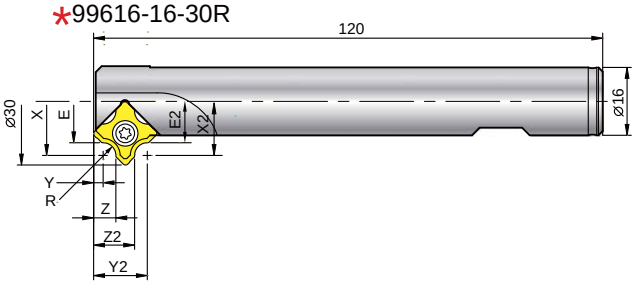
N9MT11T3R

Cutting Position >>

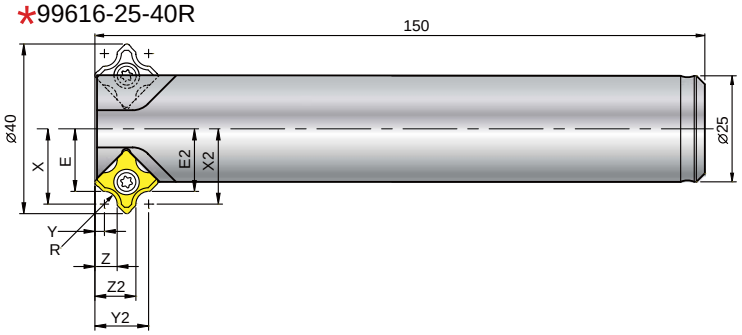
99616-16-25R



*99616-16-30R



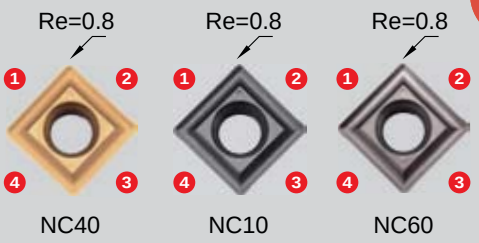
*99616-25-40R



99616-16-30R & 99616-25-40R
*For front and back corner rounding.
*Eliminates 2nd operation or deburring time.

Insert Radius	Holder	Front Chamfering				Back Chamfering				Z
		E	X	Y	Z	E2	X2	Y2	Z2	
R1.0	00-99616-16-25R	8.25	9.25	3.25	4.25	----	----	----	----	1
	00-99616-16-30R	10.75	11.75	3.25	4.25	10.75	11.75	11.65	10.65	1
	00-99616-25-40R	15.75	16.75	3.25	4.25	15.75	16.75	11.65	10.65	4
R1.5	00-99616-16-25R	8	9.5	3	4.5	----	----	----	----	1
	00-99616-16-30R	10.5	12	3	4.5	10.5	12	11.9	10.4	1
	00-99616-25-40R	15.5	17	3	4.5	15.5	17	11.9	10.4	4
R2.0	00-99616-16-25R	7.75	9.75	2.75	4.75	----	----	----	----	1
	00-99616-16-30R	10.25	12.25	2.75	4.75	10.25	12.25	12.15	10.15	1
	00-99616-25-40R	15.25	17.25	2.75	4.75	15.25	17.25	12.15	10.15	4
R2.5	00-99616-16-25R	7.5	10	2.5	5	----	----	----	----	1
	00-99616-16-30R	10	12.5	2.5	5	10	12.5	12.4	9.9	1
	00-99616-25-40R	15	17.5	2.5	5	15	17.5	12.4	9.9	4
R3.0	00-99616-16-25R	7.25	10.25	2.25	5.25	----	----	----	----	1
	00-99616-16-30R	9.75	12.75	2.25	5.25	9.75	12.75	12.65	9.65	1
	00-99616-25-40R	14.75	17.75	2.25	5.25	14.75	17.75	12.65	9.65	4

N9MT11T308LA 45° Chamfering Tool

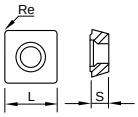


Inserts >>

NC40: • General purpose, universal grade for all unhardened steel.
• Each insert has 4 cutting edges.

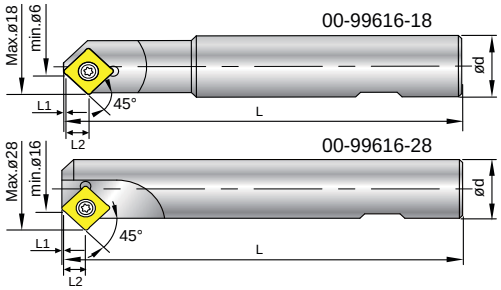
NC10: • High positive angle and fully ground cutting edge and relief angle.
• Universal grade for Al, Al-alloy, non-ferrous metal, cast iron and stainless steel.
• Each insert has 4 cutting edges.

NC60: • Cermet insert, for hardened steel up to 56 HRC .
• Each insert has 4 cutting edges.

Code	Parts No.		Coating	Grade		Dimensions		
						L	S	Re
014409	N9MT11T308LA	NC40	TiN	P35		11.11	3.97	0.8
014410		NC10	TiAN	K10F				
014411		NC60	Cermet					

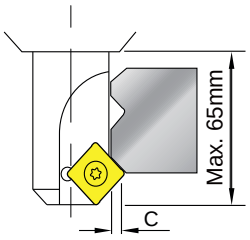
Holder >>

• 99616-28 can be applied for machining back chamfering and side grooving.

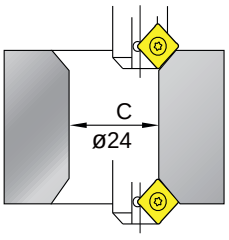


Code	Parts No.	Insert type	Chamfering	Ød	L	L1	L2	Z	Screw / Key
604017	00-99616-18	N9MT11T308LA	Ø6-Ø18	20	120	1.15	7.55	1	 NS-35080 2.5 Nm
604018	00-99616-28		Ø16-Ø28	20	120	1.15	7.55	1	NK-T15

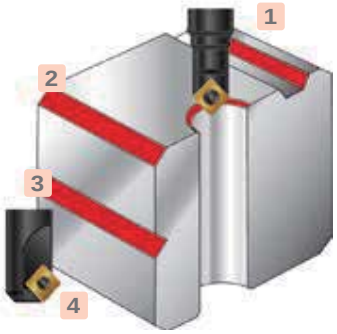
Example >>



For back chamfering
Max. 2mm



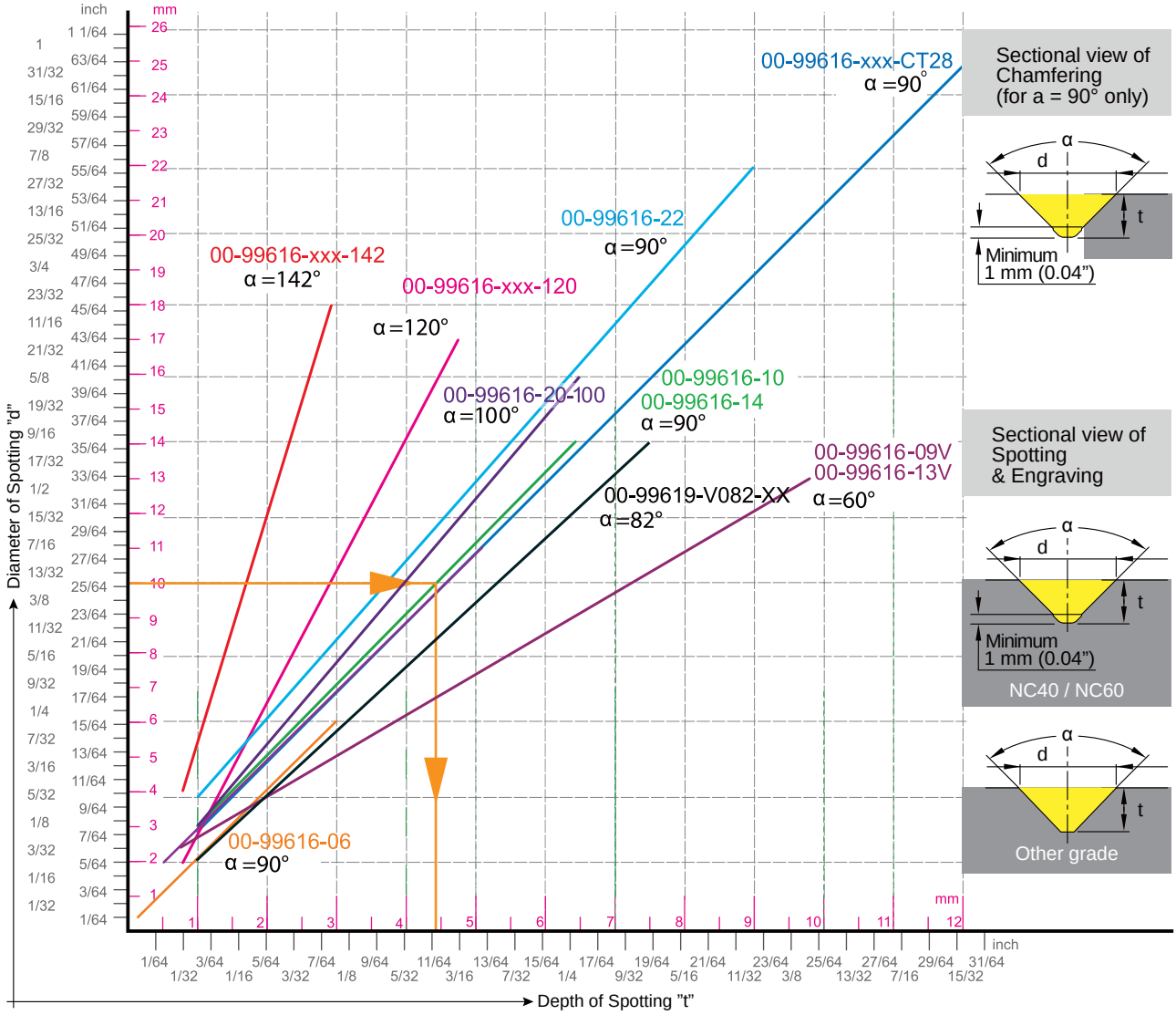
Min.diameter
for shift ø24mm.



Action	
1	External and internal chamfering
2	Side chamfering
3	Side grooving
4	Back chamfering

Cutting Data

Diameter / Depth Chart and Speed / Feed Rate Calculation of NC Spot Drill



Instruction of Use >>

1. From Spot diameter "d" to get drill depth " t ".
2. Point angle "α" is determined by which tool holder you use.
3. From "d" draw a horizontal line to get intersection of the line by point angle "α".
4. From the intersection draw a vertical line to the bottom to have depth of spotting " t ". " t " is the drill depth of the NC program.
5. The sectional view of spotting will depend on the shape of insert, NC40 and other grades of inserts have different sectional view.
6. For chamfering, do not use tip of insert, 1mm(0.04") minimum clearance is required for a smooth surface finish.

Calculate spindle speed and feed rate >>

1. Using your "d" value and cutting speed Vc from the data sheet, calculate spindle speed "S"(RPM).
2. " F" feed rate per minute F = f x S = RPM x IPR

Metric

$$S = \frac{Vc \times 1000}{\pi \times d}$$

$$F = S \times f$$

d =	diameter -mm
S =	Spindle Speed -r.p.m.
Vc =	Cutting Speed -m/min.
f =	mm/rev.
F =	mm/min.

Inch

$$S = \frac{(3.82 \times SFM)}{d}$$

$$F = f \times S$$

d =	diameter-inch
S =	Spindle Speed-r.p.m.
SFM =	Surface Speed-ft./min. Vc (m/min.) x 3.28
f = IPR =	inch/rev.
F =	inch/min.

Cutting Data

N9MT-CT >> Insert Multi-function

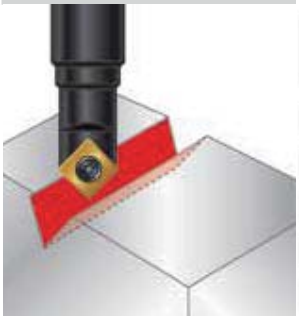
Determine spindle speed and feed rate:

- Choose spotting depth to decide spotting diameter according to the Diameter/Depth chart on page 33.
- The spindle speed should be calculated by the maximum diameter of spotting, chamfering and grooving.

Spotting	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	150~250	0.05~0.10	NC40, NC2071
	Alloy Steel	100~200	0.04~0.08	NC40, NC2071
	Stainless Steel	65~125	0.03~0.06	NC10, NC60, NC40, NC2071
	Cast iron	80-150	0.05~0.10	NC40, NC10, NC2071
	Non-Ferrous Metal (Al, Cu)	150~300	0.05~0.10	NC10, NC9076, NC2071
	Ti, Ti-alloy	40~80	0.03~0.08	NC9076
	Hardened steel 40~56 HRC	30~60	0.03~0.08	NC60

* For technical construction reasons, the insert is not located on the center of the holder.
* Inserts with supporting edges can increase feed rate 50%.

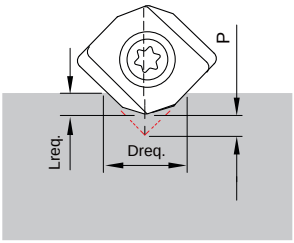
Chamfering	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	150~320	0.15~0.24	NC40, NC2071
	Alloy Steel	100~250	0.12~0.20	NC40, NC2071
	Stainless Steel	65~125	0.1~0.20	NC10, NC60, NC40, NC2071
	Cast iron	150-250	0.15~0.25	NC40, NC10, NC2071
	Non-Ferrous Metal (Al, Cu)	150~320	0.15~0.25	NC10, NC9076, NC2071
	Ti, Ti-alloy	40~80	0.03~0.08	NC9076
	Hardened steel 40~56 HRC	30~60	0.03~0.08	NC60

Grooving	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	150~250	0.05~0.10	NC40, NC2071
	Alloy Steel	100~200	0.04~0.08	NC40, NC2071
	Stainless Steel	65~125	0.03~0.06	NC10, NC60, NC40, NC2071
	Cast iron	80~150	0.05~0.08	NC40, NC10, NC2071
	Non-Ferrous Metal (Al, Cu)	150~320	0.05~0.08	NC10, NC9076, NC2071
	Ti, Ti-alloy	40~80	0.03~0.08	NC9076
	Hardened steel 40~56 HRC	30~60	0.03~0.08	NC60

Cutting Data

WSP Spotting >> 145°+90° W Spotting

WSP spotting	Formula



Lreq. = Dreq. x 0.5 - P

P =	distance of theoretical intersection point to tip of insert.
0.5 =	fixed factor for calculation
Lreq. =	required drilling depth
Dreq. =	required diameter

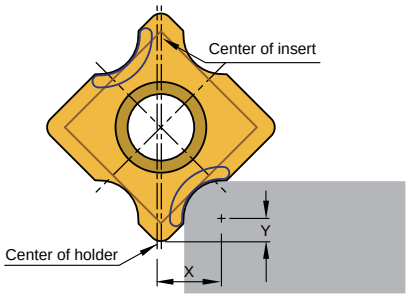
	M4	M5	M6	M8	M10	M12	M14	M16	1/4-20 UNC	5/16-18 UNC	3/8-16 UNC
P =	1.17	1.48	1.76	2.39	2.97	3.59	4.19	4.88	1.80	2.30	2.78

WSP spotting	Work Material	Vc (m/min)	f (mm/rev.)
	Carbon Steel	150 ~ 300	0.05 ~ 0.15
	Alloy Steel	120 ~ 250	0.05 ~ 0.10
	Stainless Steel	80 ~ 150	0.04 ~ 0.08
	Cast iron	100 ~ 200	0.05 ~ 0.10

N9MT-RC Insert >> Corner Rounding

Determine spindle speed and feed:
To decide running speed of the tools and feed rate, please calculate spindle speed and feed rate according to the following formula and cutting data:

Corner Rounding	Calculate spindle speed



d = 2 x X mm

$$S = \frac{Vc \times 1000}{d \times \pi} \text{ r.p.m.}$$

F = S x f mm/min.

d =	diameter of the tool for calculation purpose
X =	tool radius offset (ref. page 26~28 for RC inserts)
Vc =	Cutting Speed -m/min.
S =	Spindle Speed -r.p.m.
F =	mm/min.
f =	mm/rev.

Calculate tool length offest on machining center

TL = TL'-Y,
H = X

X =	tool radius offset (ref. page 26~28 for RC inserts)
Y =	distance to the center of radius. (ref. page 26~28 for RC inserts)
TL' =	tool length
TL =	tool length offset.
H =	tool radius offset

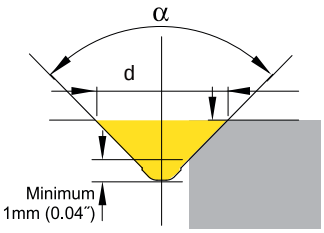
RC Insert	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	150~320	0.05~0.10	NC40, NC2071
	Alloy steel	100~250	0.05~0.10	NC40, NC2071
	High alloy steel	80~150	0.04~0.08	NC40, NC2071
	Stainless Steel	65~125	0.05~0.10	NC9036
	Cast iron	150~250	0.05~0.10	NC40, NC2071
	Aluminum, Al-alloy Si < 12%	150~320	0.05~0.10	NC9036
	Al-alloy Si >12%	100~300	0.05~0.10	NC9036
	Cu	200~250	0.05~0.10	NC9036
	Brass and Bronze	150~250	0.05~0.10	NC9036

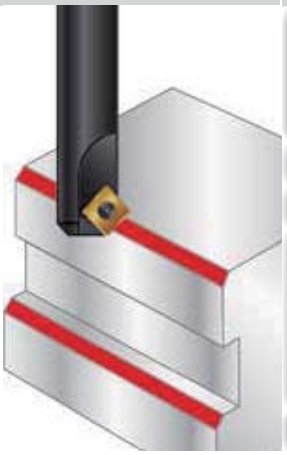
Cutting Data

N9MT-R Insert >> Corner Rounding (4 cutting edges)

R Insert	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	150~320	0.05~0.10	NC2071
	Alloy steel	100~250	0.04~0.08	NC2071
	High alloy steel	60~80	0.03~0.06	NC2071
	Cast iron	150~250	0.05~0.10	NC2071

LA Insert >> 45° Chamfering

45° Chamfering	Formula	
	$S = \frac{Vc \times 1000}{d \times \pi}$ r.p.m.	**α =** point angle 90°
		d = effective diameter
		Vc = cutting speed-m/min.or ft/min.
	F = S x f mm/min.	**S =** Spindle speed
		f = feed per rev.-mm/rev.

45° Chamfering	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	150-320	0.05~0.10	NC40
	Alloy Steel	100-250	0.04~0.08	NC40
	High alloy steel	60-80	0.03~0.06	NC40
	Stainless Steel	65-125	0.03~0.06	NC10
	Cast iron	150-250	0.05~0.10	NC10, NC40
	Aluminum, Al-alloy Si < 12%	150-320	0.05~0.10	NC10
	Al-alloy Si >12%	100-300	0.05~0.10	NC10
	Cu	200-250	0.05~0.10	NC10
	Brass and Bronze	150-250	0.05~0.10	NC10
	Hardened steel **40~56 HRC**	60-80	0.05~0.10	NC60

Center Drill >> i-Center®

The “ i-Center ” is a trademark of Nine9,
the developer of the first indexable center drill in the world.(Patented)
Offering an indexable insert system for the 1st time, Nine9’s “i-Center ” design improves your process performance.

Features

World’s first indexable center drill
Shortens set up and center drilling time
Increases tool life and reduces tooling costs

High Speed, High Feed Rate

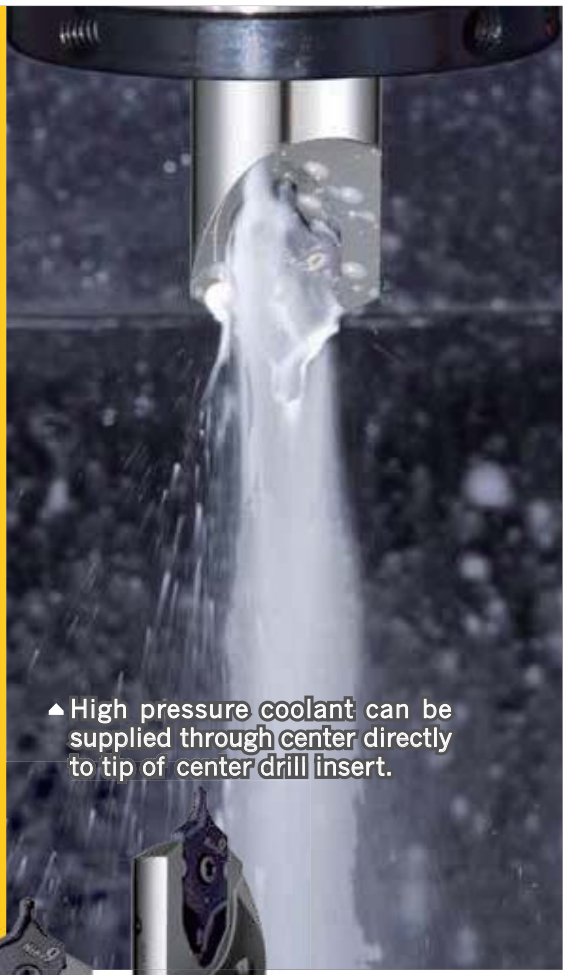
- The special ground insert and rigid holder design facilitate high performance speed and feed rates. For example, drilling alloy steel at 6000 rpm and feed rate of 600 mm/min. (0.1 mm/rev.)

Easy Tool Length Setting

- The axial position accuracy of the insert is 0.05 mm (.002”). It is not necessary to reset the tool length when changing the insert or cutting edge.

Excellent Repeatability

- The positioning repeatability of the insert is within 0.02 mm (.0008”) in radial direction, thus ensuring conformity to any national standards.



▲High pressure coolant can be supplied through center directly to tip of center drill insert.

Extended Tool Life

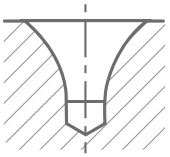
- Coolant can be supplied through the center of the holder to increase performance and extend tool life.
- Insert geometry, grades and coating process are specifically engineered for centering applications.

Special forms are possible

* Standard stock item

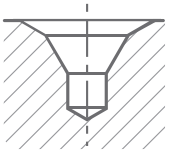
*** DIN 332 Form R**

Ø1.0~Ø10



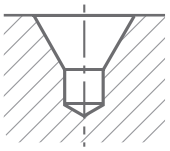
*** DIN 332 Form A + B**

Ø1.0~Ø10



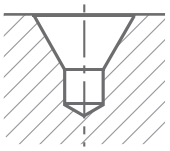
*** DIN 332 Form A**

Ø2.0~Ø2.5

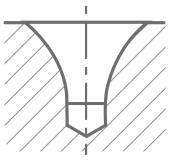


*** ANSI 60°**

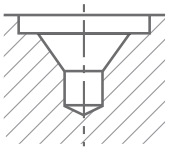
#2.0~#10



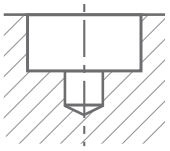
PR (Similar DIN332 R)



C Type



F Type



Insert Type:

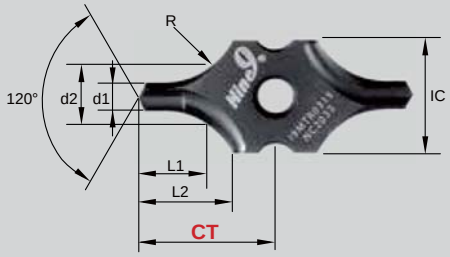
*  NC2033 / K20F grade TiAlN FUDURA NANO COATING.

*  NC5074 / P40 grade Helica coating , for IC08 inserts.

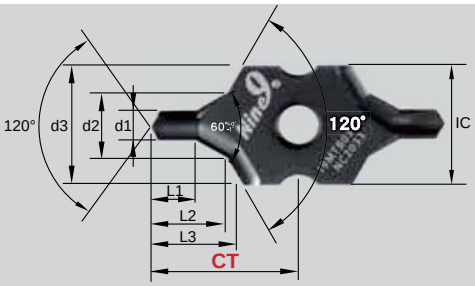
▲Excellent repeatability by insert type.
No need tool length re-setting while changing insert or cutting edge.

Indexable Center Drill

DIN332 Form R



DIN332 Form A+B



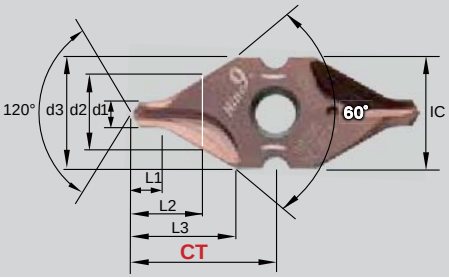
DIN332 Form R >>

Code	Parts No.	Coating	Grade	d1		d2	L1	L2	R	CT ±0.025	IC
New 032211	I9MT08T1R0100-NC5074	Helica	P40	1.00	+ 0.14 0	2.12	2.16	4.14	2.8	7.55	08
New 032212	I9MT08T1R0125-NC5074			1.25		2.65	2.74	4.64	3.5	7.90	
New 032213	I9MT08T1R0160-NC5074			1.60		3.35	3.45	5.13	4.5	8.40	
New 032214	I9MT08T1R0200-NC5074			2.00		4.25	4.45	6.08	5.65	9.10	
033201	I9MT12T2R0200-NC2033	TiAlN	K20F	2.00	+ 0.14 0	4.25	4.45	6.64	5.65	11.73	12
033202	I9MT12T2R0250-NC2033			2.50		5.3	5.59	8.11	7.15	13.00	
033203	I9MT12T2R0315-NC2033			3.15	+ 0.18 0	6.7	7.21	9.63	9.0	14.00	
034201	I9MT1603R0400-NC2033			4.00		8.5	9.06	12.23	11.0	19.40	16
034202	I9MT1603R0500-NC2033			5.00		10.6	11.45	14.2	14.0	19.40	
035201	I9MT2004R0630-NC2033			6.30	+ 0.22 0	13.2	14.63	18.2	18.0	28.40	20
035202	I9MT2004R0800-NC2033			8.00		17.0	18.63	20.44	22.5	28.30	
036201	I9MT2506R1000-NC2033			10.00		21.2	23.51	25.8	28.0	34.20	25

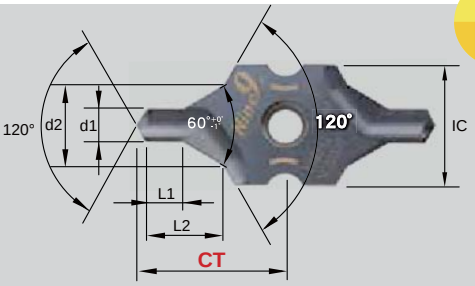
DIN332 Form A+B >>

Code	Parts No.	Coating	Grade	d1		d2	d3	L1	L2	L3	CT ±0.025	IC
New 032011	I9MT08T1B0100-NC5074	Helica	P40	1.00	+ 0.14 0	2.12	3.15	1.3	2.21	2.51	7.55	08
New 032012	I9MT08T1B0125-NC5074			1.25		2.65	4.0	1.6	2.75	3.14	7.90	
New 032013	I9MT08T1B0160-NC5074			1.60		3.35	5.0	2.0	3.46	3.93	8.4	
New 032014	I9MT08T1B0200-NC5074			2.00		4.25	6.3	2.5	4.39	4.98	9.1	
033001	I9MT12T2B0200-NC2033	TiAlN	K20F	2.00	+ 0.14 0	4.25	6.3	2.5	4.39	4.98	11.73	12
033002	I9MT12T2B0250-NC2033			2.50		5.3	8.0	3.1	5.53	6.28	13.0	
033003	I9MT12T2B0315-NC2033			3.15	+ 0.18 0	6.7	10.0	3.9	6.90	7.85	14.0	
034001	I9MT1603B0400-NC2033			4.00		8.5	12.5	5.0	8.9	10.03	19.4	16
034002	I9MT1603B0500-NC2033			5.00		10.6	16.0	6.3	11.15	12.68	19.4	
035001	I9MT2004B0630-NC2033			6.30	+ 0.22 0	13.2	18.0	8.0	13.98	15.33	28.4	20
035002	I9MT2004B0800-NC2033			8.00		17.0	20	10.1	17.89	18.73	28.3	
036001	I9MT2506B1000-NC2033			10.00		21.2	25	12.8	22.5	23.57	34.2	25

DIN332 Form A



ANSI 60°



DIN332 Form A >>

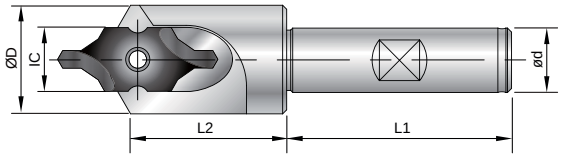
	Code	Parts No.	Grade	Coating	d1		d2	d3	L1	L2	L3	CT ±0.025	IC
New	032114	I9MT08T1A0200-NC5074	P40	Helica	2.0	+ 0.14 0	4.25	8	2.15	4.10	7.35	10.5	08
New	032115	I9MT08T1A0250-NC5074			2.5		5.3		2.58	5.00	7.34		
New	032116	I9MT08T1A0315-NC5074			3.15	+ 0.18 0	6.7		3.23	6.30	7.43		

ANSI 60° >>

Code	Parts No.	Grade	Coating	Size	d1			d2		L1		L2	CT ±0.025	IC
						mm			mm		mm	mm		
033101	I9MT12T2A2-NC2033	K20F	TiAlN	#2	5/64	1.98	+ 0.14 0	3/16	4.76	5/64	1.98	4.4	12.6	
033102	I9MT12T2A3-NC2033			#3	7/64	2.78		1/4	6.35	7/64	2.78	5.9	13.8	12
033103	I9MT12T2A4-NC2033			#4	1/8	3.18	+ 0.18 0	5/16	7.94	1/8	3.18	7.3	14.25	
034101	I9MT1603A5-NC2033			#5	3/16	4.76		7/16	11.11	3/16	4.76	10.3	20.0	16
035101	I9MT2004A6-NC2033			#6	7/32	5.56		1/2	12.7	7/32	5.56	11.8	27.75	
035102	I9MT2004A7-NC2033			#7	1/4	6.35	+ 0.22 0	5/8	15.88	1/4	6.35	14.6	28.5	20
035103	I9MT2004A8-NC2033			#8	5/16	7.94		3/4	19.05	5/16	7.94	17.6	29.0	
036101	I9MT2506A10-NC2033			#10	3/8	9.53		0.98"	25.0	3/8	9.53	22.9	34.9	25

Holder >>

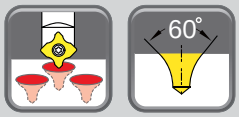
• Made of hardened high alloy steel. • Shank is ground to h6 tolerance. • Special holders are available on request.



Code	Parts No.	Type	IC	ød	L1	L2	øD	Screw	Key
802002	00-99616-IC08-10F	BC10-IC08F	08	10	30	18.5	12	NS-25060 0.9 Nm	NK-T7
803002	00-99616-IC12-16F	SB16-IC12F	12	16	48	30.5	21	NS-30072 2.0 Nm	NK-T9
804002	00-99616-IC16-16F	SB16-IC16F	16	16	48	37	27	NS-35080 2.5 Nm	NK-T15
805002	00-99616-IC20-20F	SB20-IC20F	20	20	50	51	32	NS-50125 5.5 Nm	NK-T20
806002	00-99616-IC25-25F	SB25-IC25F	25	25	56	56	43	NS-50125 5.5 Nm	NK-T20

Code	Parts No.	Type	IC	ød	L1	L2	øD	Screw	Key
812002	00-99616-IC08-3/8F	BC3/8"-IC08F	08	3/8"	30	18.5	12	NS-25060 0.9 Nm	NK-T7
813002	00-99616-IC12-5/8F	SB5/8"-IC12F	12	5/8"	48	30.5	21	NS-30072 2.0 Nm	NK-T9
814002	00-99616-IC16-5/8F	SB5/8"-IC16F	16	5/8"	48	37	27	NS-35080 2.5 Nm	NK-T15
815002	00-99616-IC20-3/4F	SB3/4"-IC20F	20	3/4"	50	51	32	NS-50125 5.5 Nm	NK-T20
816002	00-99616-IC25-1F	SB 1"-IC25F	25	1"	56	56	43	NS-50125 5.5 Nm	NK-T20

N9MT11T3PR Radius Center Drilling

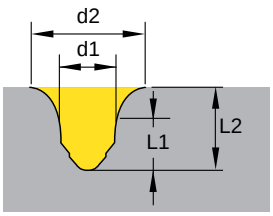


NC40

Inserts >>

- Create 60° center holes SIMILAR to DIN 332 Form R.
- Carbide insert can stand very long tool life.
- Easy tool length setting, saving tool changing time.

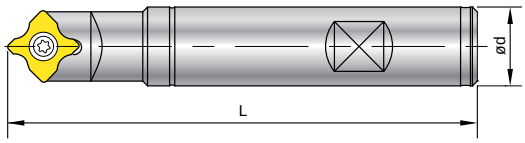
NC40:
- Universal grade for all unhardened steel and cast iron.
- Radius curve eliminates the sharp transition from drill point to countersink angle.
- Each insert has 2 cutting edges.



Code	Parts No.	Coating	Grade	Dimensions			
				d1	d2	L1	L2
014205	N9MT11T3PR20-NC40	TiN	P32	2.0	5.4	2.7	3.3
014206	N9MT11T3PR25-NC40			2.5	5.9	3.0	3.7
014207	N9MT11T3PR30-NC40			3.0	6.4	3.3	4.0

Holder >>

- PR holder has small offset value.
- Also apply as a 90° spotting drill while fitted with N9MT11T3CT2T-H insert (page 21).

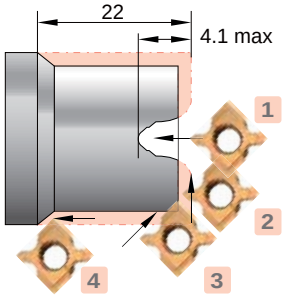


Ø16

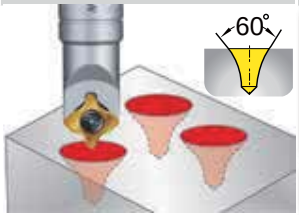
Code	Parts No.	Ød	L	Screw	Key
604004PR	00-99616-14-PR	16	100	NS-35080 2.5 Nm	NK-T15

Turning and Centering Capacity on CNC Lathes

	Action
1	Center Drilling
2	Facing
3	Chamfering
4	External Turning



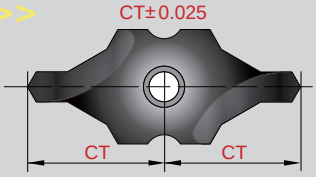
PR Insert >> Radius Center Drilling

Center Drilling	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	80-150	0.05-0.20	NC40
	Alloy steel	80-150	0.05-0.20	
	High alloy steel	80-150	0.05-0.20	
	Cast iron	80-150	0.05-0.20	

Performance

Profit by making the right choice >>

- High speed and feed rate reduce cutting time.
- The unique design increases tool life and reduces change over time.

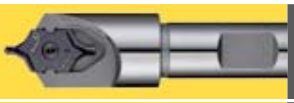


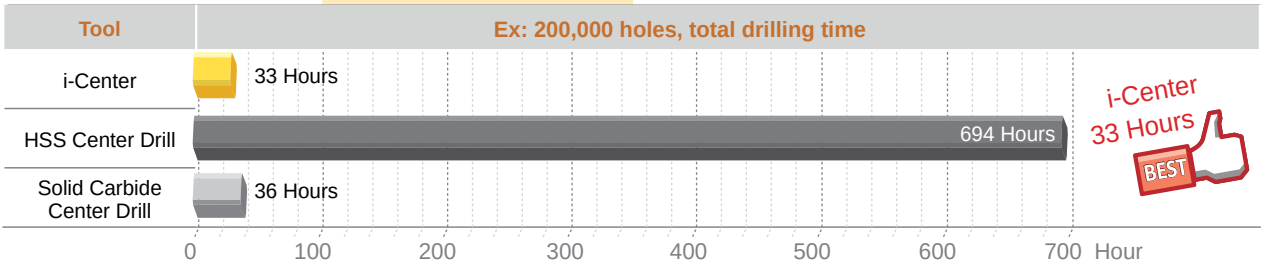
▲ 2 cutting edges

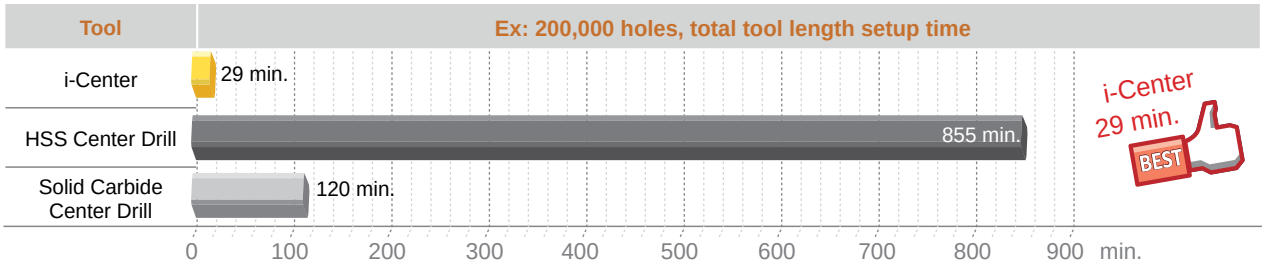
▲ 2 cutting flutes design

Comparison >>

- Workpiece : Low carbon alloy steel, 850 N/mm^2
- Machine: VMC BT40 with internal coolant

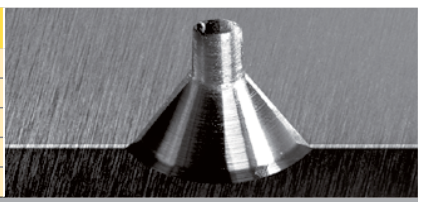
Diameter of tool : Ø3.15 mm Depth of drilling : 7.2 mm			
Comparison	**i-Center**	**HSS Center Drill (TiN Coating)**	**Solid Carbide Center Drill**
Cutting speed **m/min.**	65	17	65
Spindle speed **r.p.m.**	6570	1718	6570
Feed rate f = **mm/rev.**	0.12	0.02	0.1
Feed rate F= **mm/min.**	788.4	34.4	657
Coolant **Emulsion**	External / Internal	External	External
Drilling time **sec.**	0.55	12.5	0.65
Holes of drilling per edge	7000	700	5000

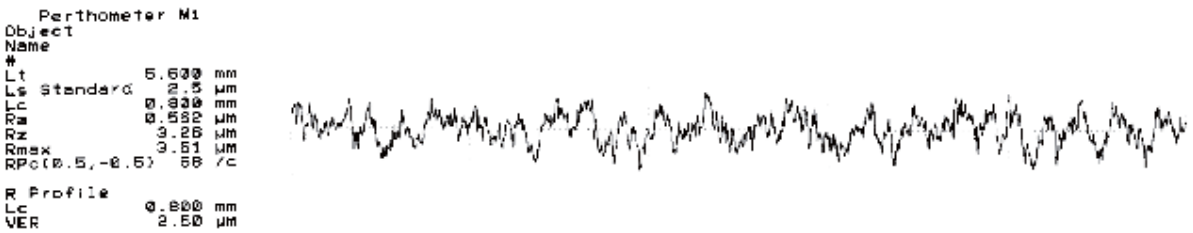




Surface finish >>

i-Center Insert	Material SCM440		
I9MT1603B0500 NC2033	**Vc**	60	m/min.
	S	3800	r.p.m.
	f	0.1	mm/rev.
	F	380	mm/min.
	Ap	13.5	mm

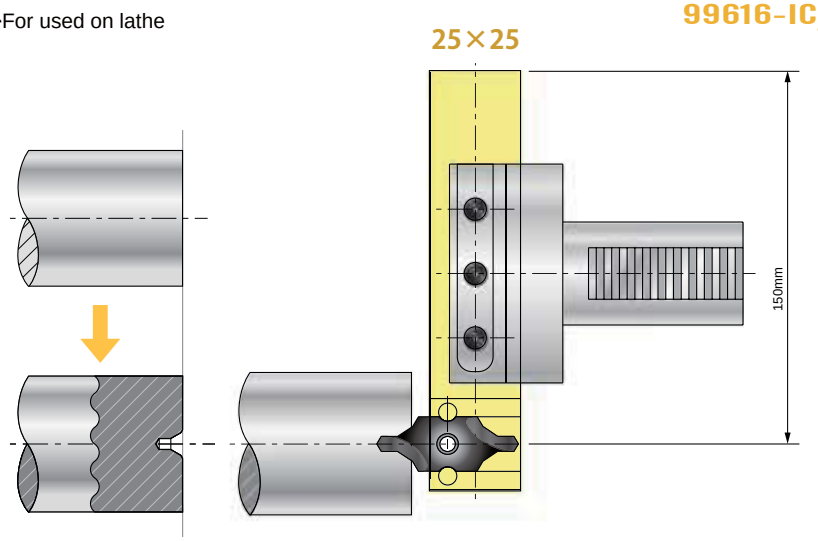




Also Available >> Special holder & Insert

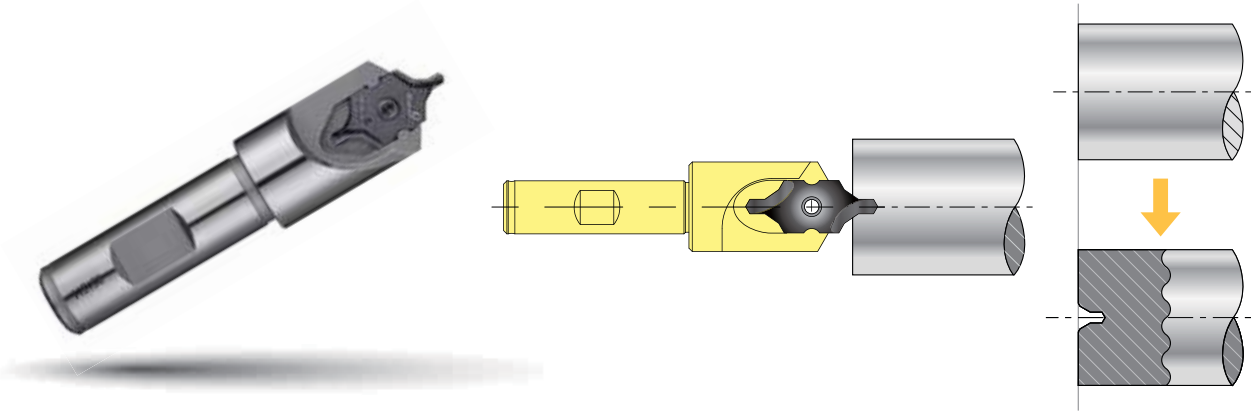
25x25 square shank holder >> Parts NO. 99616-IC 12 -L2525MF
99616-IC 16 -R2525MF

*For used on lathe

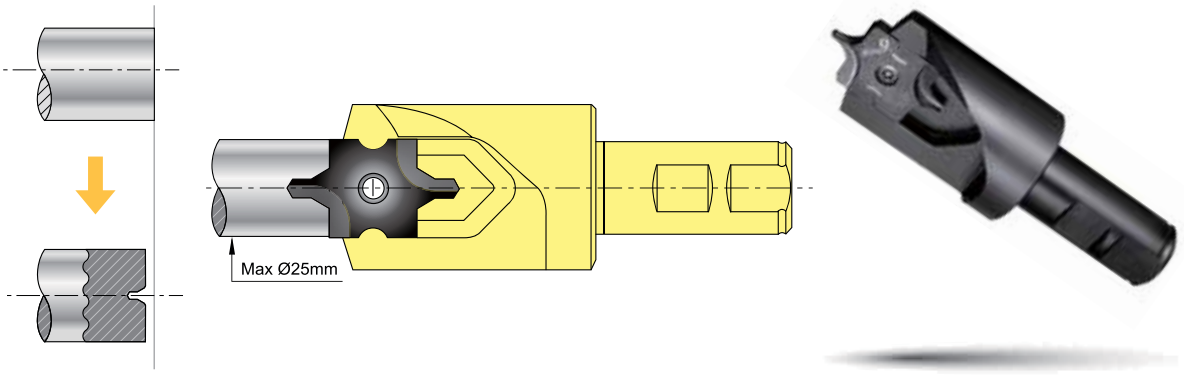


Cylindrical Shank >> Pre-balanced (G2.5 / 10,000 rpm)

Left hand tool holder and Insert. (NC5074. NC2033)



Special insert.
Combined centering, facing chamfering and external turning >>



i-Center Enquiry Form

Company >>

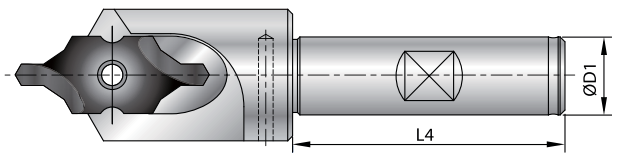
Challenge or improvement >>

The following information should be checked while discussing with customer.

Machine		
Machine Type		
Spindle Speed	Max.	r.p.m.
Power of Spindle motor	☐ KW	☐ HP
Coolant supply	☐ NO	
	☐ If yes, ☐ External	
	☐ Internal	bar(psi)
Current tool		
Cutting Speed	☐ HSS	☐ Solid Carbide
	m/min.	SFM
Others		
Feed Rate	mm/rev.	inch/rev.
Work Piece		
Material code		
Center hole type	☐ R ☐ A ☐ B ☐ C	
	☐ Other as attached drawing	
Other request	☐ Surface roughness	
	☐ Tolerance(see below)	

Special Tool holder shank dimensions >>

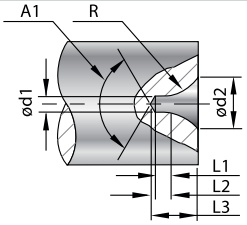
☐ Special tool holder shank, please fill in D1 and L4.
☐ As attached drawing.
☐ Metric ☐ Inch ☐ Right ☐ Left



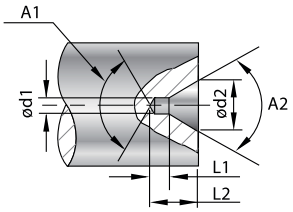
Center hole dimension >>

- Please provide workpiece drawing
- One of following type should be chosen.

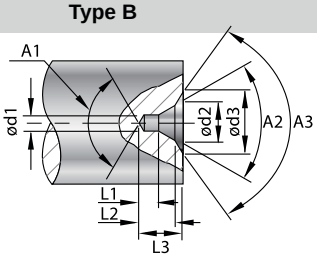
Type R



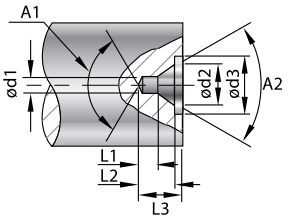
Type A



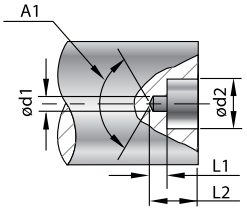
Type B



Type C



Other

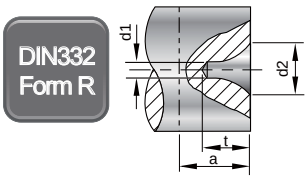


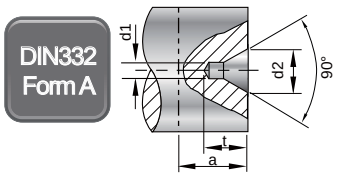
Dimension Table	A1	A2	A3	ød1	ød2	ød3
Dimension						
Tolerance	---	$^{+0°}_{-1°}$	±1°	±0.05	±0.05	---

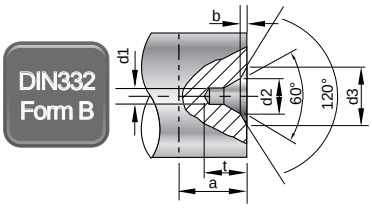
Dimension Table	L1	L2	L3	R	øD1	L4
Dimension						
Tolerance	±0.05	±0.05	±0.05	±0.5	h6	---

Technical Specifications

60° Center holes DIN 332 >> Form R, A and B



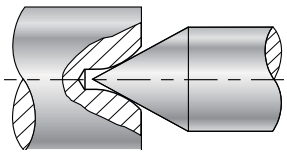


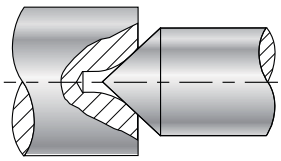


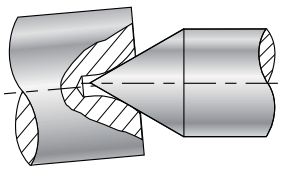
STD	DIN332 Form R ISO 2541-1972			DIN332 Form A ISO 866-1975			DIN332 Form B ISO 2540 1973				
d1	d2	t	a	d2	t	a	d2	b	d3	t	a
1	2.12	1.9	3	2.12	1.9	3	2.12	0.3	3.15	2.2	3.5
1.25	2.65	2.3	4	2.65	2.3	4	2.65	0.4	4	2.7	4.5
1.6	3.35	2.9	5	3.35	2.9	5	3.35	0.5	5	3.4	5.5
2	4.25	3.7	6	4.25	3.7	6	4.25	0.6	6.3	4.3	6.6
2.5	5.3	4.6	7	5.3	4.6	7	5.3	0.8	8	5.4	8.3
3.15	6.7	5.8	9	6.7	5.9	9	6.7	0.9	10	6.8	10
4	8.5	7.4	11	8.5	7.4	11	8.5	1.2	12.5	8.6	12.7
5	10.6	9.2	14	10.6	9.2	14	10.6	1.6	16	10.8	15.6
6.3	13.2	11.4	18	13.2	11.5	18	13.2	1.4	18	12.9	20
8	17	14.7	22	17	14.8	22	17	1.6	22.4	16.4	25
10	21.2	18.3	28	21.2	18.4	28	21.2	2	28	20.4	31

Advantage of Form R Center hole

60° Center of tail stock	90° Center of tail stock	Center hole and center are misaligned

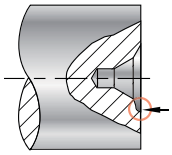


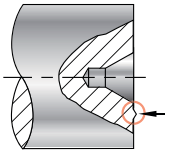


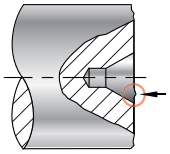


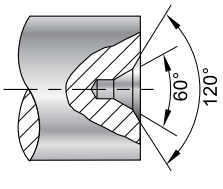
Advantage of Form B center hole

Avoid scar or distortion while transportation	Burr	Rough surface of workpiece	Total solution





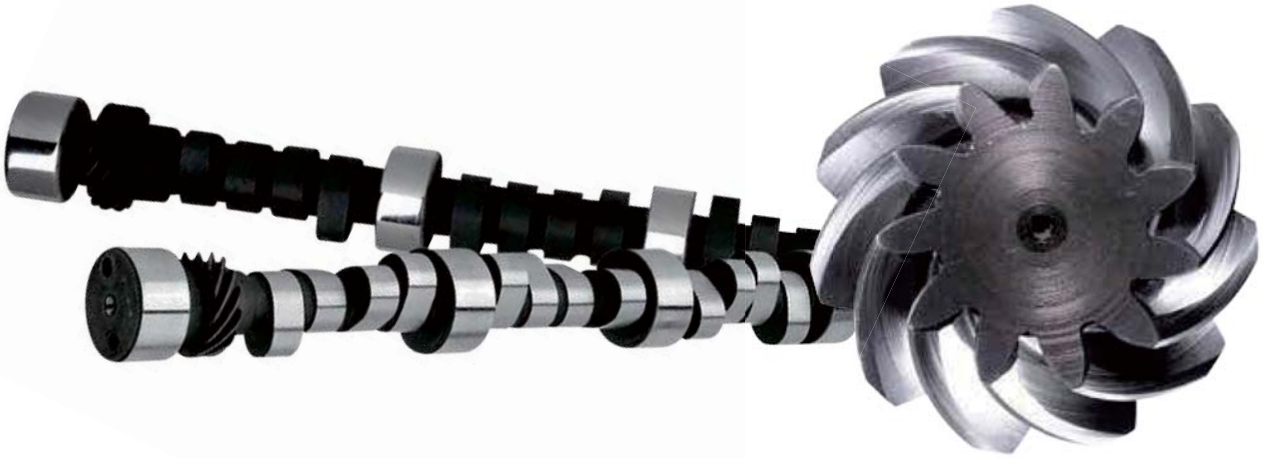


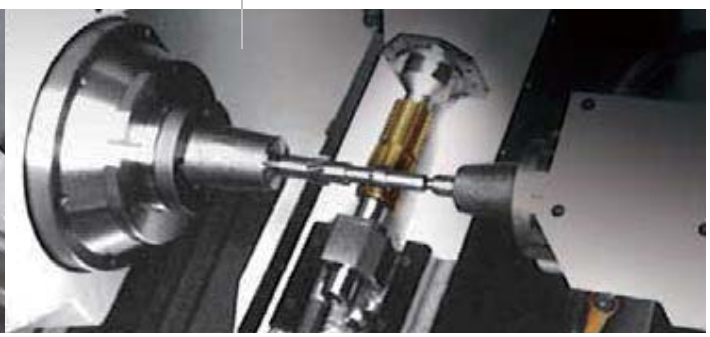


i-Center Applications

Tip >>

- Various centering applications and products - shafts of engine, transmission gear, bearings, motors, grinding parts, spindles, gear reducers, cooling fan, universal joints...
- Special forms for other applications also available on request.





Cutting Data

Attention >>

- For d1< 4 mm or size #5, the center misalignment must be less than 0.05mm.
- If the CNC lathe turret center's misalignment is above 0.15mm, please use the Center Height Adjusting Sleeve. (See page 71)
- For low spindle speed special purpose machines or lathes, lower spindle speed is allowed but the feed rate should be maintained.

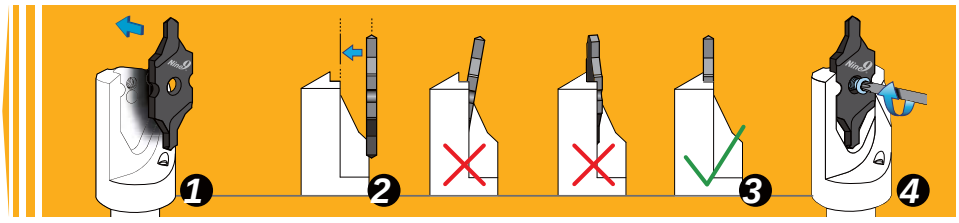
Ø1~Ø3.15 (#2~#4) >>

Workpiece material	Vc (m/min.) \ f / d1	f (mm/rev)					Cutting fluid
		IC08		IC12			
		Ø1~1.25	Ø1.6~3.15	Ø2 (#2)	Ø2.5 (#3)	Ø3.15 (#4)	
Carbon steel C<0.3%	60-70-80	(S=17825 rpm) 0.02-0.03-0.05	(S=13930 rpm) 0.03-0.05-0.06	(S=11140 rpm) 0.04-0.06-0.08	(S=8912 rpm) 0.06-0.08-0.10	(S=7073 rpm) 0.08-0.10-0.12	emulsion
Carbon steel C>0.3%	50-60-70	(S=17825 rpm) 0.02-0.03-0.05	(S=11940 rpm) 0.03-0.04-0.05	(S=9549 rpm) 0.03-0.04-0.05	(S=7639 rpm) 0.06-0.08-0.10	(S=6063 rpm) 0.08-0.10-0.12	emulsion
Low alloy steel C<0.3%	45-55-65	(S=14005 rpm) 0.01-0.02-0.04	(S=10950 rpm) 0.02-0.03-0.05	(S=8753 rpm) 0.02-0.03-0.05	(S=7002 rpm) 0.04-0.06-0.08	(S=5557 rpm) 0.06-0.08-0.10	emulsion
High alloy steel C>0.3%	40-50-60	(S=12732 rpm) 0.01-0.02	(S=9950 rpm) 0.01-0.02-0.04	(S=7957 rpm) 0.01-0.02-0.04	(S=6366 rpm) 0.02-0.04-0.06	(S=5052 rpm) 0.04-0.06-0.08	emulsion
Stainless Steel	5-10-20	(S=2546 rpm) 0.003-0.01	(S=1592 rpm) 0.005-0.02	(S=1592 rpm) 0.01-0.02	(S=1270 rpm) 0.01-0.02-0.03	(S=1010 rpm) 0.02-0.03-0.05	emulsion internal≥5 bar
Cast iron	50-60-70	(S=15278 rpm) 0.01-0.02-0.04	(S=11940 rpm) 0.02-0.04-0.06	(S=9549 rpm) 0.02-0.04-0.06	(S=7639 rpm) 0.04-0.06-0.08	(S=6063 rpm) 0.06-0.08-0.10	dry
Al, and non-ferrous metal	100-150 -200	(S=38197 rpm) 0.01-0.02-0.03	(S=29850 rpm) 0.01-0.02-0.04	(S=23873 rpm) 0.01-0.02-0.04	(S=19098 rpm) 0.02-0.03-0.05	(S=15157 rpm) 0.02-0.04-0.06	emulsion

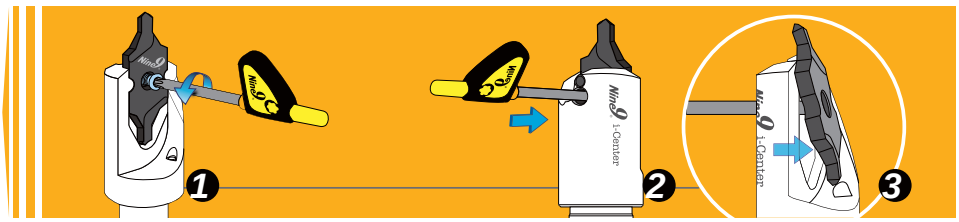
Ø4~Ø10 (#5~#10) >>

Workpiece material	Vc (m/min.) \ f / d1	f (mm/rev)						Cutting fluid
		IC16		IC20			IC25	
		Ø4 (#5)	Ø5	(#6)	Ø6.3 (#7)	Ø8 (#8)	Ø10 (#10)	
Carbon steel C<0.3%	60-70-80	(S=5570 rpm) 0.08-0.12-0.14	(S=4456 rpm) 0.10-0.12-0.16	(S=3536 rpm) 0.10-0.14-0.16	(S=2785 rpm) 0.12-0.15-0.18	(S=2228 rpm) 0.14-0.18-0.20		emulsion
Carbon steel C>0.3%	50-60-70	(S=4774 rpm) 0.08-0.12-0.14	(S=3819 rpm) 0.10-0.12-0.16	(S=3031 rpm) 0.10-0.14-0.16	(S=2387 rpm) 0.12-0.15-0.18	(S=1909 rpm) 0.14-0.18-0.20		emulsion
Low alloy steel C<0.3%	45-55-65	(S=4376 rpm) 0.06-0.08-0.10	(S=3501 rpm) 0.08-0.10-0.12	(S=2778 rpm) 0.08-0.12-0.14	(S=2188 rpm) 0.10-0.14-0.16	(S=1750 rpm) 0.12-0.16-0.20		emulsion
High alloy steel C>0.3%	40-50-60	(S=3978 rpm) 0.04-0.06-0.08	(S=3183 rpm) 0.06-0.08-0.10	(S=2526 rpm) 0.08-0.10-0.12	(S=1989 rpm) 0.10-0.14-0.16	(S=1591 rpm) 0.10-0.14-0.16		emulsion
Stainless Steel	10-15-25	(S=1194 rpm) 0.02-0.04-0.06	(S=955 rpm) 0.02-0.04-0.06	(S=758 rpm) 0.04-0.06-0.08	(S=597 rpm) 0.04-0.06-0.08	(S=477 rpm) 0.05-0.07-0.10		emulsion internal≥5 bar
Cast iron	50-60-70	(S=4774 rpm) 0.06-0.08-0.10	(S=3819 rpm) 0.08-0.10-0.12	(S=3031 rpm) 0.08-0.12-0.14	(S=2387 rpm) 0.10-0.14-0.16	(S=1909 rpm) 0.12-0.16-0.18		dry
Al, and non-ferrous metal	100-150 -200	(S=11936 rpm) 0.02-0.04-0.06	(S=9549 rpm) 0.04-0.06-0.08	(S=7578 rpm) 0.04-0.06-0.08	(S=5968 rpm) 0.06-0.08-0.10	(S=4774 rpm) 0.06-0.08-0.10		emulsion

- Clamping of the insert



- Unscrew the insert



Nine9® Engraving

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.

Features

High Positive Rake Angle

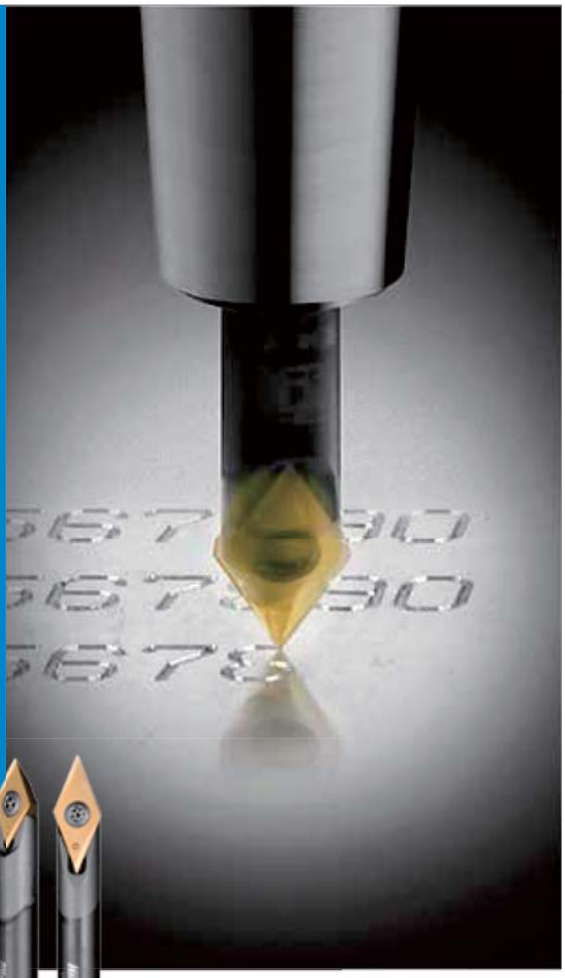
- Indexable insert.
- Suitable for engraving all types of materials, such as plastic, non-ferrous metal, aluminum, copper, carbon steel and stainless steel.

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

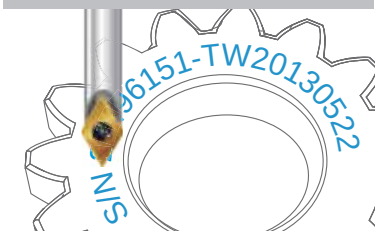
- Designed to run at high speed, up to 40,000 r.p.m.
- Feed rate 0.08mm (0.003") / rev. apply to aluminum; 0.05mm (0.002") / rev. apply to stainless steel.
- Reduces engraving cycle time!



Economical

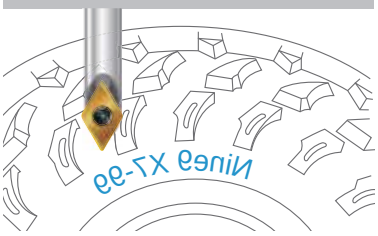
- Each indexable insert has 2 cutting edges.
- No resharpening required. Tool length is unchanged.
- No need to reset after changing insert or cutting edge.
- Excellent repeatability!

Serial number

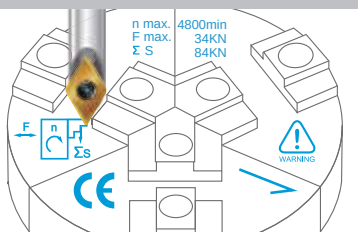


Logo outlines

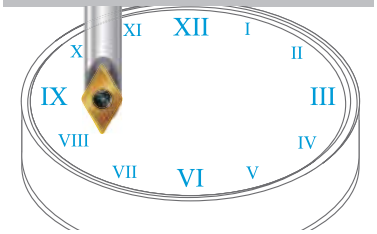
Mold & Die



Product info

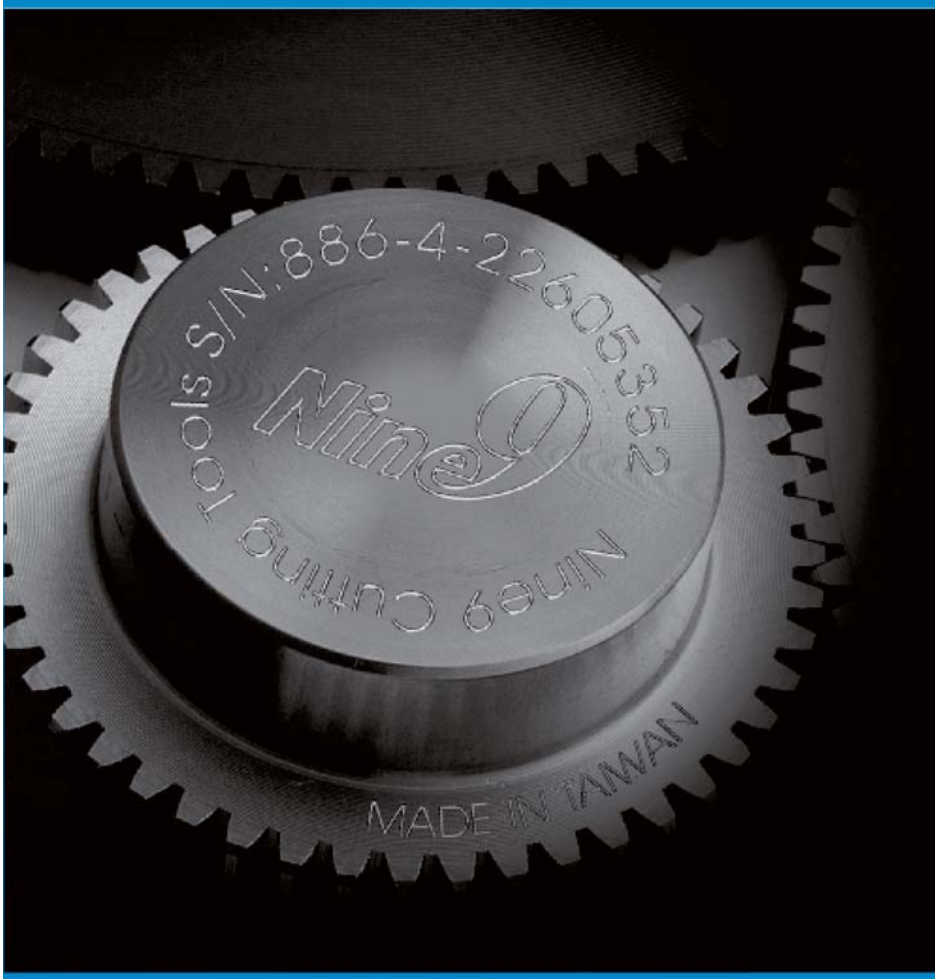


Dial scales



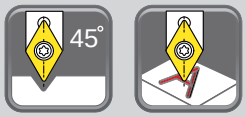
Applications

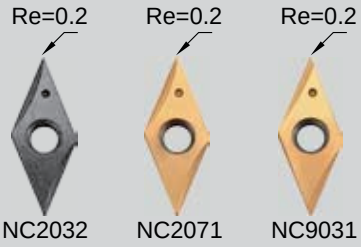
- Serial numbers, product codes, dial scales, signs, logo, graph and almost any character which can be created by the NC programming system.



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

Engraving Tool 45°



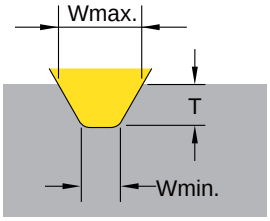


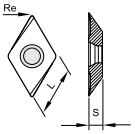
Inserts >>

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 <30HRC, non-ferrous metal and stainless steel.

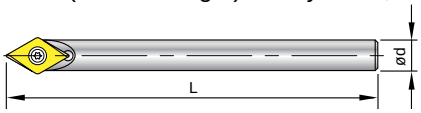
NC9031: • Fully positive ground rake angle, very sharp edge for shallow engraving.
• For non-ferrous metal such as aluminum, brass, copper, titanium, plastic and acrylic.



Code	Parts No.		Coating	Grade		Dimensions			W		T	
						L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
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 designed for shrink-fit holder, engraving machines, high speed cutting.
* • XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.



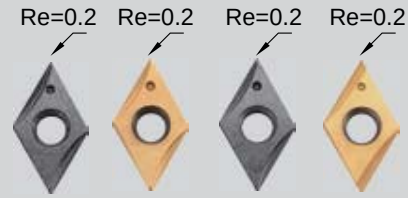
Code	Parts No.	Angle	Ød	L	L1	Screw / Key
691001	00-99619-V045-06	45°	6	40	---	 NS-22044 0.9Nm
* 691002	00-99619-V045-06L			60	---	 NK-T7
* 691003	00-99619-V045-06XL			100	---	

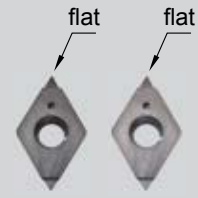
Note: • DC Slim chuck, see page 69.

Starter Kit >>

Code	Parts No.	Shank Ø	Angle	Insert included	Content
691201-4501	00-99619-V045-03K-71	Ø6 00-99619-V045-06	45°	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	
692201-6001	00-99619-V060-03K-71	Ø6 00-99619-V060-06	60°	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	

Engraving Tool 60°





Inserts >>

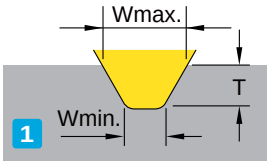
NC2032: • Long tool life
• For all kinds of steel from 30~50 HRC, carbon steel, alloy steel,and cast iron.

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 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.



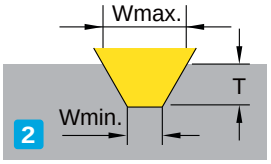
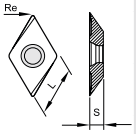
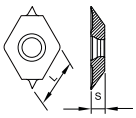


Fig	Code	Parts No.	Coating	Grade		Dimensions			W		T	
						L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
1	0106001	V06006T1W06 NC2071	TiN	K20F		6.35	2.0	0.2	0.65	2.7	0.20	2.0
	0106002	NC2032	TiAlN						0.65		0.20	
	0106003	NC2035	ALDURA						0.65		0.20	
	0106004	NC9031	TiN						0.45		0.05	
Fig	Code	Parts No.	Coating	Grade		Dimensions			W		T	
						L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
2	0106006	V06006T1W03 NC2032	TiAlN	K20F		6.35	2.0	---	0.25	1.1	0.05	0.8
	0106007	NC9036	DLC									

Holder >>

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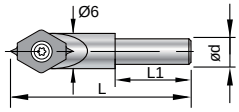
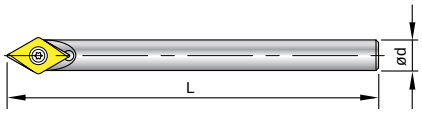
* • XL (100mm length) is only for Al, Al-alloy cutting, unbalanced <0.6gm.

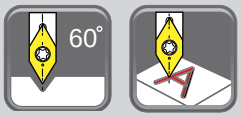


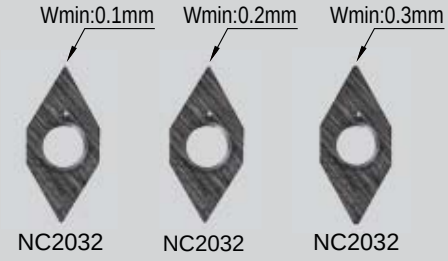


Code	Parts No.	Angle	Ød	L	L1	Screw / Key
692004	00-99619-V060-04	60°	4	30	12	 NS-22044 0.9Nm NK-T7
692001	00-99619-V060-06		6	40	---	
* 692002	00-99619-V060-06L			60	---	
* 692003	00-99619-V060-06XL			100	---	

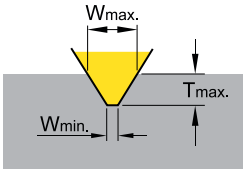
W060 Engraving Tools

NEW



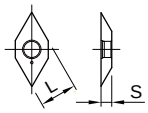


Inserts >>

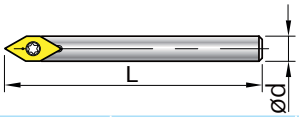


- Limited design, simply for thin or light engraving, used on engraving machine .
- Shank diameter 4mm is same as insert's size. Slim fits!
- Each insert has 2 cutting edges.

NC2032: • Universal grade for all unhardened steel.

New	Code	Parts No.	Angle	Coating		Dimensions L	Dimensions S	Wmin.	Wmax.	Tmax.
	01W2001	W06004S101-NC2032	60°	TiAlN		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

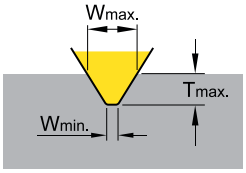
Holder >>



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

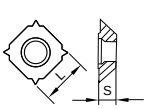
N9MT080201W

Inserts >>

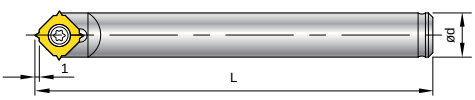


- No need to reset tool length after changing insert or cutting edge.
- Each insert has 4 cutting edges.

NC40: • Universal grade for all unhardened steel.
NC10: • Universal grade for non-ferrous metal and cast iron.

Code	Parts No.		Angle	Coating	Grade		Dimensions L	Dimensions S	Wmin.	Wmax.	Tmax.
013404	N9MT080201W	60-NC40	60°	TiN	K20F		8	2.38	0.1	1.1	0.8
013405		NC40	90°	TiN	K20F		8	2.38	0.1	2.0	0.9
013406		NC10	90°	TiAlN	K20F		8	2.38	0.1	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		

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			

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

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

- Elmulsion 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

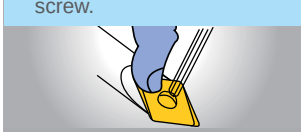
- Place and hold the insert in the insert pocket against the positioning side.
- See illustration below:

• Step-1

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

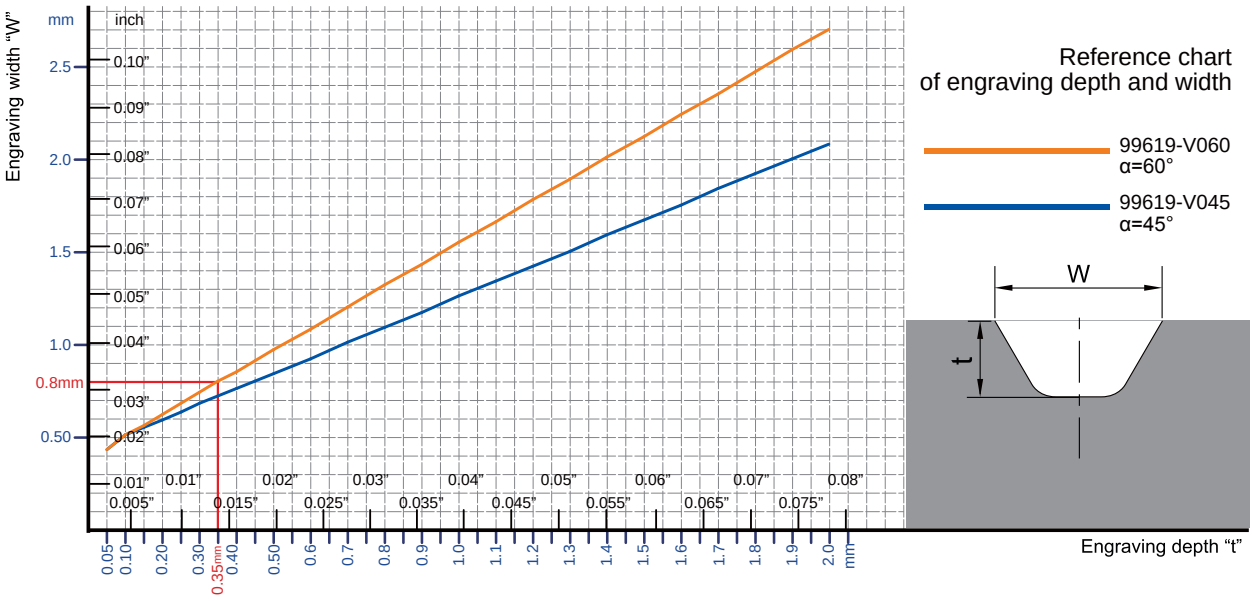
Product

Cutting Data

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 >>



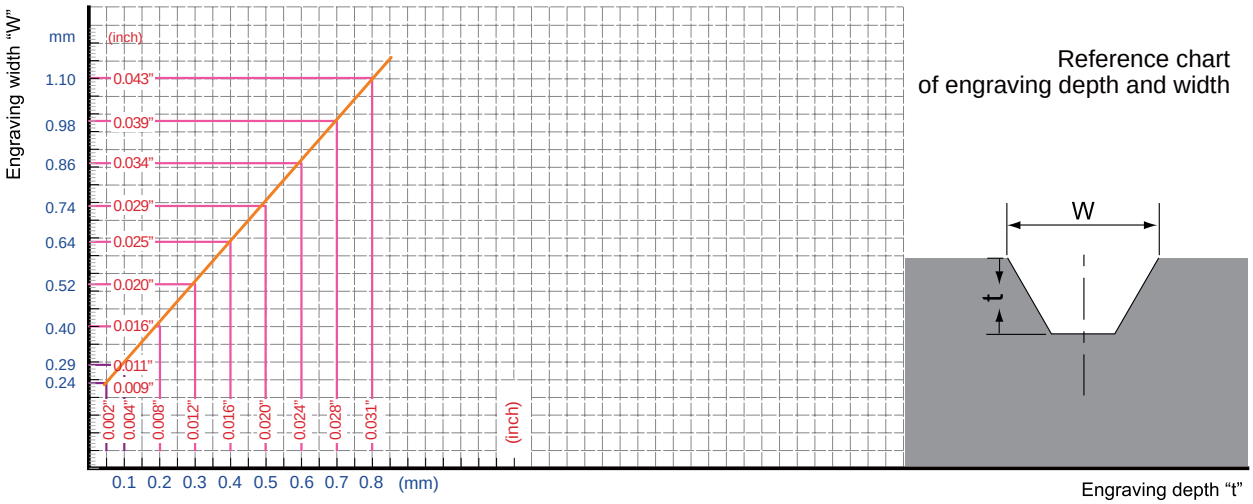
Work Material	S RPM	f (mm/rev.)	Grade of Insert
Carbon steel	5000~40000	0.008~0.05	NC2071,NC2032
Alloy steel	5000~40000	0.008~0.03	NC2032,NC2071
Stainless Steel	5000~40000	0.008~0.05	NC2071,NC9031
Cast iron	5000~40000	0.008~0.03	NC2032
Aluminum≧Non-Ferrous Metal	5000~40000	0.008~0.08	NC2071,NC9031
Hardened 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
Cast iron	0.8	0.6	0.3	0.2	0.1	—	—	0.1
Aluminum≧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

Cutting Data

V060 T1W03 >>

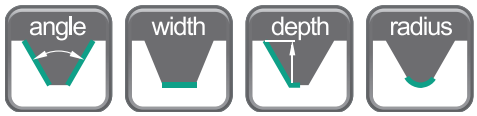


Work Material	S RPM	f (mm/rev.)	Grade of Insert
Carbon steel C<0.3%	8000 ~ 40000	0.005 ~ 0.010	NC2032
Carbon steel C>0.3%	8000 ~ 40000	0.005 ~ 0.015	NC2032
Alloy steel	6000 ~ 35000	0.005 ~ 0.010	NC2032
Stainless Steel	8000 ~ 35000	0.003 ~ 0.010	NC9036
Cast iron	6000 ~ 35000	0.005 ~ 0.015	NC2032
Aluminum	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
Cast 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

Engraving X060 >>



Features

- **Custom forms based on your specification of angle, width, depth and corner radius.**

- **Economical**
  - Each indexable insert has 2 cutting edges.
  - No resharpening required. Tool length is unchanged.
  - No need to reset after changing insert or cutting edge.

Insert >>

- Minimum width of bottom : 0.1mm.
- Angle is possible from 10° up to 120°, related to the minimum width.
- Replace solid carbide engraving tool and ball nose end mill.

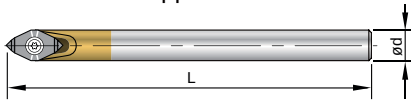
Angled form	Radius angled form	Radius form
		

Inserts Grade	Coating	Carbide	Material	P	M	K	N	H	S
NC2071	TiN	K20F	For all kind of steel < 30 HRC.	◎	●		◎		
NC2032	TiAlN	K20F	For all kind of steel from 30-50HRC, carbon steel, alloy steel and casting iron.	●	○	●			
NC2035	ALDURA	K20F	For steel with heat treatment up to 56 HRC.	◎		○		●	
NC9036	DLC	K20F	For non-ferrous metal, Al, Al-alloy, Brass, copper and long cutting chip metal.		◎		●		◎

●Best ◎Suit ○Possible

Holder >>

- One holder supports the entire X060 series of engraving inserts.



Steel Type

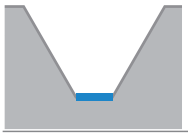
Carbide Type

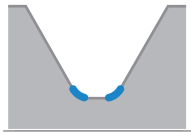
Code	Parts No.	Ød	L	Screw	Key
69X001	00-99619-X060-06	6	40	 NS-22044 0.9Nm	 NK-T7
69X002	00-99619-X060-06L	6	60		

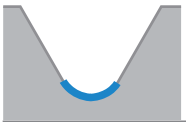
Enquiry Example >> X060 A 30 W 030 S - NC2032

Series	Angle	Bottom Form	Bottom Width	Depth	Corner Shape	Insert Grade
X060	A 30 from 10°~120°	☑ W ☐ R	030	T 0.05	☑ S Flat ☐ R Radius ------	☑ NC2032 ☐ NC2035 ☐ NC9036 ☐ NC2017

Profile Example >>

Angled form	Angle	Bottom Form	Bottom Width	Corner Shape
  	30°	W	0.30	S

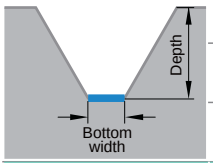
Radius angled form	Angle	Bottom Form	Bottom Width	Corner Shape
  	60°	W	0.50	R

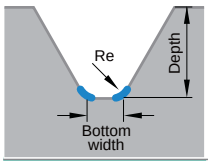
Radius form	Angle	Bottom Form	Radius
  	60°	R	0.50

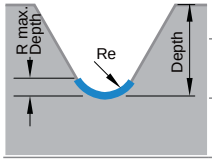
Comment	
Angle	Possible from 10° up to 120°
Bottom Form	**W** for flat shape or **R** for radius shape
Bottom Width	Bottom Width of engraving. Minimum width of bottom: 0.1 mm or 0.005”
Depth	Depth of engraving
Corner Shape	S for flat shape or R for radius shape
Grade	Refer to previous page

Developed inserts (Non-stock)

●Best ◎Suit ○Possible

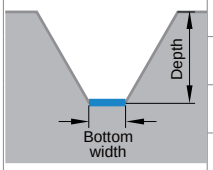
Angled form	Developed Non-Stock	Angle	Coating	Re	Bottom width	Depth	P	M	K	N	H	S
	X060A30W051S-NC2032	30°	TiALN	–	0.508	2.0	●	○	●			
	X060A60W020S-NC9036	60°	DLC	–	0.2	1.2		◎		●		◎
	X060A60W030S-NC9036				0.3	2.0		◎		●		◎

Radius angled form	Developed Non-Stock	Angle	Coating	Re	Bottom width	Depth	P	M	K	N	H	S
	X060A30W040R-NC9036	30°	DLC	0.08	0.4	2.0		◎		●		◎
	X060A45W010R-NC2035	45°	ALDURA	0.02	0.1	1.5	◎		○		●	
	X060A90W030R-NC2032	90°	TiALN	0.06	0.3	0.5	●	○	●			

Radius form	Developed Non-Stock	Angle	Coating	Re	Rmax. Depth	Depth	P	M	K	N	H	S
	X060A60R040-NC2035	60°	ALDURA	0.4	0.2	1.0	◎		○		●	
	X060A60R040-NC2071		TiN	0.4	0.2	1.0	◎	●		◎		
	X060A60R050-NC2035		ALDURA	0.5	0.25	1.0	◎		○		●	

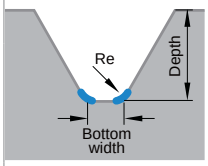
Developed inserts (Non-stock)

●Best ◎Suit ○Possible

Angled form	Developed Non-Stock	Angle	Coating	Re	Bottom width	Depth	P	M	K	N	H	S
	X060A10W025S-NC9036	10°	DLC	–	0.25	0.5		◎		●		◎
	X060A20W010S-NC2032	20°	TiALN	-	0.10	0.6	●	○	●			
	X060A20W025S-NC2032		TiALN	–	0.25	1.0	●	○	●			
	X060A20W030S-NC2032		TiALN	–	0.30	2.0	●	○	●			
	X060A20W035S-NC2032		TiALN	–	0.35	1.0	●	○	●			
	X060A20W050S-NC2032		TiALN	–	0.50	1.0	●	○	●			
	X060A20W100S-NC2032		TiALN	–	1.00	1.0	●	○	●			
	X060A30W010S-NC2032	30°	TiALN	–	0.10	1.5	●	○	●			
	X060A30W010S-NC2035		ALDURA	–	0.10	1.5	◎		○		●	
	X060A30W030S-NC2032		TiALN	–	0.30	2.0	●	○	●			
	X060A30W040S-NC2032		TiALN	–	0.40	1.0	●	○	●			
	X060A30W051S-NC2032		TiALN	–	0.51	2.0	●	○	●			
	X060A30W100S-NC2032		TiALN	–	1.00	1.0	●	○	●			
	X060A40W010S-NC9036	40°	DLC	–	0.10	1.0		◎		●		◎
	X060A40W015S-NC9036		DLC	–	0.15	1.5		◎		●		◎
	X060A40W025S-NC2032		TiALN	–	0.25	1.0	●	○	●			
	X060A50W007S-NP9001	50°	-	–	0.07	1.0		◎		●		◎
	X060A60W010S-NC2032	60°	TiALN	–	0.10	0.5	●	○	●			
	X060A60W010S-NC9036		DLC	–	0.10	0.5		◎		●		◎
	X060A60W015S-NC9036		DLC	–	0.15	0.5		◎		●		◎
	X060A60W020S-NC2032		TiALN	–	0.20	1.2	●	○	●			
	X060A60W020S-NC9036		DLC	–	0.20	1.2		◎		●		◎
	X060A60W030S-NC2032		TiALN	–	0.30	2.0	●	○	●			
	X060A60W030S-NC9036		DLC	–	0.30	2.0		◎		●		◎
	X060A60W040S-NC9036		DLC	–	0.40	1.0		◎		●		◎
	X060A60W050S-NC2032		TiALN	–	0.50	1.0	●	○	●			
	X060A60W050S-NC9036		DLC	–	0.50	1.0		◎		●		◎
	X060A60W070S-NC2032		TiALN	–	0.70	1.0	●	○	●			
	X060A60W070S-NP9001		-	–	0.70	2.0		◎		●		◎
	X060A60W075S-NC9036		DLC	–	0.75	1.0		◎		●		◎
	X060A60W090S-NC9036		DLC	–	0.90	1.0		◎		●		◎
	X060A60W100S-NC2032		TiALN	–	1.00	1.0	●	○	●			
	X060A60W110S-NC9036		DLC	–	1.10	1.0		◎		●		◎
	X060A66W030S-NC2032	66°	TiALN	–	0.30	1.0	●	○	●			
	X060A70W020S-NC2032	70°	TiALN	–	0.20	1.0	●	○	●			
	X060A90W015S-NC9036	90°	DLC	–	0.15	1.0		◎		●		◎
	X060A90W030S-NC9036		DLC	–	0.30	1.0		◎		●		◎
	X060A90W050S-NC9036		DLC	–	0.50	1.0		◎		●		◎
	X060A90W080S-2T-NC9036		DLC	–	0.80	1.8		◎		●		◎

Developed inserts (Non-stock)

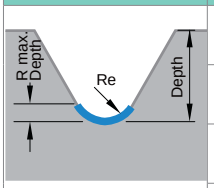
● Best ◎ Suit ○ Possible

Radius angled form	Developed Non-Stock	Angle	Coating	Re	Bottom width	Depth	P	M	K	N	H	S
	X060A10W020R-NC2035	10°	ALDURA	0.04	0.20	0.5	◎		○		●	
	X060A30W040R-NC2032	30°	TiALN	0.08	0.40	2.0	●	○	●			
	X060A30W040R-NC9036		DLC	0.08	0.40	2.0		◎		●		◎
	X060A30W040R-NC2038		TiCN	0.08	0.40	2.0	◎	●		◎		
	X060A35W010R-NC2035	35°	ALDURA	0.02	0.10	2.0	◎		○		●	
	X060A45W010R-NC2035	45°	ALDURA	0.02	0.10	1.5	◎		○		●	
	X060A45W020R-NC2032		TiALN	0.04	0.20	1.2	●	○	●			
	X060A45W040R-NC2038		TiCN	0.08	0.40	2.0	◎	●		◎		
	X060A45W040R-NC9036		DLC	0.08	0.40	2.0		◎		●		◎
	X060A45W040R-NP9001		-	0.08	0.40	2.0		◎		●		◎
	X060A50W020R-NC9036	50°	DLC	0.04	0.20	1.5		◎		●		◎
	X060A55W043R-NC2032	55°	TiALN	0.20	0.43	0.75	●	○	●			
	X060A55W070R-NC2032		TiALN	0.14	0.70	2.0	●	○	●			
	X060A60W010R-NC2032	60°	TiALN	0.02	0.10	1.0	●	○	●			
	X060A60W012R-NC2032		TiALN	0.07	0.12	1.5	●	○	●			
	X060A60W020R-NC2032		TiALN	0.04	0.20	1.2	●	○	●			
	X060A60W034R-NC9036		DLC	0.07	0.34	1.5		◎		●		◎
	X060A60W040R-NC2032		TiALN	0.08	0.40	2.0	●	○	●			
	X060A60W040R-NC2038		TiCN	0.08	0.40	2.0	◎	●		◎		
	X060A60W040R-NC9036		DLC	0.08	0.40	2.0		◎		●		◎
	X060A60W040R-NP9001		-	0.08	0.40	2.0		◎		●		◎
	X060A60W051R-NC2032		TiALN	0.10	0.51	2.0	●	○	●			
	X060A60W080R-NC2032		TiALN	0.20	0.80	1.7	●	○	●			
	X060A60W090R-NC2032		TiALN	0.18	0.90	1.5	●	○	●			
	X060A70W020R-NC2035	70°	ALDURA	0.04	0.20	1.0	◎		○		●	
	X060A80W060R-NC9036	80°	DLC	0.12	0.60	1.3		◎		●		◎
	X060A90W010R-NC2032	90°	TiALN	0.02	0.10	0.7	●	○	●			
	X060A90W030R-NC2032		TiALN	0.06	0.30	0.5	●	○	●			

2016.08.31

Developed inserts (Non-stock)

●Best ◎Suit ○Possible

Radius form	Developed Non-Stock	Angle	Coating	Re	Rmax. Depth	Depth	P	M	K	N	H	S
	X060A20R010-NC9036	20°	DLC	0.10	0.08	0.50		◎		●		◎
	X060A21R060(T1.2)-NC2032	21°	TiALN	0.60	0.49	1.20	●	○	●			
	X060A30R010-NC2032	30°	TiALN	0.10	0.07	1.00	●	○	●			
	X060A30R010-NC9036		DLC	0.10	0.07	2.00		◎		●		◎
	X060A30R030-NC2032		TiALN	0.30	0.22	1.50	●	○	●			
	X060A30R030-NC2071		TiN	0.30	0.22	1.50	◎	●		◎		
	X060A325R06(T1.2)-NC2032	32.5°	TiALN	0.60	0.43	1.20	●	○	●			
	X060A40R040-NC2032	40°	TiALN	0.40	0.26	1.00	●	○	●			
	X060A40R080-NC2032		TiALN	0.80	0.53	1.50	●	○	●			
	X060A45R010-NC2032	45°	TiALN	0.10	0.06	1.00	●	○	●			
	X060A45R010-NC2035		ALDURA	0.10	0.06	1.00	◎		○		●	
	X060A45R013-NC2032		TiALN	0.13	0.08	0.28	●	○	●			
	X060A60R010-NC2032	60°	TiALN	0.10	0.05	0.20	●	○	●			
	X060A60R010-NC2035		ALDURA	0.10	0.05	0.2	◎		○		●	
	X060A60R012-NC2032		TiALN	0.12	0.06	1.00	●	○	●			
	X060A60R012-NC2071		TiN	0.12	0.06	1.00	◎	●		◎		
	X060A60R012-NP9001		-	0.12	0.06	1.00		◎		●		◎
	X060A60R040-NC2032		TiALN	0.40	0.20	1.00	●	○	●			
	X060A60R040-NC2035		ALDURA	0.40	0.20	1.00	◎		○		●	
	X060A60R040-NC2071		TiN	0.40	0.20	1.00	◎	●		◎		
	X060A60R050-NC2035		ALDURA	0.40	0.25	1.00	◎		○		●	
	X060A60R060-NC2032		TiALN	0.60	0.30	1.70	●	○	●			
	X060A90R010-NC2035	90°	ALDURA	0.10	0.03	0.60	◎		○		●	
	X060A90R010-NC2071		TiN	0.10	0.03	0.60	◎	●		◎		
	X060A90R010-NC9036		DLC	0.10	0.03	0.60		◎		●		◎

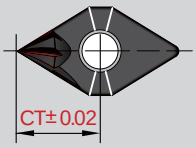
2016.08.31

NC Deburring

Patent Pending

Features >>

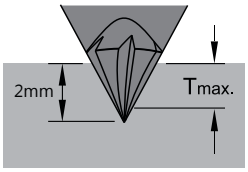
- High feed rate for high speed deburring on CNC machines.
- Indexable type ensures the relative position of deburring.

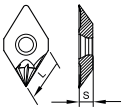


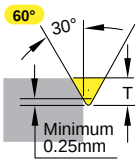
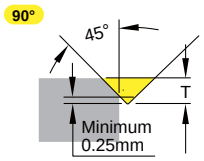
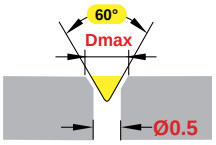
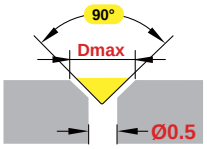
NC2032

Inserts >>

- Smallest counter sink diameter Ø0.5 mm.
- Ideal for fine hole deburring.
- Each insert has one cutting edge.
- Using same tool holder of X060 engraving tool.
- Indexable type. Relative position of deburring depth and diameter are accurate.
- TiAlN coated carbide insert can stand very long life.

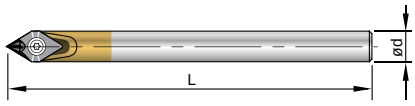


Code	Parts No.	Angle	Coating	Grade		Dimensions			Tmax.	AP	
						L	S	Re		min.	max.
01X601	X060A60T6-NC2032	60°	TiAlN	K20F		6	2.0	--	1.75	0.1	1.0
01X901	X060A90T6-NC2032	90°				6	2.0	--	1.75	0.1	1.0

Deburring		Counter sinking	
			
Tmin. :0.25 Tmax.:1.75	Tmin. :0.25 Tmax.:1.75	Dmax.:2.0	Dmax.:3.5

Holder >>

- Provides high rigidity and anti-vibration.
- One holder supports the entire X060 series of engraving inserts.



Steel Type

Carbide Type

Code	Parts No.	Ød	L	Screw	Key
69X001	00-99619-X060-06	6	40	 NS-22044 0.9Nm	 NK-T7
* 69X002	00-99619-X060-06L	6	60		

Starter Kit >>

Code	Parts No.	Shank Ø	Angle	Insert included	Content
69X202-X601	00-99619-X060-DB60-02K-32	6	60°	X060A60T6-NC2032	1 x Holder 1 x T7 Key 2 x inserts
69X202-X901	00-99619-X060-DB90-02K-32		90°	X060A90T6-NC2032	

Chamfer Mill 45° >>

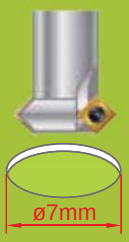
Nine9 chamfer mill
is designed for chamfering and countersinking with an indexable insert.
The insert is a specifically designed for use in high speed machining ; the multiple flutes provide for increased feed rate, optimizing performance and reducing cutting time.

Features

Ultra high speed and feed rate is the biggest advantage of Nine9 Chamfer Mills.
It is not a traditional chamfer tool, it runs 4 times faster in cutting speed and 10 times higher in feed rate. It is the most efficient tool you ever met.

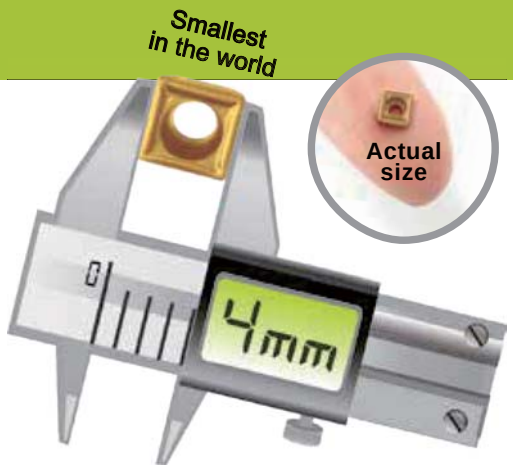
Excellent Repeatability >>

- Smallest insert in the world for chamfering mill.
- Smallest Indexable counter sink, diameter ø7 mm.
- The insert is dual-relief angle, specially edge honning and optimized coated for high cutting speed.
- Optimized the number of teeth on the holder to achieve higher feed rate.

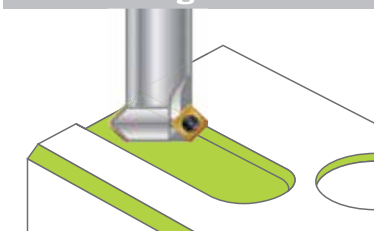


Applications >>

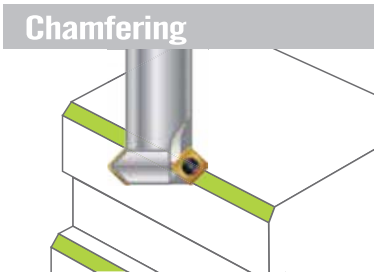
- 90° counter sink and 45° chamfering.
- For counter sink, circular chamfering, contour chamfering and face milling.



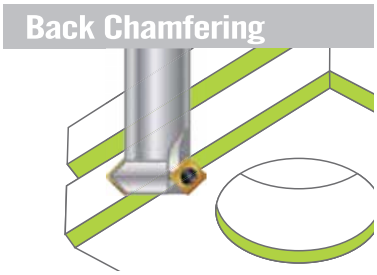
Face Milling



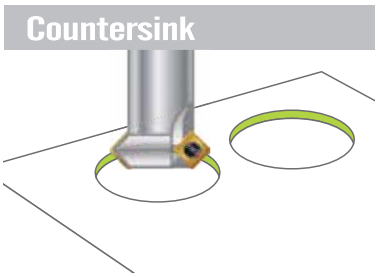
Chamfering



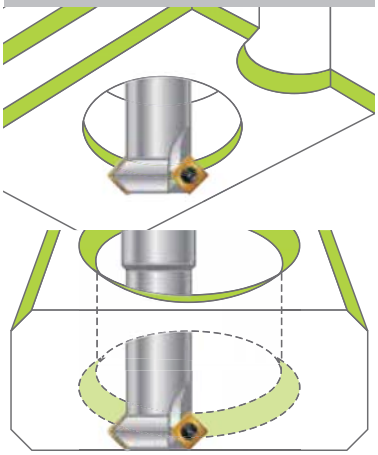
Back Chamfering



Countersink



Back Circular Chamfering



▲ For front and back chamfering.
Eliminates 2nd operation or deburring time.

Indexable Chamfer Mill

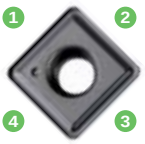
Features >>

- Benefitting from the specially ground dual-relief insert and optimized coating, higher feed rates and cutting speeds can be achieved on chamfering operations.
- Each insert has 4 cutting edges, reducing cost of inserts.
- Fine edge honning cutting edge, good chip breaking condition and long tool life.

Inserts >>

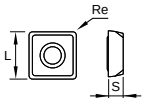
NC2032:
- AlTiN coating, very long tool life.
- For carbon steel, alloy steel, cast iron and hardened steel up to 56HRC
- Each insert has 4 cutting edges.

NC9071:
- TiN coating, very sharp cutting edge produces excellent surface finish
- For non ferrous metal, aluminum, aluminum-alloy, brass, copper and stainless steel.
- Each insert has 4 cutting edges.



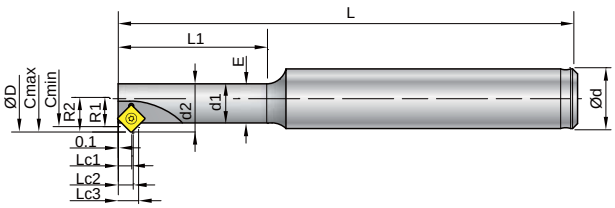
NC2032

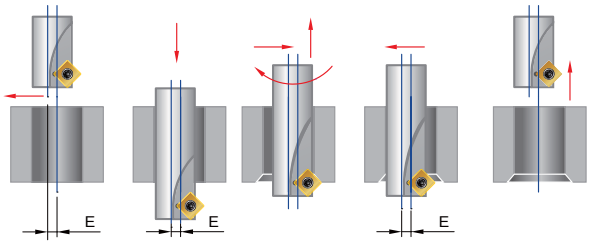
NC9071

Code	Parts No.	Coating	Grade		Dimensions			Screw	Key
	Code of insert				L	S	Re		
021401	N9GX04T002 NC2032	AlTiN	K20F		4.0	1.8	0.2	NS-18037 0.6Nm	NK-T6
021402	N9GX04T002 NC9071	TiN							
023401	N9GX060204 NC2032	AlTiN			6.35	2.38	0.4	NS-22055 0.9Nm	NK-T7
023402	N9GX060204 NC9071	TiN							
025401	N9GX090308 NC2032	AlTiN			9.52	3.18	0.8	NS-30072 2.0Nm	NK-T9
025402	N9GX090308 NC9071	TiN							

99616-C02, C04, C06 >>

- Made from hot working steel and hardened.
- Elliptical necked bar to optimize the tool strength.

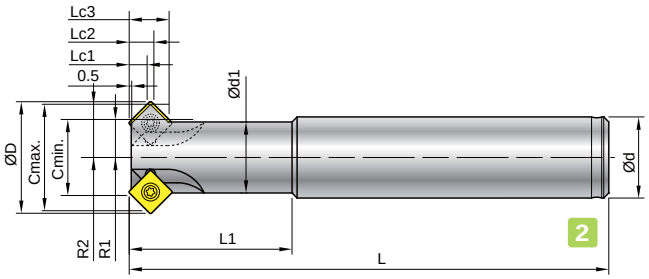




Code	Parts No.	Type	Cmin ø	Cmax ø	ød	ød1	ød2	øD	R1	R2	L	L1	Lc1	Lc2	Lc3	E	◌z	insert Screw / Key
701003	00-99616-C02	BC10-C02-80	6.8	8.8	10	5.25	6.5	9	3.4	4.4	80	20	2.56	2.93	3.93	1.25	1	
701004	00-99616-C04	BC12-C04-100	8.5	10.8	12	6.45	8	11.1	4.25	5.4	100	25	2.51	2.98	4.13	1.55	1	N9GX04T002 NS-18037 0.6Nm NK-T6
701005	00-99616-C06	BC12-C06-100	10.26	13.2	12	7.88	9.75	13.5	5.13	6.6	100	30	2.51	2.98	4.45	1.88	1	

99616-C10~99616-C52 >>

• Made from tool steel.



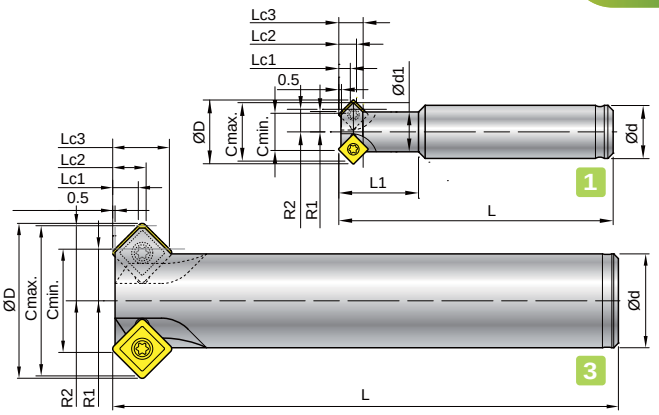
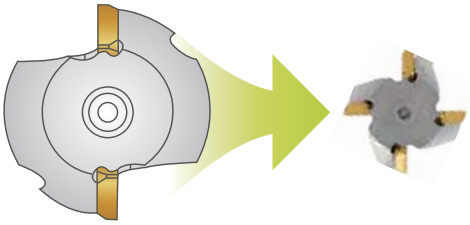


Fig	Code	Parts No.	Type	Cmin ø	Cmax ø	ød	ød1	øD	R1	R2	L	L1	Lc1	Lc2	Lc3	○z	insert Screw / Key
1	701001	00-99616-C10	BC10-C07-60	7	11	10	7.5	12	3.8	4.3	60	15	2.6	2.9	4.6	2	N9GX04T002 NS-18037 0.6Nm NK-T6
2	701002	00-99616-C20	BC12-C11-100	11	16	12	9.6	16.2	5.9	8	100	25	2.6	2.9	5.0	4	
2	703001	00-99616-C30	BC16-C15-120	15	21	16	14	22	7.5	11.5	120	40	3.5	4.9	7.9	4	N9GX060204 NS-22055 0.9Nm NK-T7
2	703002	00-99616-C40	BC20-C19-130	19	25	20	18	26	9.5	12.5	130	50	3.5	4.9	7.9	4	
3	705001	00-99616-C50	BC20-C22-130	22	32	20	--	33	11	16	130	--	5.5	7.1	12.1	4	N9GX090308 NS-30072 2.0Nm NK-T9
2	705002	00-99616-C52	BC25-C22-180	22	32	25	20	33	11	16	180	80	5.5	7.1	12.1	4	

Starter Kit >>

Fig	Code	Parts No.	Insert included	Holder included	Content
1	701201-1401	00-99616-C1020-32	N9GX04T002-NC2032	00-99616-C10 + 00-99616-C20	2 x holders + 10 inserts + 1 key
	701201-1402	00-99616-C1020-71	N9GX04T002-NC9071		
2	703201-3401	00-99616-C3040-32	N9GX060204-NC2032	00-99616-C30 + 00-99616-C40	
	703201-3402	00-99616-C3040-71	N9GX060204-NC9071		
3	705201-5401	00-99616-C5052-32	N9GX090308-NC2032	00-99616-C50 + 00-99616-C52	
	705201-5402	00-99616-C5052-71	N9GX090308-NC9071		

Performance



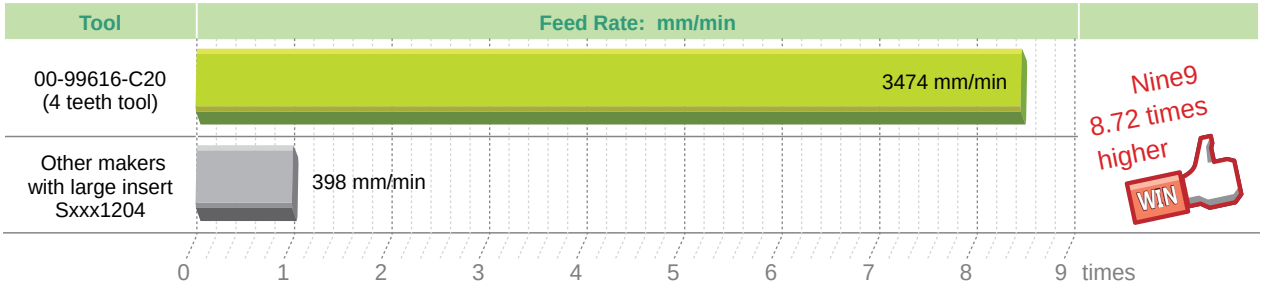
Feed Rate =
Feed per Tooth x Spindle Speed x **No. of Flute** mm/min.

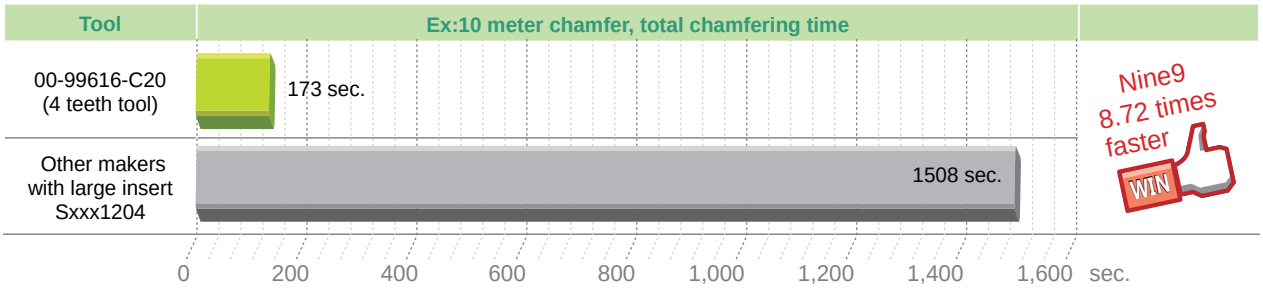
UP **Spindle Speed** = $\frac{\text{Cutting Speed x 1000}}{\pi \text{ x Cmin.}}$

Test Result >> Example 1

• Chamfer tool with larger insert(Sxxx1204) and Nine9 N9GX04 insert.

Tool			
Cutting data		**Nine 9 Chamfer mills**	**Other makers with Large insert**
Chamfering		1 mm	1 mm
Feed rate	**mm/rev.**	0.1	0.1
Dia. of cutter	**mm**	11	32
Teeth of cutter		4	2
Cutting Speed Vc	**m/min.**	300	200
Spindle Speed	**r.p.m.**	8685	1990
Feed rate	**mm/min**	3474	398





Cutting Data

99616-C02, C04, C06 Cutting Data >>

Workpiece Material		Grade of insert	Cutting Speed VC m/min.	Feed Rate mm / tooth
Material Group	Sample Code (JIS)			N9GX04T002 Max. Chamfering 1.5mm
Carbon steel C<0.3%	SS400	NC9071	60-80-120	0.02 ~ 0.07
Carbon steel C>0.3%	S50C, P5	NC2032	60-80-120	0.02 ~ 0.07
Low alloy steel C<0.3%	SCM420	NC9071	60-80-120	0.01 ~ 0.04
High alloy steel C>0.3%	SKD11	NC2032	60-80-120	0.02 ~ 0.07
Stainless Steel	SUS304	NC9071	30-60-100	0.01 ~ 0.04
Cast iron	FC25	NC2032	60-80-120	0.02 ~ 0.06
Al, and non-ferrous metal	A6061	NC9071	80-100-150	0.03 ~ 0.10

99616-C10~C52 Cutting Data >>

Workpiece material		Grade of insert	Cutting Speed Vc m/min.	Feed rate mm / tooth		
				N9GX04T002	N9GX060204	N9GX090308
Material Group	Sample Code (JIS)			Max. Chamfering 1.5mm	Max. Chamering 2.5mm	Max. Chamfering 4mm
Carbon steel C<0.3%	SS400	NC9071	150-250-350	0.06~0.12	0.10~0.25	0.10~0.25
Carbon steel C>0.3%	S50C,P5	NC2032	200-300-400	0.06~0.10	0.10~0.20	0.10~0.25
Low alloy steel C<0.3%	SCM420	NC9071	180-240-260	0.06~0.10	0.10~0.20	0.10~0.20
High alloy steel C>0.3%	SKD11	NC2032	120-150-200	0.06~0.10	0.10~0.15	0.10~0.15
Stainless Steel	SUS304	NC9071	120-150-180	0.06~0.10	0.06~0.15	0.10~0.20
Casting iron	FC25	NC2032	120-150-180	0.06~0.10	0.10~0.15	0.10~0.20
Al, and non-ferrous metal	A6061	NC9071	200-400-600	0.06~0.15	0.10~0.25	0.10~0.25
Hardened steel<50 HRC	SKD61	NC2032	80-90-100	0.06~0.10	0.06~0.12	0.10~0.15

DC Slim Chuck

Extension Adaptor >>

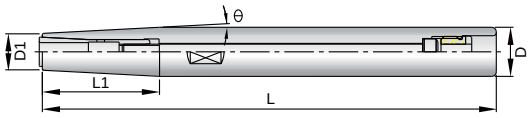
DC-E Collet

45° Engraving Tool

60° Engraving Tool

Spotting
90° Engraving Tool

* Stop Nut

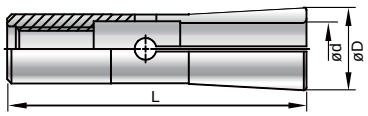


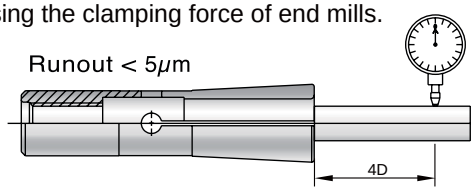
Parts No.	Type of Holder	d	L	L1	øD	D1	θ	Collet	Back Screw	Stop Screw	Hexagon Key	Stop Nut
0-329090-102	ST10-DC4-90	2~4	90	14	12	9	--	DC4	M4 * L60	--	0-301940~632	TP-M8
-112	ST12-DC4-120	2~4	120	38	12	9	3°		M4 * L85	OP-M8		--
0-329090-212	ST12-DC6-120	2~6	120	40	12	14	--	DC6	M5 * L95	--	0-301940~642	TP-M12
-222	ST16-DC6-150	2~6	150	38	16	14	3°		M5 * L100	OP-M10		--
-232	ST20-DC6-200	2~6	200	70	20	14	3°		M5 * L100	OP-M10		--
-242	ST25-DC6-250	2~6	250	115	25	14	3°		M5 * L100	OP-M10	0-301940~643	--
0-329090-322	ST20-DC8-200	3~8	200	28	20	19	2°	DC8	M6 * L120	OP-M12	0-301940~652	--
0-329090-432	ST25-DC10-250	4~10	250	28	25	24	2°	DC10	M8 * L150	OP-M16	0-301940~662	--

* Stop nut is applied when clamping and unclamping tools.

DC-E Collet >>

• The design of DC-E collets is emphasized on increasing the clamping force of end mills.





Type	DC-4E	DC-6E	DC-8E	DC-10E
D	7	9.6	15	19.1
L	31	36	45	52

DC4-E		DC6-E		DC8-E		DC10-E	
Parts No.	Size(mm)	Parts No.	Size(mm)	Parts No.	Size(mm)	Parts No.	Size(mm)
0-300090-102	2.0	0-300090-203	3.0	0-300090-303	3.0	-	-
0-300090-103	3.0	0-300090-204	4.0	0-300090-304	4.0	0-300090-404	4.0
0-300090-104	4.0	0-300090-206	6.0	0-300090-306	6.0	0-300090-406	6.0
				0-300090-308	8.0	0-300090-408	8.0
						0-300090-410	10.0

Extension Bar For NC Spot Drill

Solid Carbide Extension Bar >>

• TiN coated to identify the efficient length.

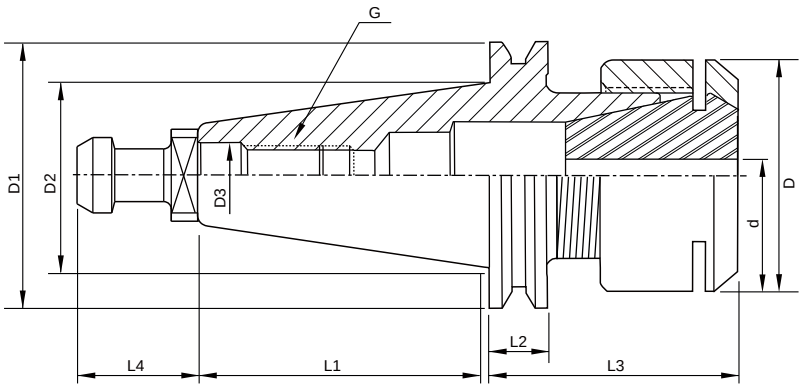
• NC Spot Drill
99616-10-M6 (P.15)
99616-14-M8 (P.17)

Order No.	Parts No.	ØD	T	L	M
00-99801-12W	BC12-100M06W	12	60	100	M6xP1.0
00-99801-14W	BC14-120M08W	14	70	120	M8xP1.25
00-99801-16W	BC16-150M08W	16	80	150	M8xP1.25

ISO 20/25 Tool Holder for Engraving Machine

Tool Holder >>

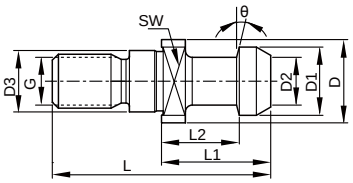
- Runout: 0.01mm (4xD).
- Max. speed: 50,000 r.p.m.
- Applied with pull stud and nut.



Taper Shank	Parts No.	Type	D1	D2	D3	D	L1	L2	L3	L4	G	Collet	Pull Stud	Clamping Nut
ISO20	0-225100-325	ISO20 ER16-R	33	22.2	8.5	22	33	8	30	12	M8	ER16	ISO20-D	CN-ER16R
ISO25	0-235100-425	ISO25 ER20-R	37	25.4	9	30	39.7	8	33	16	M8	ER20	ISO25-L	CN-ER20R

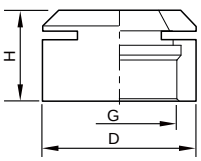
Pull Stud >>

Parts No.	Type	L	L1	L2	D	D1	D2	D3	θ	G	SW
0-220000-150	ISO20-D	26	12	9	12	9	6	8.5	15°	M8	10
0-220000-250	ISO20-L	28	14	10	11	8.5	6	8.5	15°	M8	9
0-230000-150	ISO25-D	28	12	9	13	11	7	9	15°	M8	11
0-230000-250	ISO25-L	32	16	11.5	12	10	7	9	15°	M8	10



Clamping Nut >>

Parts No.	Type	D	H	G
0-205100-302	CN-ER16R	22	19	M19X1.0P
0-205200-402	CN-ER20R	30	25	M25X1.5P



Spring Collet >>

- Concentricity (0.01mm)

Parts No: 300100-3XX	
Size	Range
ER16-3*	3-2
ER16-4	4-3
ER16-5	5-4
ER16-6	6-5
ER16-7	7-6
ER16-8	8-7
ER16-9	9-8
ER16-10	10-9

* Ordering example
ER16-3:300100-3**03**-AA

Parts No: 300100-4XX	
Size	Range
ER20-3	3-2
ER20-4	4-3
ER20-5	5-4
ER20-6	6-5
ER20-7	7-6
ER20-8	8-7
ER20-9	9-8
ER20-10*	10-9
ER20-11	11-10
ER20-12	12-11
ER20-13	13-12

* Ordering example
ER20-10:300100-4**10**-AA

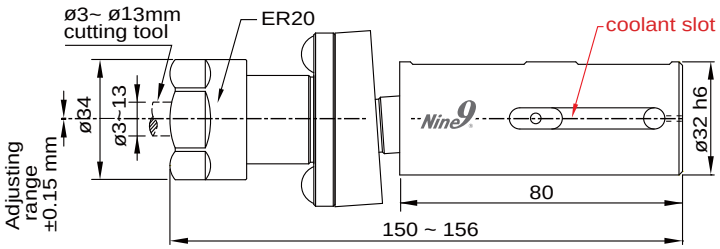
Center Height Adjusting Sleeve

Principle >>

- Designed for adjusting Center Height of center drills, NC spot drills, reamers and taps on the CNC lathes.
- The main body is made from two sleeves. The inner sleeve is to hold and lock the cutting tool.
- Its center is inclined to the outer sleeve. When the inner sleeve is pushed or pulled, the cutting tool's center height is adjusted to lower or higher position.

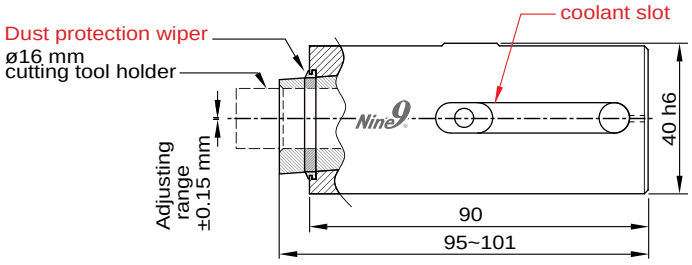
Parts No.:00-99600-320H >>

Type : SB32-IDER20



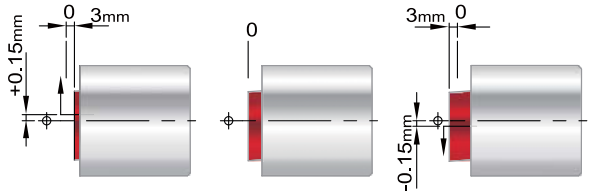
Parts No.:00-99600-400H >>

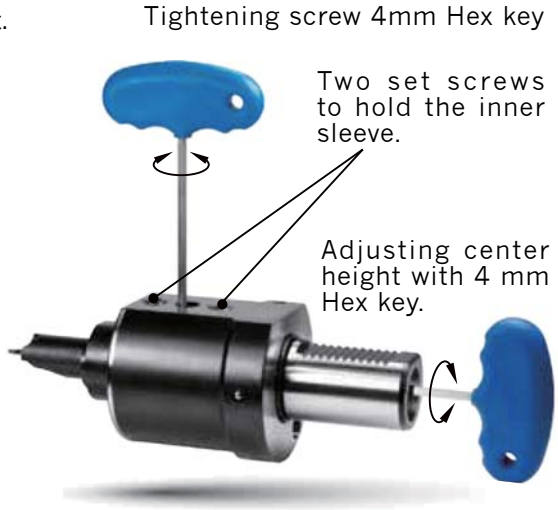
Type : SB32-ID16



Applications >>

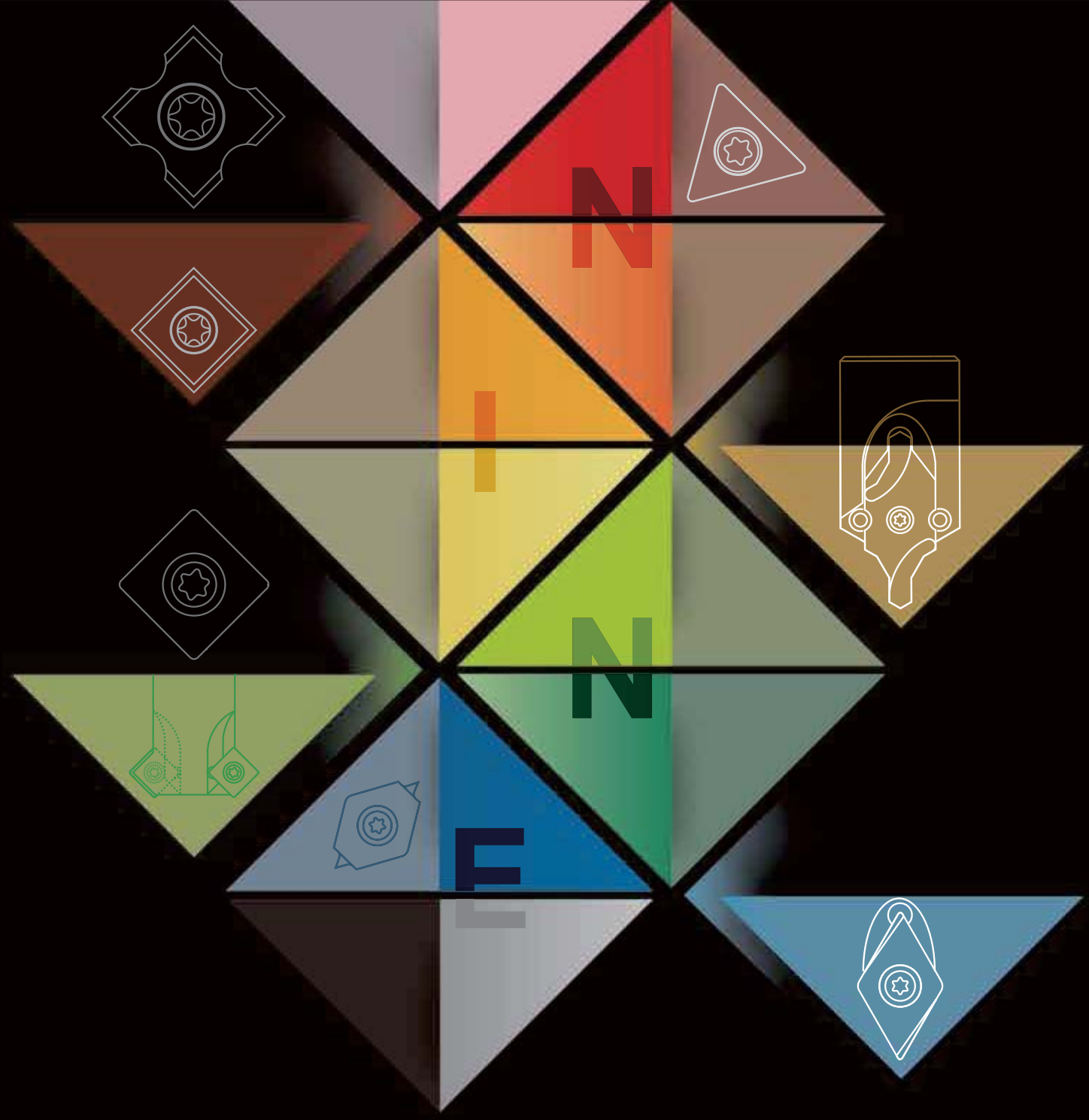
- Used when the CNC lathes need to adjust the center height.
- This sleeve can be clamped by VDI 40, VDI 50 E2 tool holders,and other type of internal turning tool holders.
- Center height adjusting range: ±0.15 mm(.006").
- Total axial movement is 6mm(.236").





You will be interested to know the whole range of Nine9 tools.

The Winner is not necessarily
the one who runs the fastest
but the one who holds on to the last



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