

CUTTING TOOLS & TOOL HOLDERS

Nine9[®]

Cat. 17



Nine9.jic-tools.com.tw





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 industry, 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 >>



Page **08**
NC Spot Drill



Page **24**
Corner Rounding



Page **36**
i - Center



Page **47**
Engraving Tool



Page **52**
NC Deburring















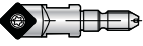







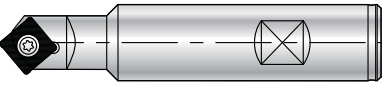



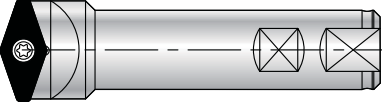







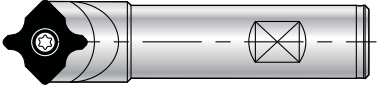

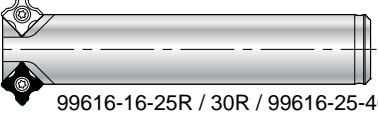




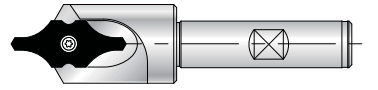

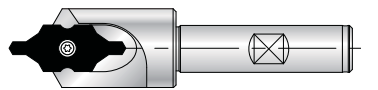

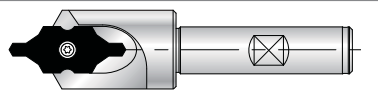

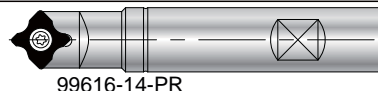













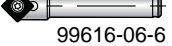

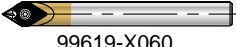



Page **64**
Chamfer Mill



Page **70**
Accessories

- ▶ DC Slim Chuck
- ▶ Extension Bar
- ▶ ISO 20/25 Tool Holder
- ▶ Center Height Adjusting Sleeve

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		11
	 99616-13V	 V9MT12T3	2	13	•	•	•	• Tmin=0.1		
82°	 99619-V082-3/8	 V0820802	2	9	•	•	•	• Tmin=0.1		12
	 99619-V082-5/8	 V08212T3	2	14	•	•	•	• Tmin=0.1		
90°	 99616-06-6	 N9MT05T1	1	6	•	•		• Tmin=0.1		13
	 99616-08-8	 N9MT0602	1	8	•	•	•	• Tmin=0.1		
	 99616-10...	 N9MT0802	2	10	•	•		• Tmin=0.1		14
	 99616-10-M5									
	 99616-14...	 N9MT11T3	3	14	•	•		• Tmin=0.1 (2 Cutting edges)		16
	 99616-14-M8							• Tmin=1.0 (4 Cutting edges)		
	 99616-22	 N9MT1704	3	22	•	•	•			18
	 99616-25-CT28	 N9MT2204	4	25	•	•				19
100°	 99616-20-100		3	16	•	•				
120°	 99616-20-120	 N9MT11T3	3	17	•	•			20	
142°	 99616-20-142...		3	18	•	•				
	 99619-V142...	 V1421604	2	32	•				21	
145° + 90°	 99616-10 / 14 / 22 ...	 WSP / M4-M16	3.3	20	•	•	•		22	

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						25
			R1.0	R3.0		•				26
RC	 99616-22...RC	 N9MT1704RC (2 Cutting edges)	R4.0	R6.0		•				27
R	 99616-16-25R / 30R / 99616-25-40R	 N9MT11T3R (4 Cutting edges)	R1.0	R3.0		•				29
Large 45° Chamfering										
45°	 99616-18...LA  99616-28...LA	 N9MT11T308LA	6	28		•				31
			16	28		•	*	*Side grooving		
Center Drilling / i-Center										
R	 99616-IC...	 DIN332 Form R	1.0	10					•	38
60° + 120°	 99616-IC...	 DIN332 Form A+B	1.0	10					•	38
60°	 99616-IC...	 ANSI 60°	5/64"	3/8"					•	39
PR	 99616-14-PR	 N9MT11T3PR	2.0	3.0					•	41
Engraving Tools										
30° ~ 60°	 99619-X060...	 X060A30 / 45 / 60	0.1	1.39				•		48
45°	 99619-V045...	 V04506T1W	0.45	2.1		•		•		56
60°	 99619-V060...	 V06006T1W	0.25	2.7		•		•		57
60°	 99619-W060...	 W06004S	0.1	1.1		•		•		58
60°	 99616-10...SW	 N9MT0802	0.1	1.1		•		•		59
90°	 99616-10...SW	 N9MT0802	0.1	2.0		•		•		
		 99616-06-6	 N9MT05T1	1.0	6.0		•	•	•	13
NC Deburring										
60°	 99619-X060...	 X060A60T6	0.3	2.0		•				52
90°	 99619-X060...	 X060A90T6	0.5	3.5		•				



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 technology extends tool life dramatically. Nine9-insert helps you to save money and increase productivity.

Products	Grade	Coating	P	M	K	N	H	S
			Steel	Stainless Steel	Cast Iron	Non-Ferrous	Hardened Steel Up to 56 HRC	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

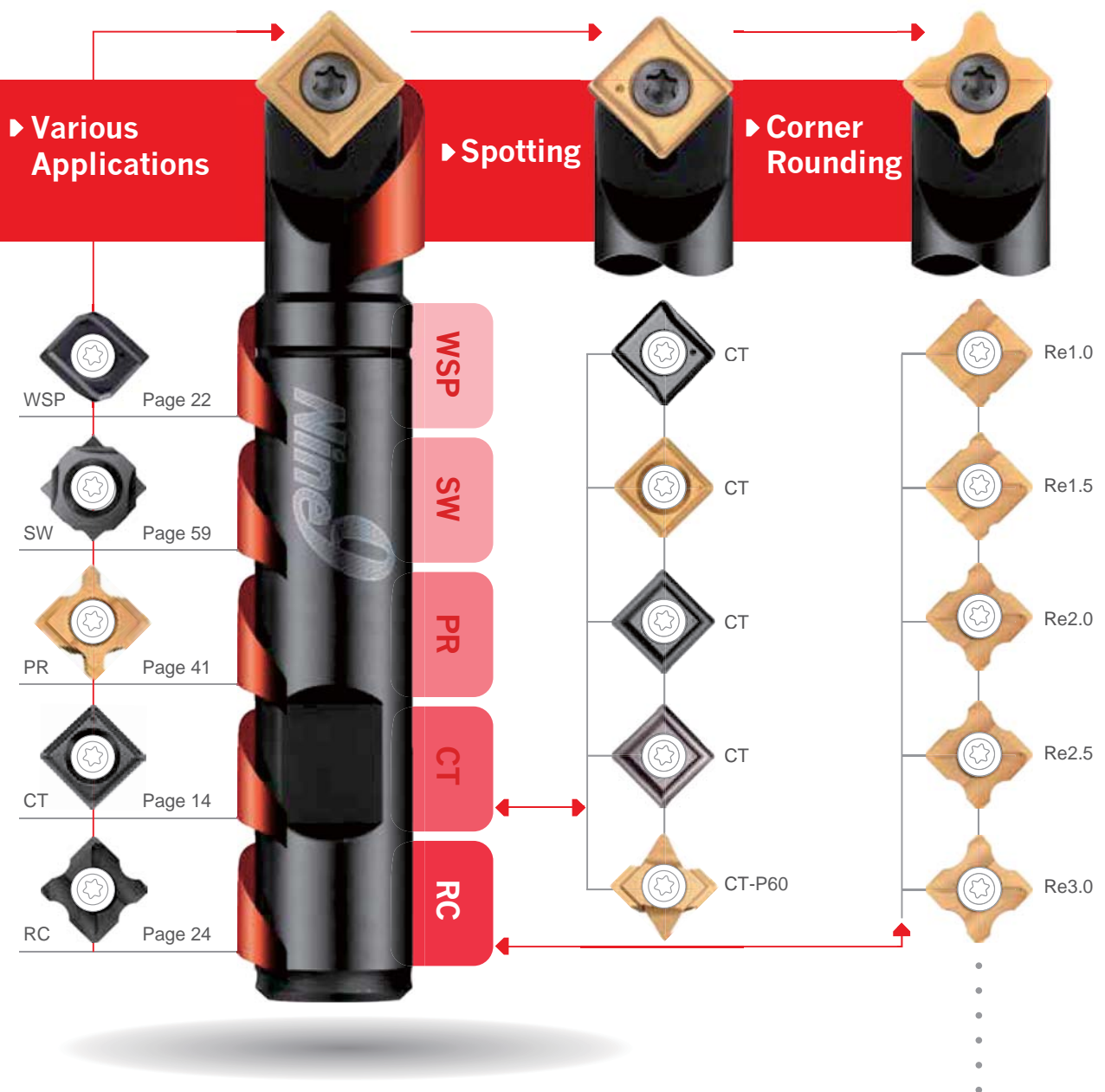


Highly Efficient



Long Tool Life

► Various inserts can fit on the same tool 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 >>


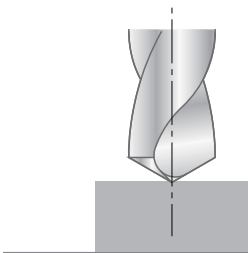
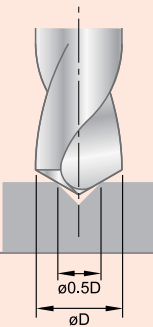
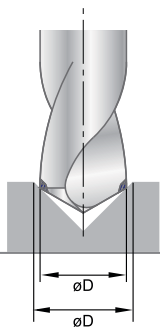
- **Higher feed rate.**

Why? Because the drill is guided at the strongest part of cutting edge.

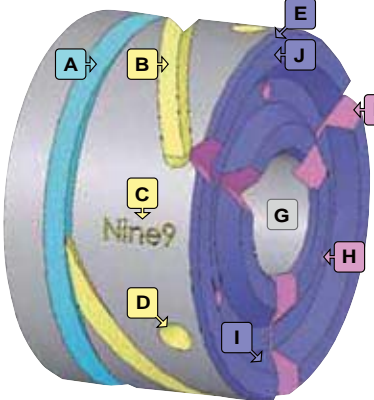
- **Better center position.**

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
<ul style="list-style-type: none"> • Better center position! • Longer tool life! 	<ul style="list-style-type: none"> • Drill has less position accuracy and diameter tolerance. 	<ul style="list-style-type: none"> • Best result! • Higher speed and feed rate. • Better position accuracy and diameter tolerance. 	<ul style="list-style-type: none"> • Longer spotting time! • Guided at the weakest corner of drill. • Shorter tool life
	 Unstable tool life	 Ø0.5D ØD	 ØD ØD
	✗	○	✗

► 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	





NC Spot Drill >>

NC Spot Drill with indexable carbide insert.

High efficiency! Low cost!

CNC lathes, CNC turning centers and machining centers.

Features

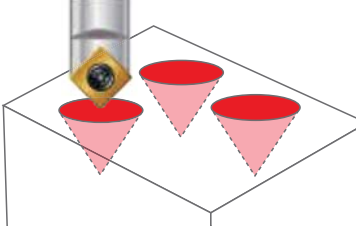
- ▶ Spotting produces better hole position and geometrically uniform holes
- ▶ Available shank diameter-Ø5, Ø6, Ø10, Ø12, Ø16, Ø20, Ø25mm, Ø3/8", Ø1/2", Ø5/8", Ø1/4", Ø3/4", M5, M6 and M8.
- ▶ One tool will perform multiple applications
 - Long tool life.
 - Each insert has 2 or 4 cutting edges.
 - Suitable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



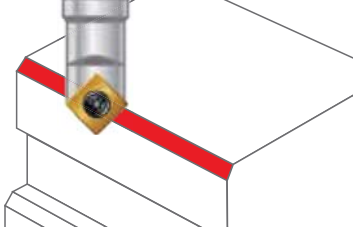
- ▲ Machining Center
- a** Engraving
 - b** Spotting
 - c** Chamfering
 - d** Grooving

▼ ALL IN ONE!!

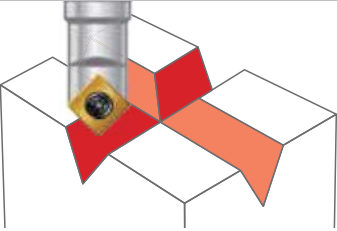
Spotting



Chamfering



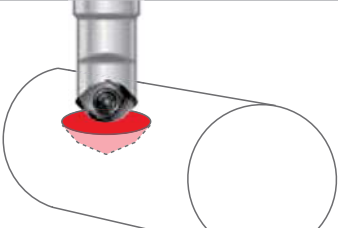
Grooving



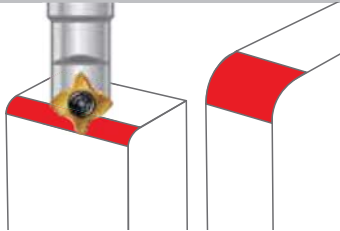
Engraving



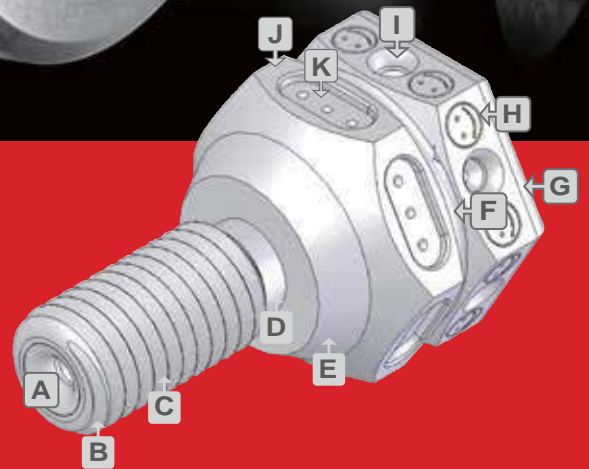
W Spotting



Corner Rounding



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



- Multifunctional:
- | | | | |
|----------|-----------------------------|----------|-----------------|
| A | Center Drilling | B | 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

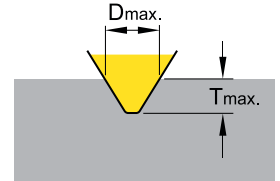


P60-NC40

► Inserts >>

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

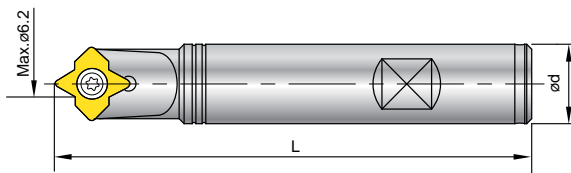
- NC40:**
- Universal grade for all unhardened steel and cast iron.
 - Each insert has 2 cutting edges.



Code	Parts No.	Coating	Grade	Dimensions	Dmax.	Tmax.
014204	N9MT11T3P60-NC40	TiN	P35		6.2	4

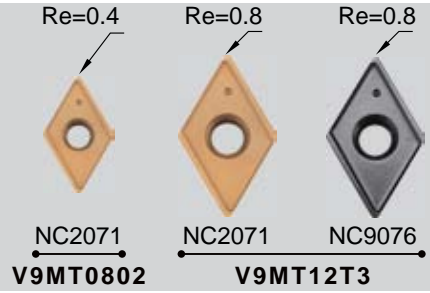
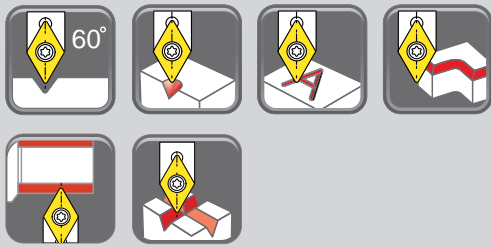
► Holder >>

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



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

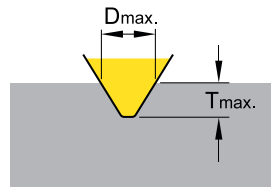


▶ Inserts >>

- 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.

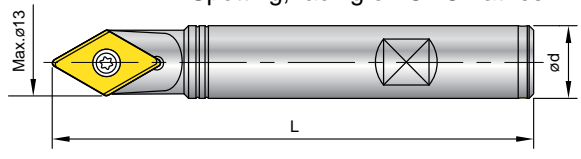
NC9076: • For non-ferrous material such as aluminum, al-alloy, titanium brass, copper and long cutting chip metal.
• Produces excellent surface finish on non-ferrous metal.
• Each insert has 2 cutting edges.



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

▶ Holder >>

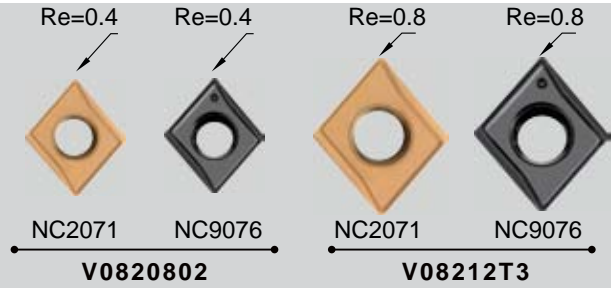
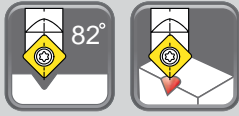
- A single cutting edge creates higher precision and position when spotting.
- Applications:
 - Spotting, engraving, grooving and chamfering on milling machines, machining centers.
 - Spotting, facing on CNC Lathes.



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

NC Spot Drill

V0820802 / V08212T3

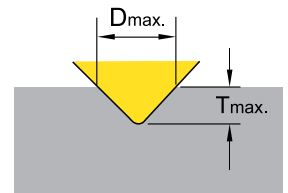


▶ Inserts >>

- 82 degree indexable spotting insert, Dmax 14mm (0.551")
- Match the geometry of American 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.

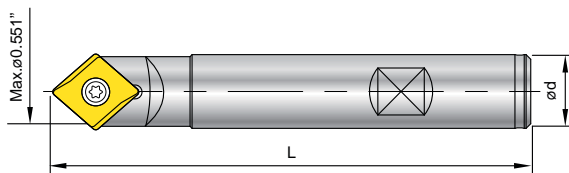
NC9076: • For non-ferrous material such as aluminum, al-alloy, titanium brass, copper and long cutting chip metal.
• Produces excellent surface finish on non-ferrous metal.
• Each insert has 2 cutting edges.



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

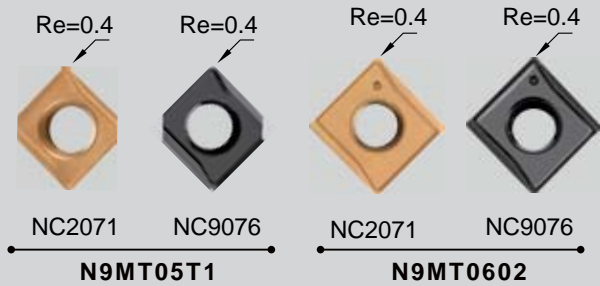
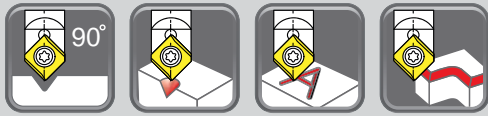
▶ Holder >>

- 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.



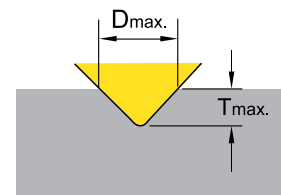
Code	Parts No.	Ød	L	Insert Type	Screw	Key
693001	00-99619-V082-3/8	3/8"	90	V0820802	NS-30055 2.0 Nm	NK-T8
693002	00-99619-V082-5/8	5/8"	100	V08212T3	NS-35080 2.5 Nm	NK-T15

N9MT05T1 / N9MT0602



▶ Inserts >>

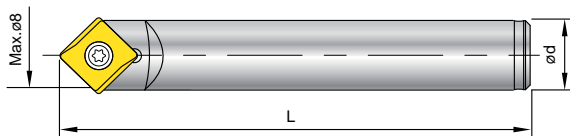
- Mini spotting drill with indexable insert, low cutting power required.
 - Especially good for Swiss type automatic lathes and CNC lathes.
- NC2071:**
- Universal grade for all unhardened steel and cast iron.
 - Geometry with supporting edges to stabilize the cutting condition on low power machine.
 - 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			Dmax.	Tmax.	
					L	S	Re			
011201	N9MT05T1CT	NC2071	TiN	K20F		5	1.8	0.4	6	2.8
011202		NC9076	DLC	K20F		6.35	2.38	0.4	8	3.8
012201	N9MT0602CT	NC2071	TiN	K20F						
012202		NC9076	DLC	K20F						

▶ Holder >>

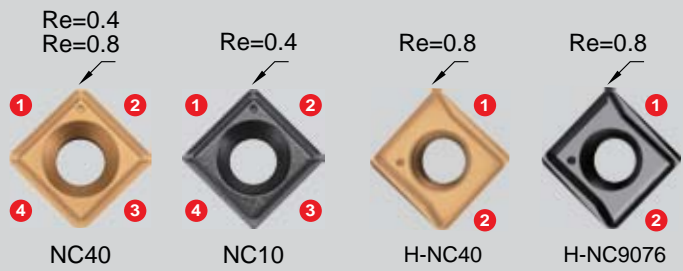
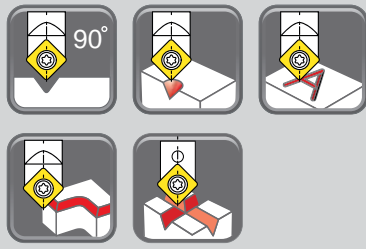
- Smallest indexable spotting drill holder.
- Single cutting edge design gives higher precision when spotting.
- Applications :
 - Spotting, engraving, and chamfering on milling machines, machining centers.
 - Spotting, facing on CNC Lathes.



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

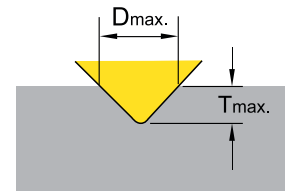
Note:601003 is carbide shank holder.

N9MT0802



▶ Inserts >>

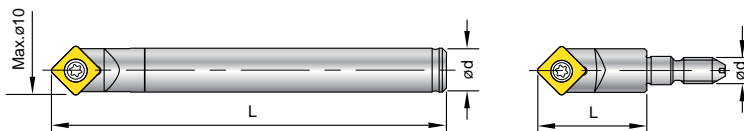
- NC40:**
 - General purpose, universal grade for all unhardened steel.
 - Each insert has 4 cutting edges.
- NC10:**
 - High positive angle and fully ground cutting edge and relief angle.
 - Universal grade for non-ferrous metal, cast iron and stainless steel.
 - Each insert has 4 cutting edges.
- H-NC40:**
 - 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	Image	Dimensions			Dmax.	Tmax.
					L	S	Re		
013401	N9MT080208CT	NC40	TiN		8.31	2.38	0.8	10	4.5
013402	N9MT080204CT	NC40	TiN		8.31	2.38	0.4		
013403		NC10	TiAlN		8.31	2.38	0.4		
013201	N9MT0802CT2T	H-NC40	TiN		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		
603003	00-99616-10-SL10 (Weldon)	10	90		
613001	00-99616-10-3/8	3/8"	90	NS-30055 2.0 Nm	NK-T8
623001	00-99616-10-M5	M5	25		
623002	00-99616-10-M6	M6	25		

Note: • Balanced type holder is on request.
 • Nine9 extension bar for M5,M6 screw fit holder, see page 70.

N9MT0802



► Single Set >>

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

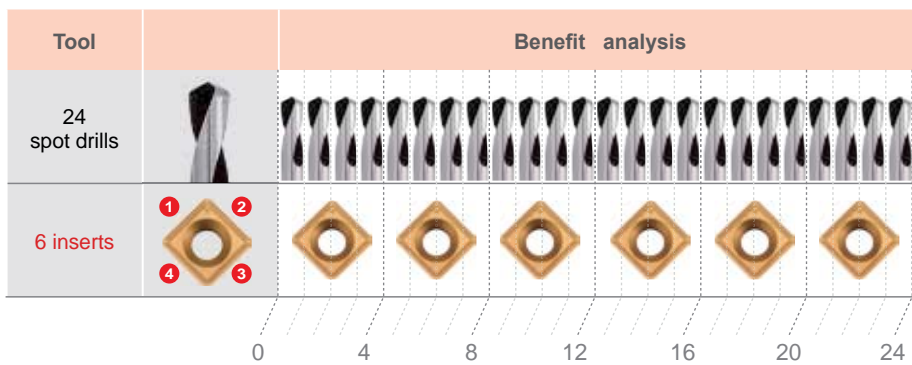
Code	Parts No.	Ød	Total Length	Insert fitted	Dmax.	Tmax.
603101-3401	00-99616-10-02S	10	90	N9MT080208CT-NC40	10	4.5
603101-3403	00-99616-10-02SAL	10	90	N9MT080204CT-NC10	10	4.5

► 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	<p>1 tool holder + 6 inserts + 1 key</p>
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 >>



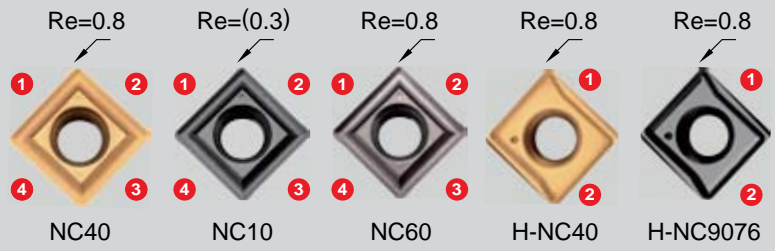
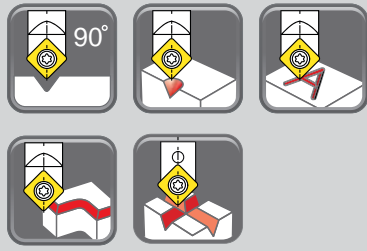
Low Cost! Economy!

 6 inserts 12 inserts 24 inserts ...	=	 24 spot drills 48 spot drills 96 spot drills ...
--	---	---

Note: N9MT080201W Engraving, see page 59.

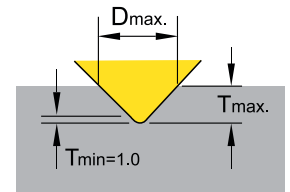


N9MT11T3

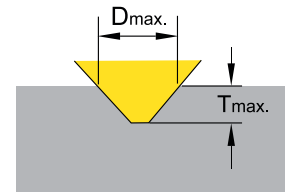


▶ Inserts >>

- 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

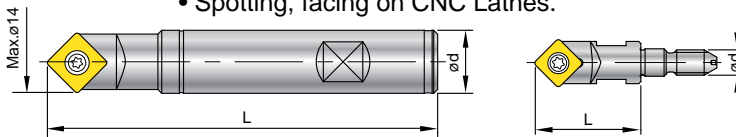


Other grade

Code	Parts No.	Coating	Grade	Re	Dimensions			Dmax.	Tmax.		
					L	S	Re				
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.



Code	Parts No.	Ød	L	Screw	Key
604002	00-99616-14-12	12	100		
604004	00-99616-14	16	100		
604007	00-99616-14-150L	16	150		
604009	00-99616-14-220L	20	220	NS-35080 2.5 Nm	NK-T15
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: • Balanced type holder is on request.
 • Nine9 extension bar for M5,M6 screw fit holder, see page 70.

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"

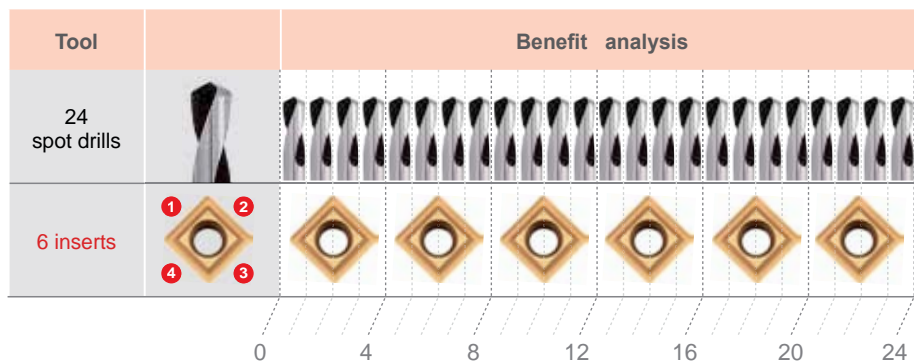
► Starter Package >>

- 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 >>



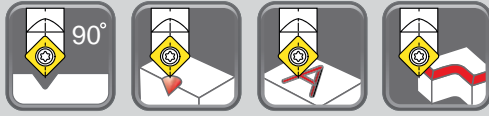
Low Cost! Economy!

6 inserts
12 inserts
24 inserts
⋮

=

24 spot drills
48 spot drills
96 spot drills
⋮

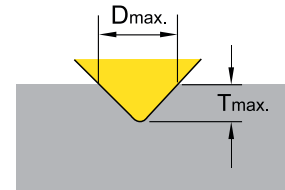
N9MT1704



▶ Inserts >>

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

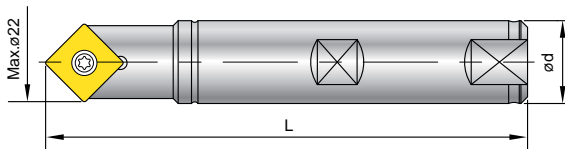
- NC2071** :
- High positive geometry, fully ground cutting edge and relief angle.
 - Universal grade for all unhardened steel and cast iron.
 - Each insert has 2 cutting edges.



Code	Parts No.	Coating	Grade	Image	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.



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

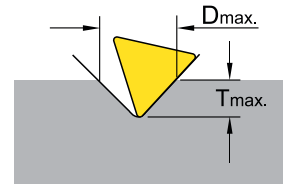


NC40



▶ Inserts >>

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

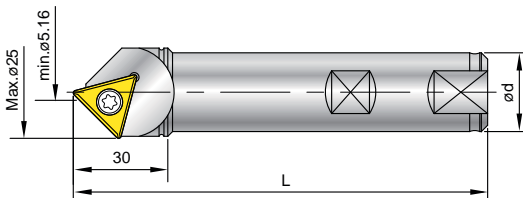


- NC40:**
- Universal grade for carbon steel, alloy steel and cast iron.
 - Each insert has 3 cutting edges.

Code	Parts No.	Coating	Grade	Image	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.

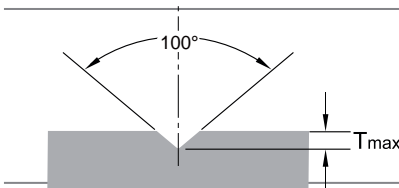
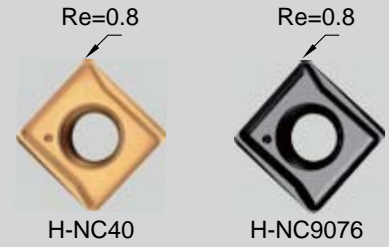


Ø25

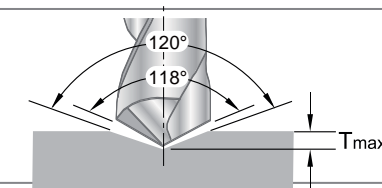
Code	Parts No.	Ød	L	Screw	Key
607001	00-99616-25-CT28	25	120	NS-40100 3.5 Nm	NK-T15
617001	00-99616-1-CT28	1"	120		

100°
120°
142°

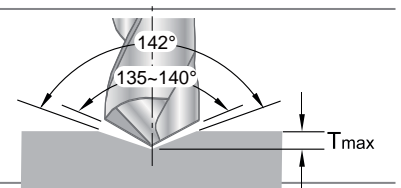
N9MT11T3CT2T-H



- For aircraft 100° normal rivet hole and screw hole.



- For spotting before drilling by 118° point angle drill.
- 60° chamfering.

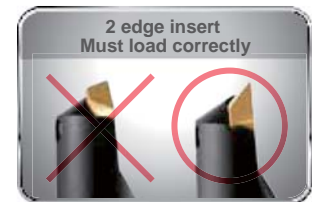


- For spotting before drilling by 135°~140° point angle high performance drill.

► Inserts >>

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

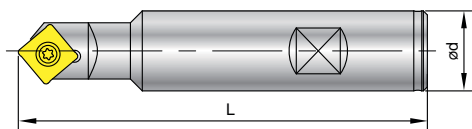
- H-NC9076:**
- High positive geometry and sharp edge.
 - For non-ferrous material such as aluminum, titanium, brass, copper and long cutting chip metal.
 - Produces excellent surface finish when chamfering non-ferrous metal.
 - Each insert has 2 cutting edges.



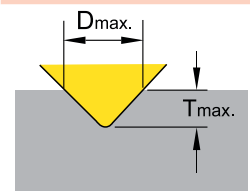
Code	Parts No.	Coating	Grade	Re	Dimensions		
					L	S	Re
014202	N9MT11T3CT2T	H-NC40	TiN	K20F	11	3.97	0.8
014203		H-NC9076	DLC				

► Holder >>

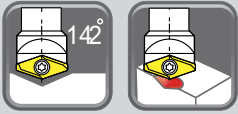
- Indexable insert spotting drill holders for 100°/120°/142° spotting.
- Spotting produces better hole position and geometrically uniform holes.
- Increase tool life of the next drilling operation.



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

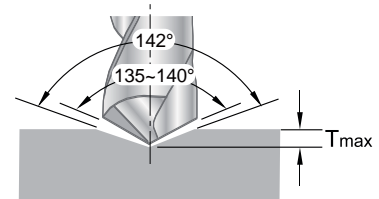
V1421604-NC2071



▶ 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.

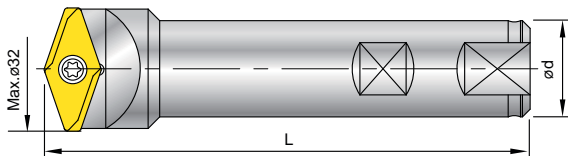


NC Spot Drill

Code	Parts No.	Coating	Grade	Image	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 !



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

145°
+
90°

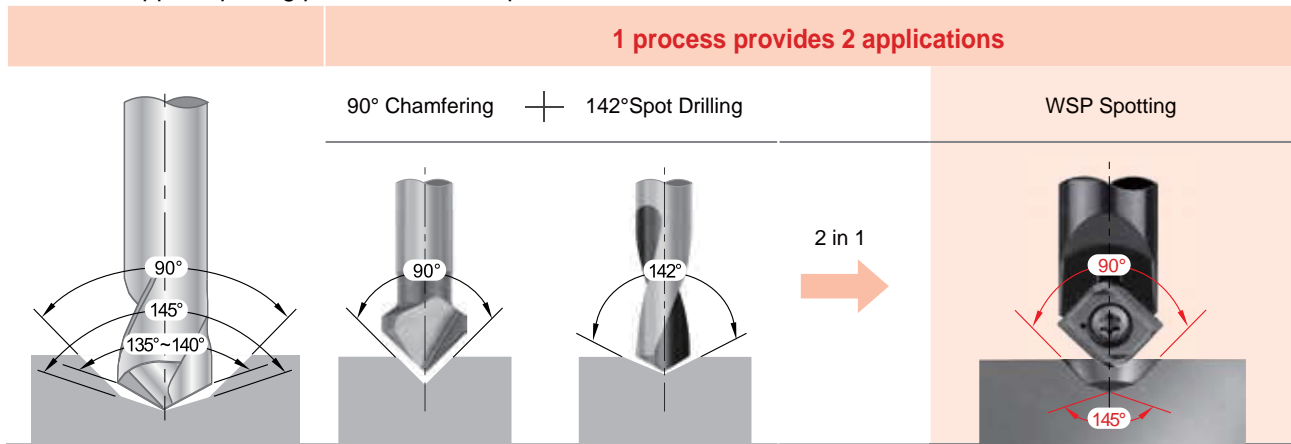
WSP Spotting New Geometry of Spotting Tool



NC2033

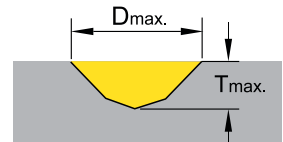
► Combined spotting and chamfering 145° + 90° >>

- Reduces process to one operation. Shorten 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 34.

WSP Spotting New Geometry of Spotting Tool

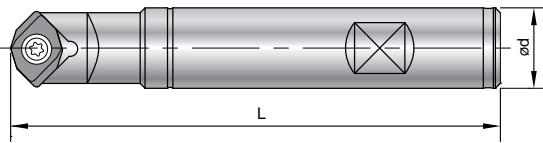


NC Spot Drill



► Holder >>

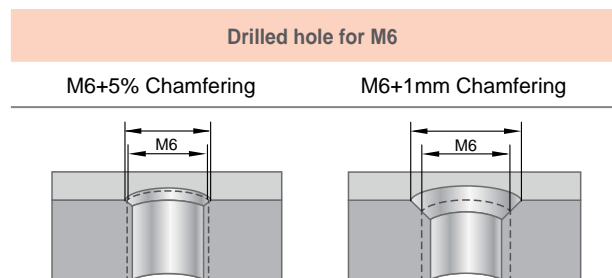
- Utilizes standard **NC Spot Drill** holders.
- Holders and inserts are interchangeable.
- Applications: Spotting, grooving and chamfering.



Code	Parts No.	Ød	L	Insert Type	Thread Size	Screw	Key
603001	00-99616-10	10	89.08±0.29	N9MT0802	M4-M6	NS-30055 2.0Nm	NK-T8
613001	00-99616-10-3/8	3/8"					
604004	00-99616-14	16	97.55±0.55	N9MT11T3	M8-M10	NS-35080 2.5Nm	NK-T15
614002	00-99616-14-5/8	5/8"					
606001	00-99616-22	20	96.24±0.64	N9MT1704	M12-M16	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 34)



► Comparison >>

Carbide Step Drill	Spotting + Drill	WSP Spotting + Drill
<ul style="list-style-type: none"> • Tool cost is high • Shorter tool life • Can't drill directly from solid on round parts. Bad position accuracy. 	<ul style="list-style-type: none"> • Longer drilling time • Guided at the weakest corner of drill • Shorter tool life 	<ul style="list-style-type: none"> • Shorter drilling time • Guided at the strongest corner of drill • Longer tool life • Also for chamfering or grooving application

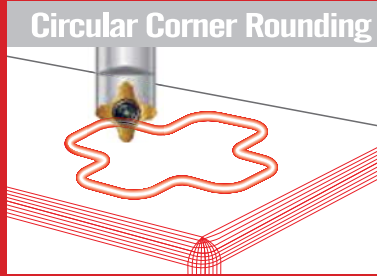
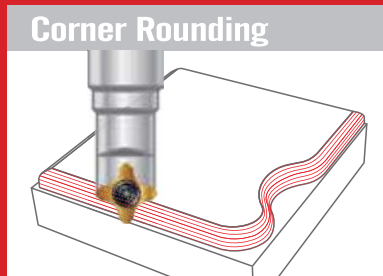


Corner Rounding >> Type of RC

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



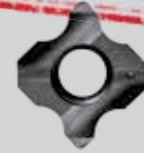
N9MT05T1RC



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



NC2071



NC9036

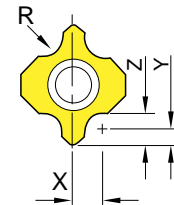


▶ Inserts >>

- 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.

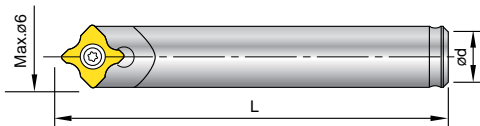
- NC9036:**
- For non-ferrous material such as aluminum, acrylic, titanium, brass, copper and stainless steel.
 - High positive geometry and sharp edge produces excellent surface finish.
 - Each insert has 2 cutting edges.



Insert Radius	Code	Parts No.	Coating	Grade	offset			Dimensions		
					X	Y	Z			
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	5	1.8
	011207		NC9036	DLC						
1.0	011205	N9MT05T1RC10	NC2071	TiN	K20F	1.75	0.75	1.75	5	1.8
	011208		NC9036	DLC						

▶ Holder >>

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



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

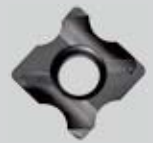
N9MT11T3RC



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



NC40



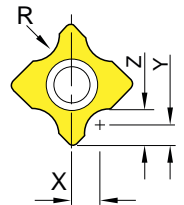
NC9036

▶ Inserts >>

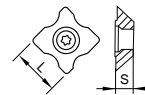
- Higher cutting speed and feed rate.
- Combination corner rounding and 45° chamfering application on same insert.
- Various corner radius inserts can fit on same holder.

- 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.



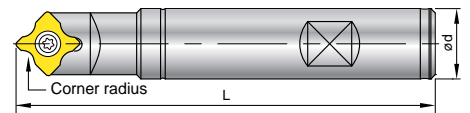
Insert Radius	Code	Parts No.		Coating	Grade	offset			Dimensions			
						X	Y	Z	L	S		
1.0	014209	N9MT11T3RC10	NC40	TiN	K20F	2.75	1.5	2.5	11.11	3.97		
	014224		NC9036	DLC								
1.5	014210	N9MT11T3RC15	NC40	TiN	K20F	3.25	1.5	3				
	014225		NC9036	DLC								
2.0	014211	N9MT11T3RC20	NC40	TiN	K20F	3.75	1.5	3.5				
	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"			0.437"	0.156"
	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"				
	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

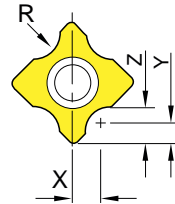


► Inserts >>

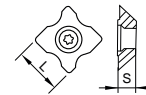
- Higher cutting speed and feed rate.
- Combination corner rounding and 45° chamfering application on same insert.
- Various corner radius inserts can fit on same holder.

- 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.

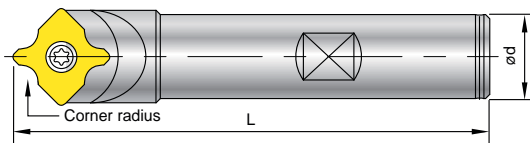


Corner radius(R)	Code	Parts No.	Coating	Grade	offset			Dimensions	
					X	Y	Z	L	S
4.0	016202	N9MT1704RC40	NC2071	TiN	6.15	2	6	17	4.76
	016208		NC9036	DLC					
5.0	016203	N9MT1704RC50	NC2071	TiN	7.1	2	7		
	016209		NC9036	DLC					
6.0	016204	N9MT1704RC60	NC2071	TiN	8.1	2	8		
	016210		NC9036	DLC					



► 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		



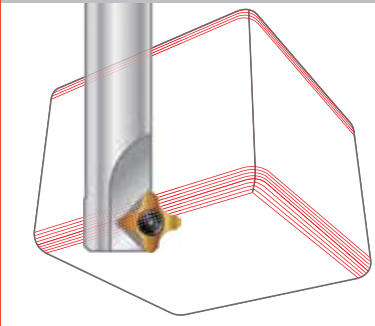
Corner Rounding >> Type of R

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.

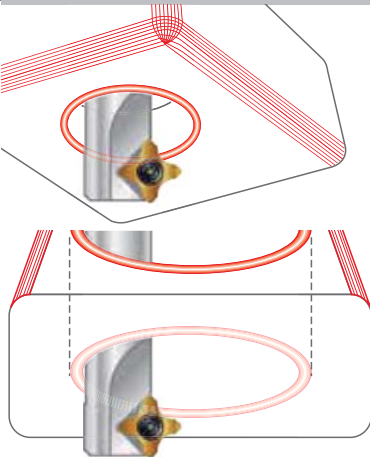
Features

- 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 >>

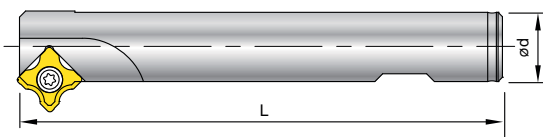
- For front and back corner rounding.
- Various corner radius inserts can fit on same holder.
- Coated carbide inserts for excellent tool life.
- Each insert has 4 cutting edges.

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		

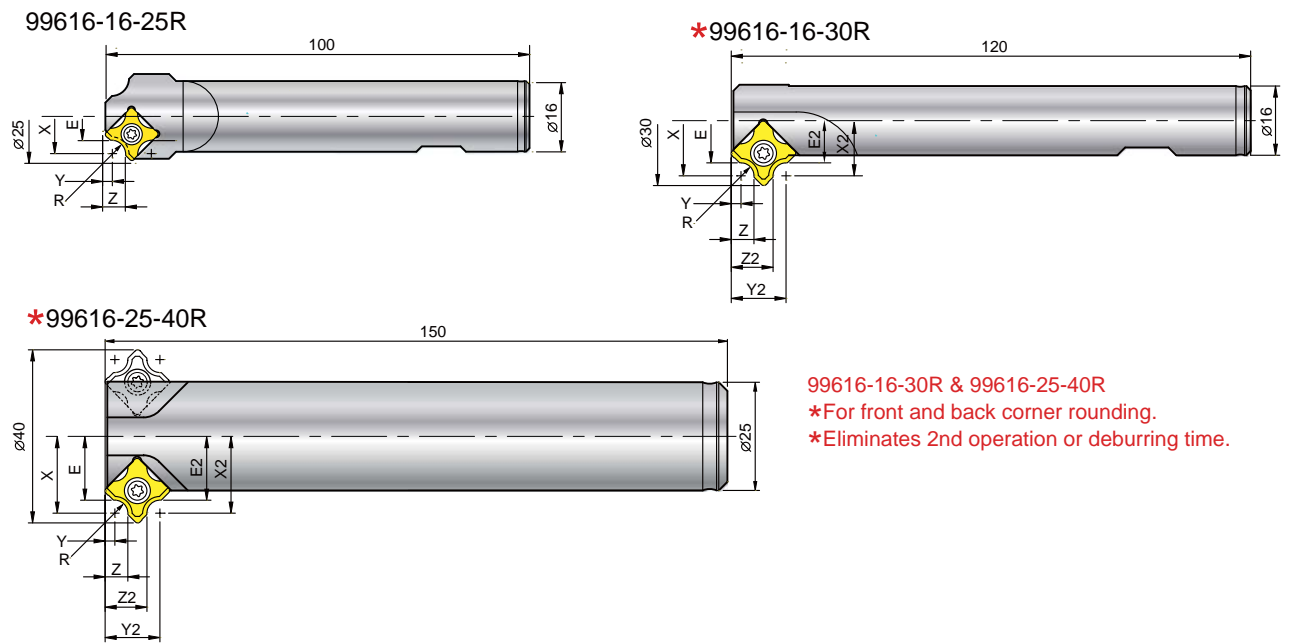
▶ More >>

- Also can fit with N9MT11T308LA inserts for front and back chamfering. (Please see page 31)

N9MT11T3R

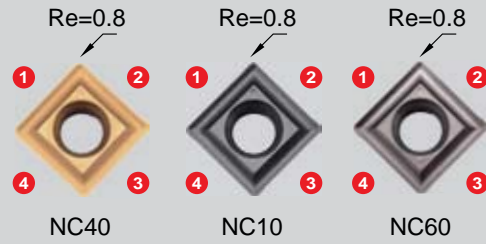


▶ Cutting Position >>



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



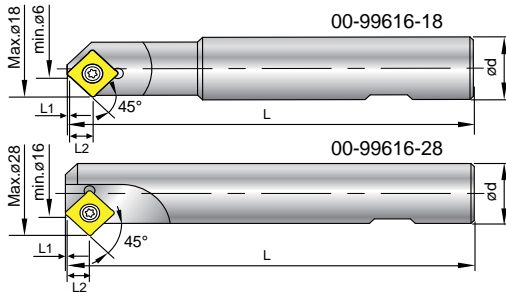
▶ Inserts >>

- 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	Re	Dimensions		
					L	S	Re
014409	N9MT11T308LA	NC40	TiN		11.11	3.97	0.8
014410		NC10	TiAN				
014411		NC60	Cermet				

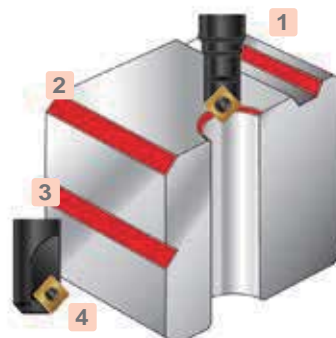
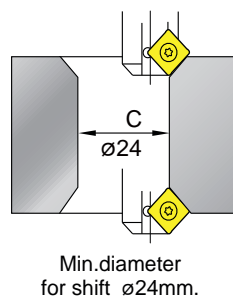
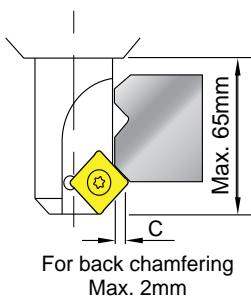
▶ Holder >>

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



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

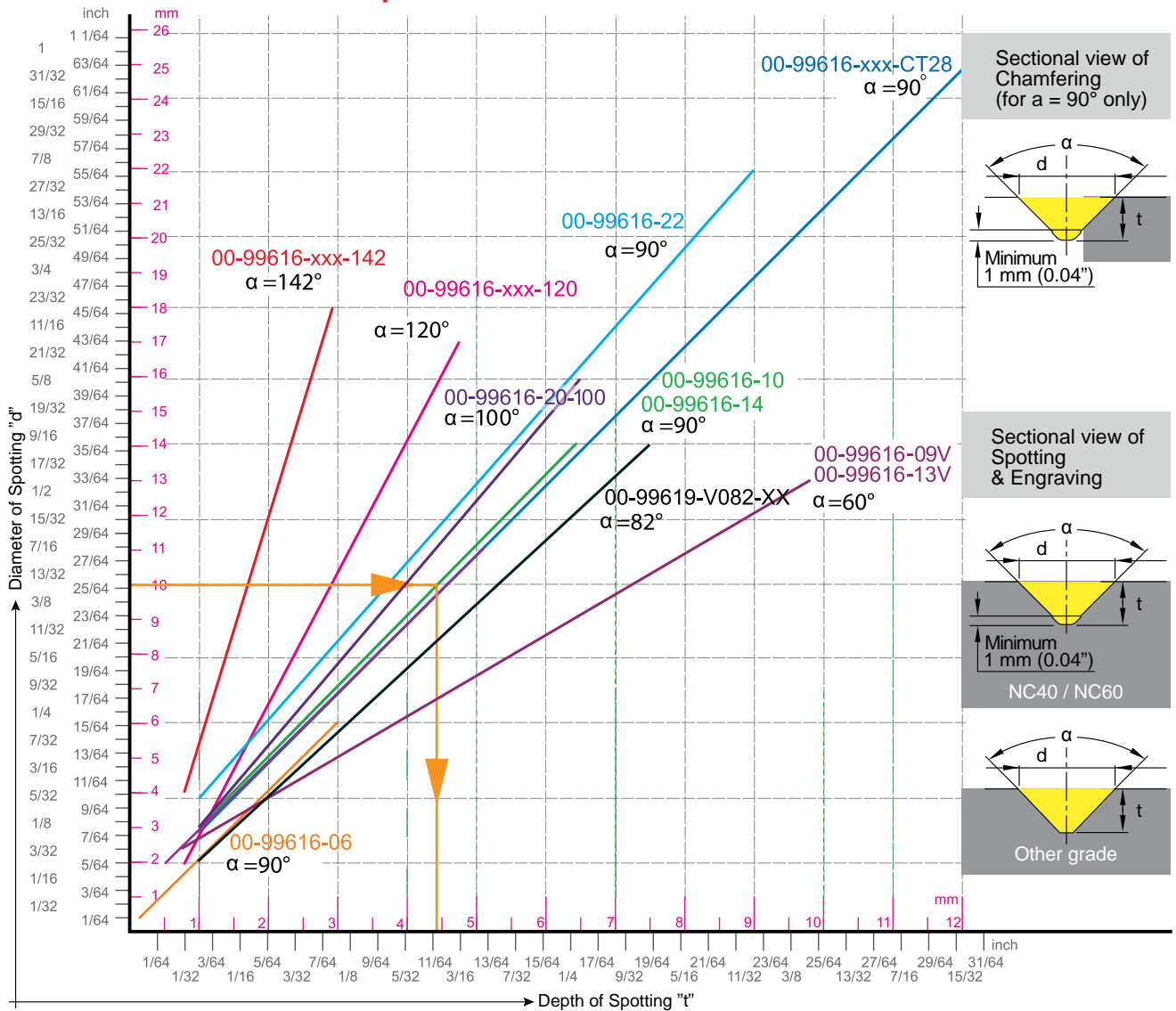
▶ Example >>



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 V_c from the data sheet, calculate spindle speed "S"(RPM).
2. "F" feed rate per minute $F = f \times S = \text{RPM} \times \text{IPR}$


Metric		Inch	
$S = \frac{V_c \times 1000}{\pi \times d}$	d = diameter -mm	$S = \frac{(3.82 \times \text{SFM})}{d}$	d = diameter-inch
$F = S \times f$	S = Spindle Speed -r.p.m.	$F = f \times S$	S = Spindle Speed-r.p.m.
	V_c = Cutting Speed -m/min.		SFM = Surface Speed-ft./min. V_c (m/min.) x 3.28
	f = mm/rev.		f = IPR = inch/rev.
	F = mm/min.		F = inch/min.

Cutting Data

▶ N9MT-CT >> Insert Multi-function


Determine spindle speed and feed rate:

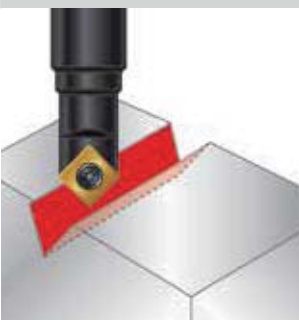
- Choose spotting depth to decide spotting diameter according to the Diameter/Depth chart on page 32.
- The spindle speed should be calculated by the maximum diameter of spotting, chamfering and grooving.

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.

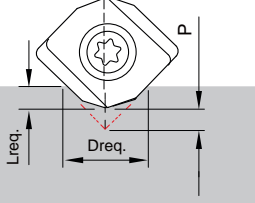

* Inserts with supporting edges can increase feed rate 50%.

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

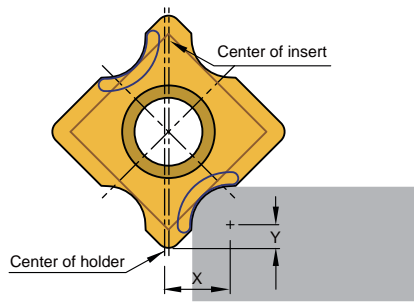
► WSP Spotting >> 145°+90° W Spotting

WSP spotting	Formula										
	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	d = diameter of the tool for calculation purpose
	S = $\frac{Vc \times 1000}{d \times \pi}$ r.p.m.	X = tool radius offset (ref. page 25~27 for RC inserts)
	F = S x f mm/min.	Vc = Cutting Speed -m/min.
		S = Spindle Speed -r.p.m.
		F = mm/min.
		f = mm/rev.
Calculate tool length offset on machining center		
	TL = TL' - Y,	X = tool radius offset (ref. page 25~27 for RC inserts)
	H = X	Y = distance to the center of radius. (ref. page 25~27 for RC inserts)
		TL' = tool length
		TL = tool length offset.
		H = tool radius offset

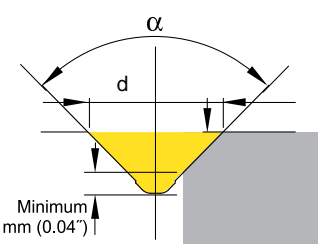
RC Insert	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	150~320	0.05~0.10	NC40, NC2071
	Alloy steel	100~250	0.05~0.10	NC40, NC2071
	High alloy steel	80~150	0.04~0.08	NC40, NC2071
	Stainless Steel	65~125	0.05~0.10	NC9036
	Cast iron	150~250	0.05~0.10	NC40, NC2071
	Aluminum, Al-alloy 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
	$\alpha = \text{point angle } 90^\circ$
	$S = \frac{Vc \times 1000}{d \times \pi} \text{ r.p.m.}$
	$F = S \times f \text{ mm/min.}$
	$f = \text{feed per rev.-mm/rev.}$
	$d = \text{effective diameter}$
	$Vc = \text{cutting speed-m/min.or ft/min.}$
	$S = \text{Spindle speed}$

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.)

▶ Excellent Repeatability

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

▶ 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.



▲ 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.

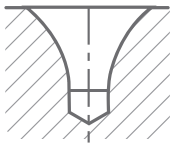
▶ Special forms are possible



* Standard stock item

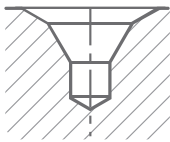
*** DIN 332 Form R**

Ø1.0~Ø10



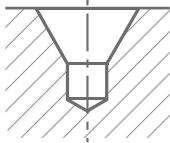
*** DIN 332 Form A + B**

Ø1.0~Ø10



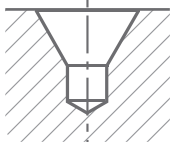
*** DIN 332 Form A**

Ø2.0~Ø2.5

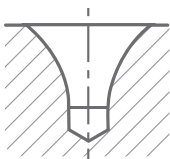


*** ANSI 60°**

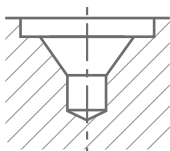
#2.0~#10



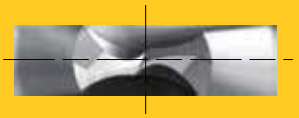
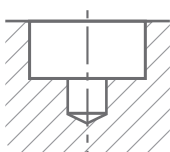
PR (Similar DIN332 R)



C Type



F Type



▲ 2 cutting flutes design

Inserts:

- 2 cutting flutes design same as carbide center drill for high performance speed and feed rate.
- Each insert has 2 cutting edges.



NC2033:

- K20F grade, TiAlN coated, for carbon steel, alloy steel, high alloy steel and cast iron.



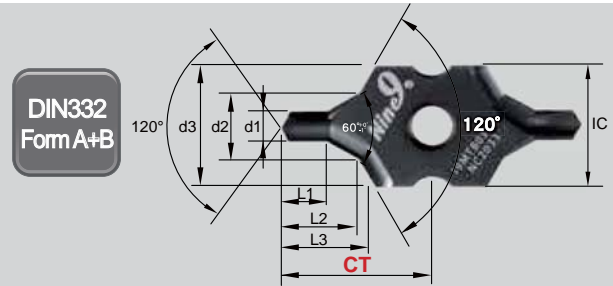
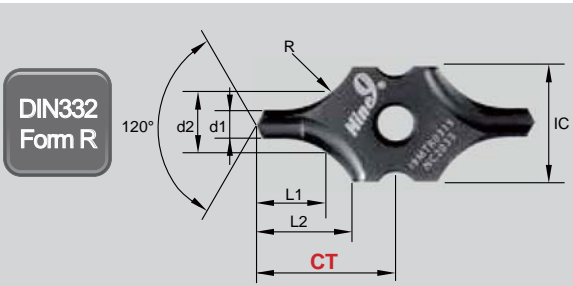
NC5074:

- P40 grade, Helica coating, design for small diameter center drill (IC08 inserts).



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

Insert of Indexable Center Drill



► DIN332 Form R >>

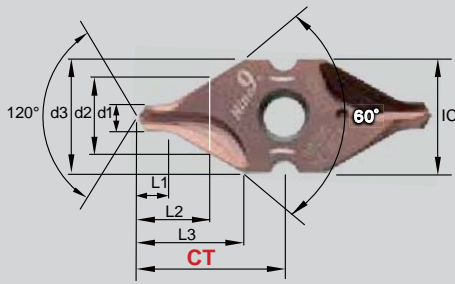
IC	Code	Parts No.	Coating	Grade	d1	d2	L1	L2	R	CT ±0.025					
08	032211	I9MT08T1R0100-NC5074	Helica	P40	1.00	2.12	2.16	4.14	2.8	7.55					
	032212	I9MT08T1R0125-NC5074			1.25						2.65	2.74	4.64	3.5	7.90
	032213	I9MT08T1R0160-NC5074			1.60						3.35	3.45	5.13	4.5	8.40
	032214	I9MT08T1R0200-NC5074			2.00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



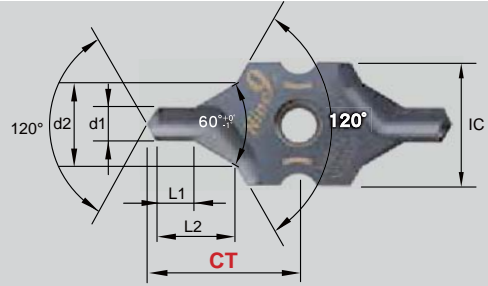
► DIN332 Form A+B >>

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

DIN332
Form A



ANSI
60°



► DIN332 Form A >>

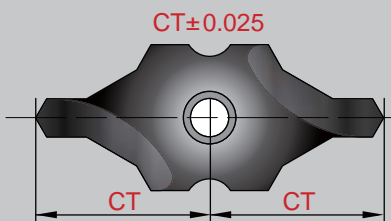
IC	Code	Parts No.	Coating	Grade	d1	d2	d3	L1	L2	L3	CT ±0.025
08	032114	I9MT08T1A0200-NC5074	Helica	P40	2.0	4.25	8	2.15	4.10	7.35	10.5
	032115	I9MT08T1A0250-NC5074			2.5						
	032116	I9MT08T1A0315-NC5074			3.15						



► ANSI 60° >>

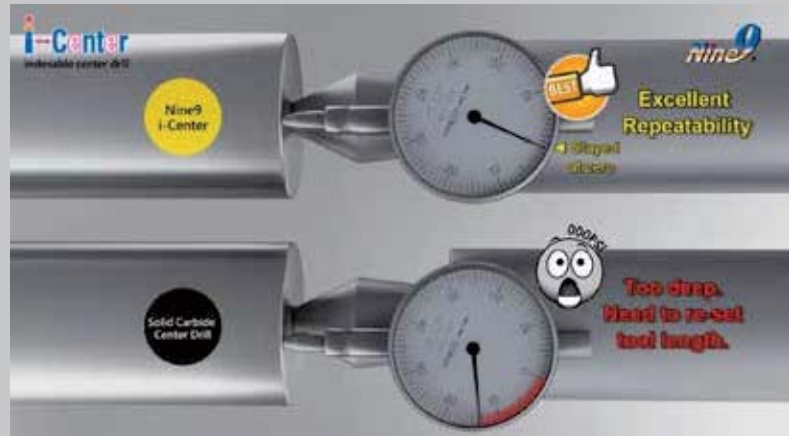
IC	Code	Parts No.	Coating	Grade	Size	d1		d2		L1		L2		CT ±0.025
							mm		mm		mm		mm	
12	033101	I9MT12T2A2-NC2033	TiAlN	K20F	#2	5/64	1.98	+0.14 0	3/16	4.76	5/64	1.98	4.4	12.6
	033102	I9MT12T2A3-NC2033			#3	7/64	2.78		1/4	6.35	7/64	2.78	5.9	13.8
	033103	I9MT12T2A4-NC2033			#4	1/8	3.18		5/16	7.94	1/8	3.18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

Excellent Repeatability



CT ±0.025mm

it means the repeatability of the drilling depth of drilled hole. It also ensures the tool length while changing the insert or cutting edge.



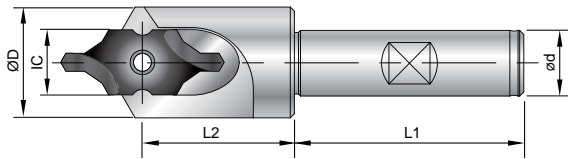
Holders of Indexable Center Drill

NEW



► Weldon Shank >>

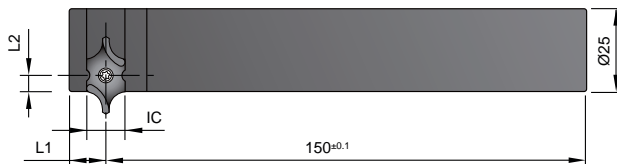
- Made of hardened high alloy steel, 58 HRC.
- Shank is ground to h6 tolerance.
- Special holders or left hand holders are available on request.



IC	Code	Parts No.	Type	ød	L1	L2	øD	Screw	Key
08	802002	00-99616-IC08-10F	BC10-IC08F	10	30	18.5	12	NS-25060 0.9 Nm	NK-T7
	812002	00-99616-IC08-3/8F	BC3/8"-IC08F	3/8"					
12	803002	00-99616-IC12-16F	SB16-IC12F	16	48	30.5	21	NS-30072 2.0 Nm	NK-T9
	813002	00-99616-IC12-5/8F	SB5/8"-IC12F	5/8"					
16	804002	00-99616-IC16-16F	SB16-IC16F	16	48	37	27	NS-35080 2.5 Nm	NK-T15
	814002	00-99616-IC16-5/8F	SB5/8"-IC16F	5/8"					
20	805002	00-99616-IC20-20F	SB20-IC20F	20	50	51	32	NS-50125 5.5 Nm	NK-T20
	815002	00-99616-IC20-3/4F	SB3/4"-IC20F	3/4"					
25	806002	00-99616-IC25-25F	SB25-IC25F	25	56	56	43	NS-50125 5.5 Nm	NK-T20
	816002	00-99616-IC25-1F	SB 1"-IC25F	1"					

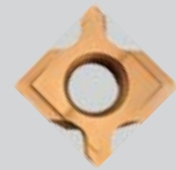
New ► Square Shank 25 x 25 Right / Left Hand >>

- For used on lathe.
- Made of hardened high alloy steel, 40 HRC.
- Other sizes are available on request.



IC	Code	Parts No.	L1	L2	Screw	Key
08	822022	99616-IC08-R2525MF	8	3.25	NS-25060 0.9 Nm	NK-T7
	822012	99616-IC08-L2525MF				
12	823022	99616-IC12-R2525MF	11	4.9	NS-30072 2.0 Nm	NK-T9
	823012	99616-IC12-L2525MF				
16	824022	99616-IC16-R2525MF	13	4.9	NS-35080 2.5 Nm	NK-T15
	824012	99616-IC16-L2525MF				

N9MT11T3PR Radius Form Center Drilling

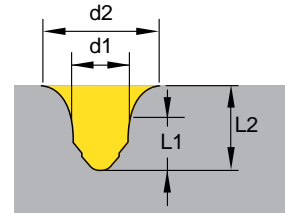


NC40

▶ Inserts >>

- Create 60° center holes SIMILAR to DIN 332 Form R.
- Easy tool length setting, saving tool changing time.
- Each insert has 2 cutting edges.

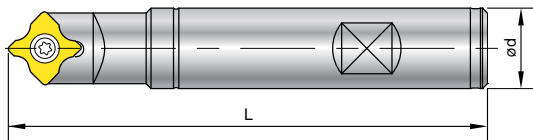
- NC40:**
- Universal grade for all unhardened steel and cast iron.
 - Radius curve eliminates the sharp transition from drill point to countersink angle.



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 20).

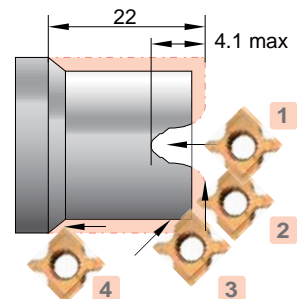


Ø16

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

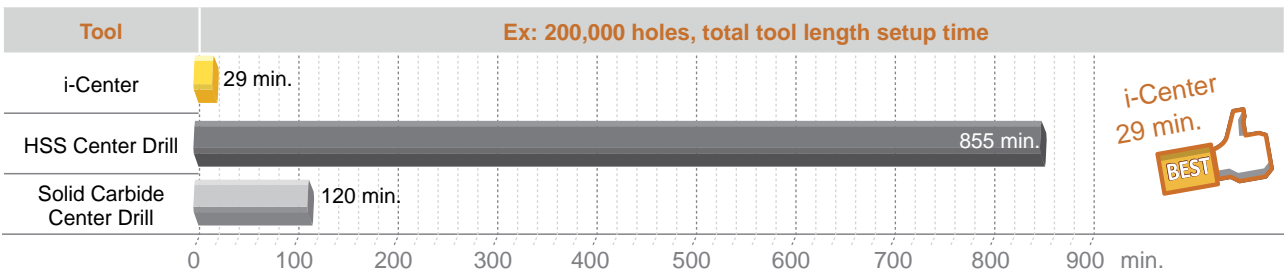
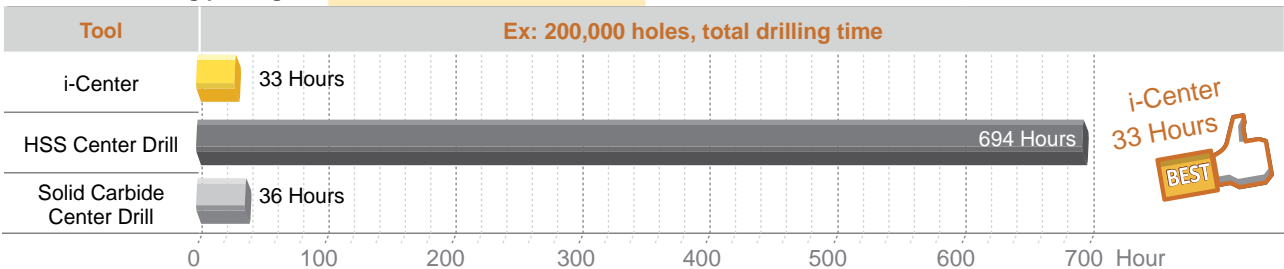
Center Drilling	Work Material	Vc (m/min)	f (mm/rev.)	Grade of Insert
	Carbon Steel	80-150	0.05-0.20	NC40
	Alloy steel	80-150	0.05-0.20	
	High alloy steel	80-150	0.05-0.20	
	Cast iron	80-150	0.05-0.20	

Performance

► Comparison >>

Workpiece : Low carbon alloy steel, 850 N/mm²
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



Special holder & Insert >> Also Available

Cylindrical Shank

Pre-balanced (G2.5 / 10,000 r.p.m.)

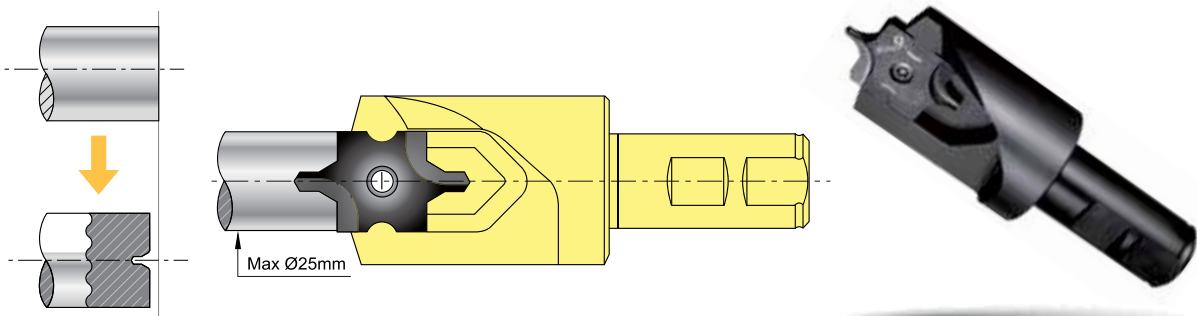


Left hand tool holder Left hand Insert



Special insert

Combined centering, chamfering and facing by one insert.



i-Center Enquiry Form

▶ Previous process tool >>

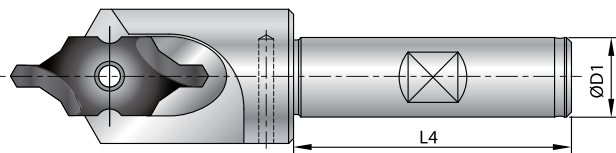
▶ Challenge or improvement >>

The following information should be checked while discussing with customer.

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

▶ Special Tool holder shank dimensions >>

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

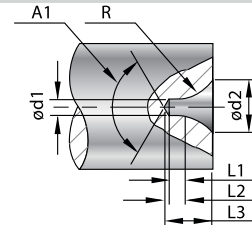


▶ Center hole dimension >>

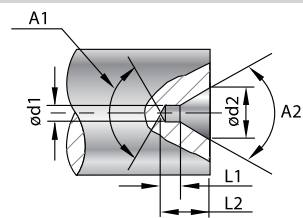
- Please provide workpiece drawing
- One of following type should be chosen.



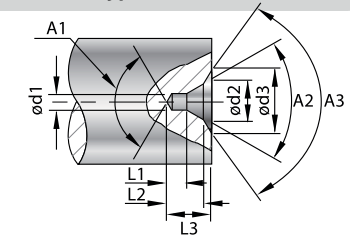
Type R



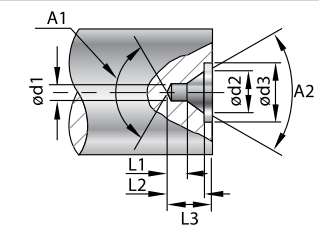
Type A



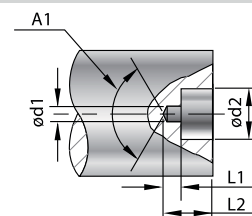
Type B



Type C



Other

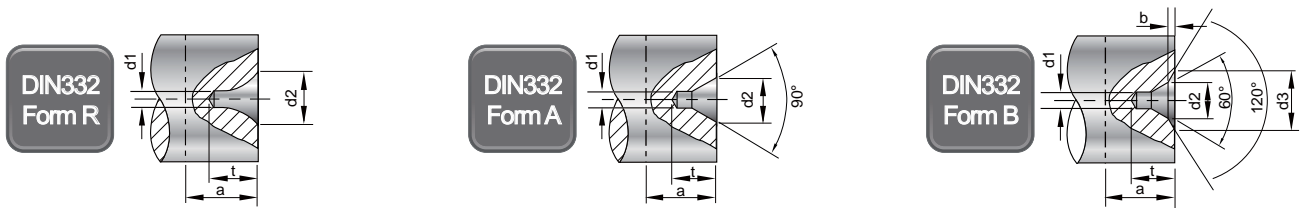


Dimension Table	A1	A2	A3	ød1	ød2	ød3
Dimension						
Tolerance	---	+0° -1°	±1°	±0.05	±0.05	---

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

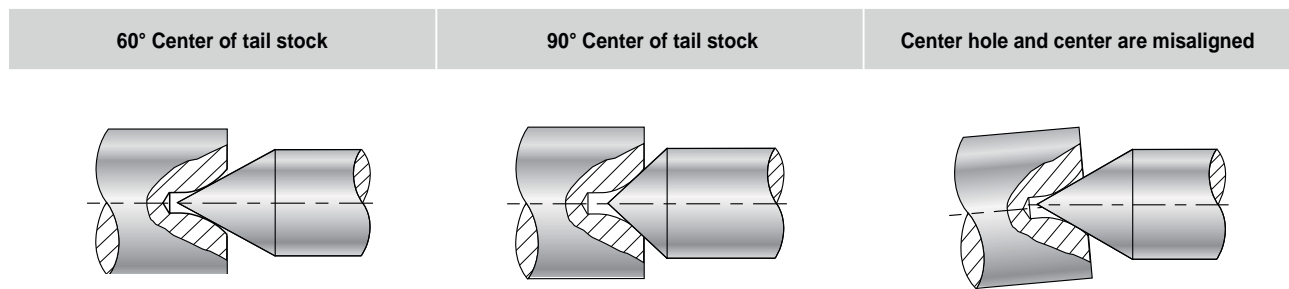
Technical Standard ISO 2541-1972 / DIN332

► 60° Center holes

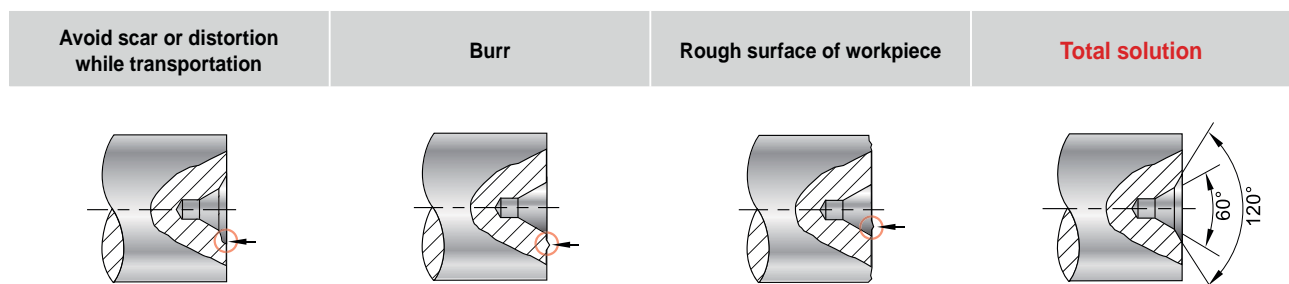


STD	DIN332 Form R ISO 2541-1972			DIN332 Form A ISO 866-1975			DIN332 Form B ISO 2540 1973					
	d1	d2	t	a	d2	t	a	d2	b	d3	t	a
1	2.12	1.9	3	3	2.12	1.9	3	2.12	0.3	3.15	2.2	3.5
1.25	2.65	2.3	4	4	2.65	2.3	4	2.65	0.4	4	2.7	4.5
1.6	3.35	2.9	5	5	3.35	2.9	5	3.35	0.5	5	3.4	5.5
2	4.25	3.7	6	6	4.25	3.7	6	4.25	0.6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

► Advantage of Form R Center hole



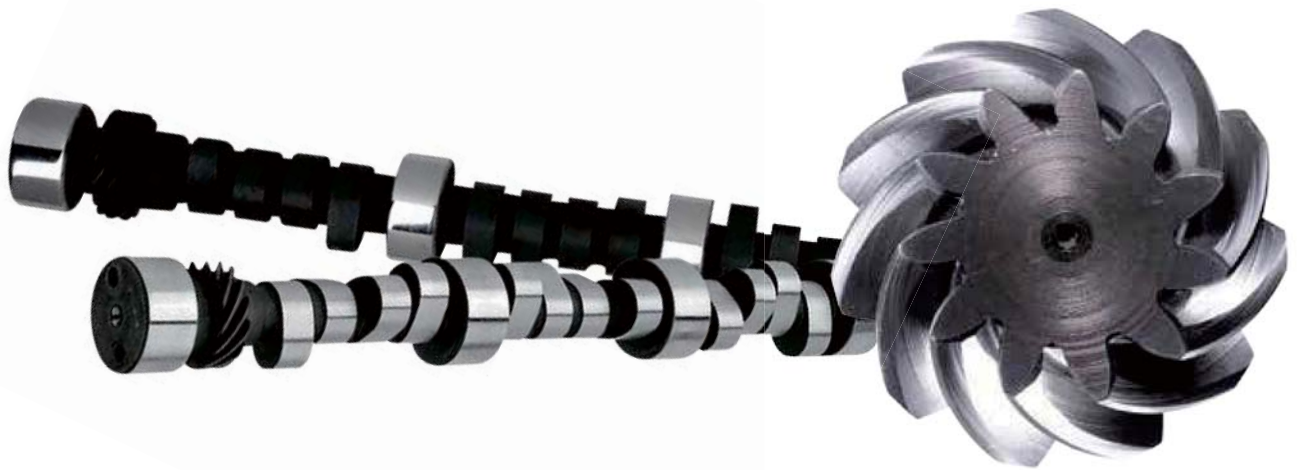
► Advantage of Form B center hole



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.



i-Center



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 72)
- For low spindle speed special purpose machines or lathes, lower spindle speed is allowed but the feed rate should be maintained.

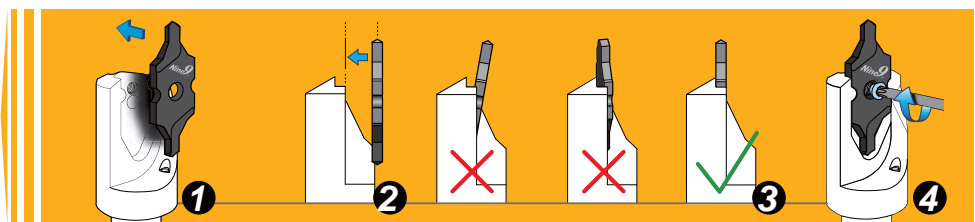
► $\varnothing 1 \sim \varnothing 3.15$ (#2~#4) >>

Workpiece material	Vc (m/min.)	f d1	f (mm/rev)					Cutting fluid
			IC08		IC12			
			$\varnothing 1 \sim 1.25$	$\varnothing 1.6 \sim 3.15$	$\varnothing 2$ (#2)	$\varnothing 2.5$ (#3)	$\varnothing 3.15$ (#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

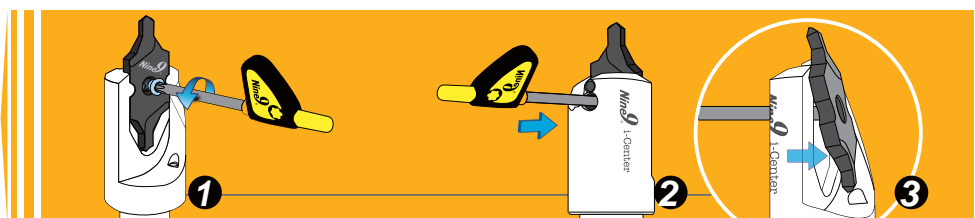
► $\varnothing 4 \sim \varnothing 10$ (#5~#10) >>

Workpiece material	Vc (m/min.)	f d1	f (mm/rev)					Cutting fluid
			IC16		IC20		IC25	
			$\varnothing 4$ (#5)	$\varnothing 5$	(#6)	$\varnothing 6.3$ (#7)	$\varnothing 8$ (#8)	
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





Engraving X060

Micro engraving insert -

provides fine engraving 0.1 & 0.2mm bottom width with narrow angle 30° / 45° / 60°. Two type of forms for your option - radius angled and radius.

Features

► Economical

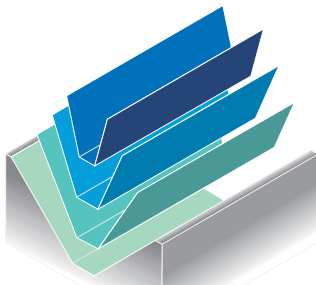
- Each indexable insert has 2 cutting edges.
- No resharpening required.
- No need to reset tool length after changing insert or cutting edge.
- A single cutting edge design creates higher precision and position when engraving.

- Replace solid carbide engraving tool and ball nose end mill.
- One holder supports the entire X060 series of engraving inserts.
- Also using for deburring tool, see page 52.

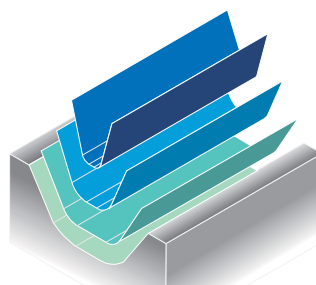


► Unlimited variations

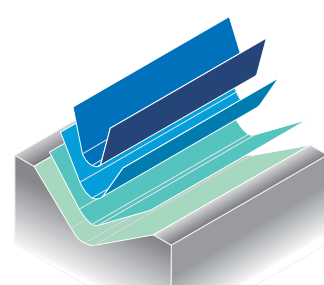
- Different form and variety grade of insert for your options.
- Special forms based on your customized angle, width, depth and corner radius are available on request.



Angled form



Radius angled form



Radius form

- Min. width of bottom : 0.1mm.
- Max. depth: 2mm, related to the angle and width.
- Angle is possible from 20° up to 120°, related to the minimum width.

Engraving X060 - 30° Micro Engraving Insert

NEW



Radius Angled Form

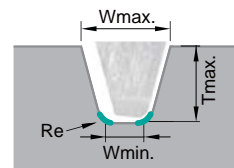


Radius Form



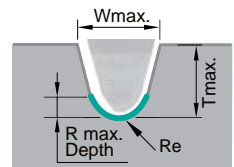
▶ Insert >>

- NC2032:** • For all kinds of steel from < 40 HRC, carbon steel, alloy steel, and cast iron.
- NC2035:** • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.
- XP9001:** • Mirror polished, for non-ferrous metal, aluminum, brass, copper, plastic, acrylic.



Radius Angled Form

Code	Parts No.	Coating	Grade	Diagram	Dimensions			Wmin.	Wmax.	Tmax.
					L	S	Re			
01X0136	X060A30W010R	NC2032	TiALN		6	2.05	0.02	0.10	0.37	0.5
01X0137		NC2035	ALDURA							
01X0138		XP9001	Polished							
01X0140	X060A30W020R	NC2032	TiALN		6	2.05	0.04	0.20	0.74	1.0
01X0141		NC2035	ALDURA							
01X0142		XP9001	Polished							

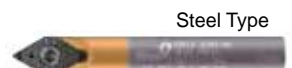
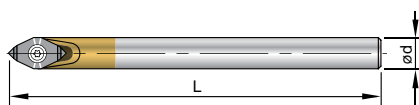


Radius Form

Code	Parts No.	Coating	Grade	Diagram	Dimensions			R max. Depth	Wmax.	Tmax.
					L	S	Re			
01X0080	X060A30R010	NC2032	TiALN		6	2.05	0.1	0.07	0.42	0.5
01X0118		NC2035	ALDURA							
01X0130		XP9001	Polished							
01X0119	X060A30R020	NC2032	TiALN		6	2.05	0.2	0.15	0.84	1.0
01X0132		NC2035	ALDURA							
01X0134		XP9001	Polished							

▶ Holder >>

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



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

Engraving X060 - 45° Micro Engraving Insert



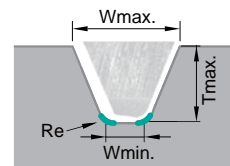
Radius Angled Form

Radius Form



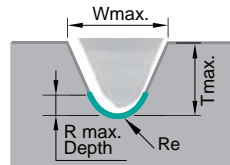
► Insert >>

- NC2032:** • For all kinds of steel from < 40 HRC, carbon steel, alloy steel, and cast iron.
- NC2035:** • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.
- XP9001:** • Mirror polished, for non-ferrous metal, aluminum, brass, copper, plastic, acrylic.



Radius Angled Form

Code	Parts No.	Coating	Grade	Diagram	Dimensions			Wmin.	Wmax.	Tmax.	
					L	S	Re				
01X0105	NC2032	TiAlN	K20F		6	2.05	0.02	0.10	0.52	0.5	
01X0097	X060A45W010R	NC2035			ALDURA	6	2.05	0.04	0.20	1.03	1.0
01X0152	XP9001	Polished			6	2.05	0.04	0.20	1.03	1.0	
01X0021	NC2032	TiAlN			6	2.05	0.04	0.20	1.03	1.0	
01X0153	X060A45W020R	NC2035			ALDURA	6	2.05	0.04	0.20	1.03	1.0
01X0154	XP9001	Polished			6	2.05	0.04	0.20	1.03	1.0	

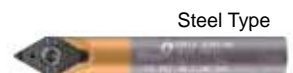
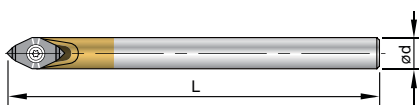


Radius Form

Code	Parts No.	Coating	Grade	Diagram	Dimensions			R max. Depth	Wmax.	Tmax.	
					L	S	Re				
01X0011	NC2032	TiAlN	K20F		6	2.05	0.1	0.06	0.55	0.5	
01X0012	X060A45R010	NC2035			ALDURA	6	2.05	0.2	0.12	1.1	1.0
01X0148	XP9001	Polished			6	2.05	0.2	0.12	1.1	1.0	
01X0013	NC2032	TiAlN			6	2.05	0.2	0.12	1.1	1.0	
01X0149	X060A45R020	NC2035			ALDURA	6	2.05	0.2	0.12	1.1	1.0
01X0150	XP9001	Polished			6	2.05	0.2	0.12	1.1	1.0	

► Holder >>

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



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

Engraving X060 - 60° Micro Engraving Insert

NEW



Radius Angled Form

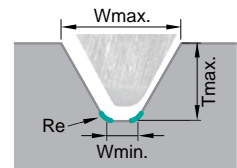


Radius Form



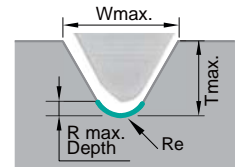
▶ Insert >>

- NC2032:** • For all kinds of steel from < 40 HRC, carbon steel, alloy steel, and cast iron.
- NC2035:** • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.
- XP9001:** • Mirror polished, for non-ferrous metal, aluminum, brass, copper, plastic, acrylic.



Radius Angled Form

Code	Parts No.	Coating	Grade	Diagram	Dimensions			Wmin.	Wmax.	Tmax.
					L	S	Re			
01X0057	NC2032	TiALN	K20F		6	2.05	0.02	0.10	0.68	0.5
01X0161	X060A60W010R	NC2035			ALDURA					
01X0162	XP9001	Polished								
01X0063	NC2032	TiALN								
01X0165	X060A60W020R	NC2035			ALDURA					
01X0166	XP9001	Polished								

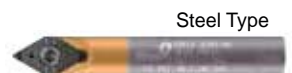
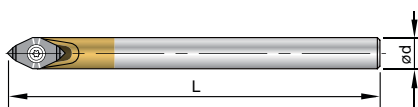


Radius Form

Code	Parts No.	Coating	Grade	Diagram	Dimensions			R max. Depth	Wmax.	Tmax.
					L	S	Re			
01X0009	NC2032	TiALN	K20F		6	2.05	0.1	0.05	0.69	0.5
01X0076	X060A60R010	NC2035			ALDURA					
01X0157	XP9001	Polished								
01X0117	NC2032	TiALN								
01X0158	X060A60R020	NC2035			ALDURA					
01X0159	XP9001	Polished								

▶ Holder >>

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



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

Cutting Data

⚠ Before you start, please pay attention the following conditions

- The downward feed rate of the Z-axis should be reduced to 50% of the table feed rate.
- Cutting fluid emulsion is recommended for engraving on steel, stainless steel, Al and Al-alloy; blown cooled air is recommended for engraving on cast iron and plastic.
- The tool shank runout should be below 0.01 mm.
- Shrink fit 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.

▶ 30° Engraving X060 Insert >>

Work Material	S (r.p.m.)	f (mm/rev.)				Grade of Insert
		Radius Angled Form		Radius Form		
		X060A30W010R	X060A30W020R	X060A30R010	X060A30R020	
Carbon steel C < 0.3%	8000 ~ 40000	0.0010 ~ 0.006	0.001 ~ 0.010	0.0010 ~ 0.010	0.002 ~ 0.015	NC2032
Carbon steel C > 0.3%		0.0010 ~ 0.005	0.001 ~ 0.008	0.0010 ~ 0.008	0.002 ~ 0.012	NC2032
Alloy steel		0.0005 ~ 0.005	0.001 ~ 0.006	0.0010 ~ 0.005	0.002 ~ 0.010	NC2032, NC2035
Stainless Steel		0.0005 ~ 0.004	0.001 ~ 0.006	0.0010 ~ 0.005	0.002 ~ 0.010	NC2032
Cast iron		0.0010 ~ 0.005	0.001 ~ 0.006	0.0010 ~ 0.006	0.002 ~ 0.010	NC2032
Aluminum		0.0010 ~ 0.008	0.001 ~ 0.012	0.0010 ~ 0.010	0.002 ~ 0.020	XP9001
Copper, Brass		0.0010 ~ 0.008	0.001 ~ 0.012	0.0010 ~ 0.010	0.002 ~ 0.020	XP9001
Hardened Steel Up to 56 HRC		0.0005 ~ 0.003	0.001 ~ 0.005	0.0005 ~ 0.003	0.002 ~ 0.006	NC2035

▶ 45° Engraving X060 Insert >>

Work Material	S (r.p.m.)	f (mm/rev.)				Grade of Insert
		Radius Angled Form		Radius Form		
		X060A45W010R	X060A45W020R	X060A45R010	X060A45R020	
Carbon steel C < 0.3%	8000 ~ 40000	0.001 ~ 0.010	0.002 ~ 0.012	0.001 ~ 0.010	0.002 ~ 0.015	NC2032
Carbon steel C > 0.3%		0.001 ~ 0.008	0.002 ~ 0.010	0.001 ~ 0.008	0.002 ~ 0.012	NC2032
Alloy steel		0.001 ~ 0.006	0.002 ~ 0.010	0.001 ~ 0.006	0.002 ~ 0.010	NC2032, NC2035
Stainless Steel		0.001 ~ 0.006	0.002 ~ 0.008	0.001 ~ 0.006	0.002 ~ 0.010	NC2032
Cast iron		0.001 ~ 0.008	0.002 ~ 0.010	0.001 ~ 0.008	0.002 ~ 0.010	NC2032
Aluminum		0.001 ~ 0.010	0.002 ~ 0.015	0.001 ~ 0.012	0.002 ~ 0.020	XP9001
Copper, Brass		0.001 ~ 0.010	0.002 ~ 0.015	0.001 ~ 0.012	0.002 ~ 0.020	XP9001
Hardened Steel Up to 56 HRC		0.001 ~ 0.004	0.002 ~ 0.006	0.001 ~ 0.004	0.002 ~ 0.006	NC2035

▶ 60° Engraving X060 Insert >>

Work Material	S (r.p.m.)	f (mm/rev.)				Grade of Insert
		Radius Angled Form		Radius Form		
		X060A60W010R	X060A60W020R	X060A60R010	X060A60R020	
Carbon steel C < 0.3%	8000 ~ 40000	0.001 ~ 0.010	0.002~0.012	0.001~0.010	0.002~0.015	NC2032
Carbon steel C > 0.3%		0.001 ~ 0.010	0.002~0.010	0.001~0.010	0.002~0.012	NC2032
Alloy steel		0.001 ~ 0.008	0.002~0.010	0.001~0.008	0.002~0.010	NC2032, NC2035
Stainless Steel		0.001 ~ 0.006	0.002~0.008	0.001~0.006	0.002~0.010	NC2032
Cast iron		0.001 ~ 0.010	0.002~0.010	0.001~0.010	0.002~0.010	NC2032
Aluminum		0.001 ~ 0.012	0.002~0.015	0.001~0.015	0.002~0.020	XP9001
Copper, Brass		0.001 ~ 0.012	0.002~0.015	0.001~0.015	0.002~0.020	XP9001
Hardened Steel Up to 56 HRC		0.001 ~ 0.005	0.002~0.006	0.001~0.005	0.002~0.006	NC2035



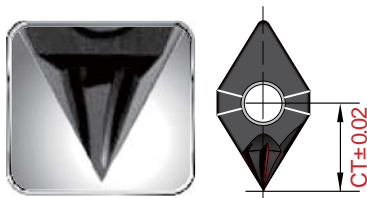
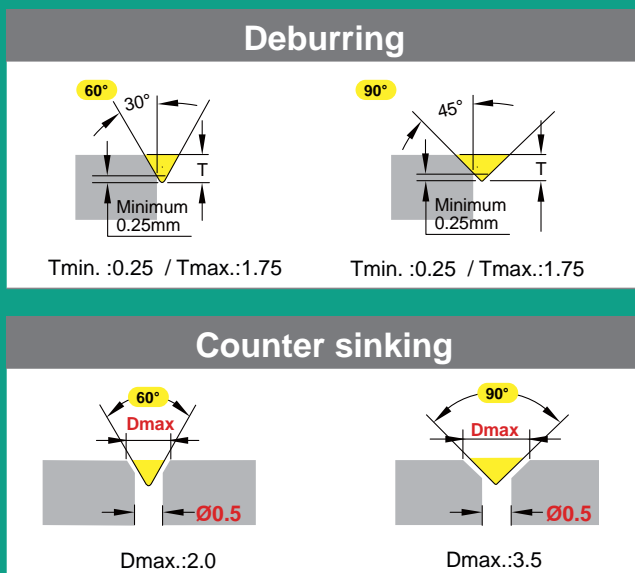
NC Deburring

Achieve high speed and high feed deburring and countersinking on CNC machine.

Retain exceptional positional accuracy of the deburring depth and diameter.

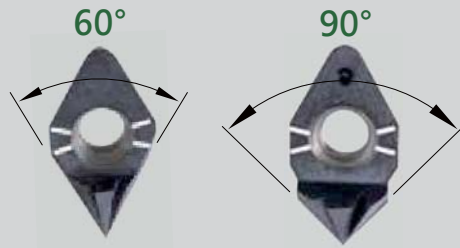
Features

- Ideal for fine hole deburring.
- Smallest counter sink diameter $\varnothing 0.5$ mm.
- Using same tool holder of X060 engraving tool.



Insert has 6 flutes, capable of running 6 times higher feed rate.

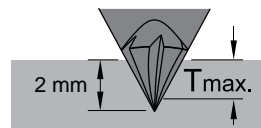




▶ Inserts >>

- Each insert with 6 flutes, single edge.
- TiAlN coated carbide insert can stand very long life.

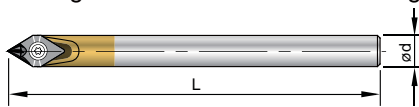
NC2032: • For all kinds of steel from < 40 HRC, carbon steel, alloy steel, cast iron, aluminum and non-ferrous metal..



Code	Parts No.	Angle	Coating	Grade	Diagram	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°									

▶ Holder >>

- Using same tool holder of X060 engraving tool.



Code	Parts No.	Shank	Ød	L	Screw	Key
69X001	00-99619-X060-06	steel		40		
69X002	00-99619-X060-06L	Carbide	6	60	NS-22044 0.9Nm	NK-T7
69X003	00-99619-X060-06LS	steel		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	

▶ Cutting Data >>

Work Material	S (r.p.m.)	Feed Rate (mm / tooth)	Grade of Insert
Carbon Steel C<0.3%	8000~40000	0.005-0.05	NC2032
Alloy steel	6000~35000	0.005-0.04	
Stainless Steel	6000~25000	0.005-0.03	
Cast iron	6000~35000	0.005-0.03	
Aluminum, Non-Ferrous Metal	8000~40000	0.005-0.05	



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

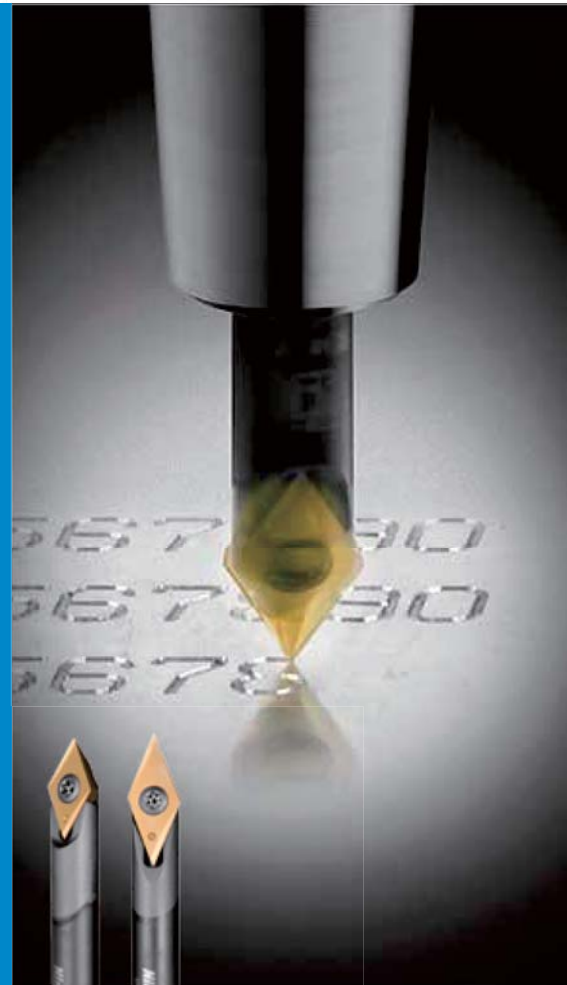
- Full peripherally ground insert to ensure efficient repeatability.
- It performs excellently without producing any burrs, especially in copper, aluminum and stainless steel.

► High Speed, High Feed Rate

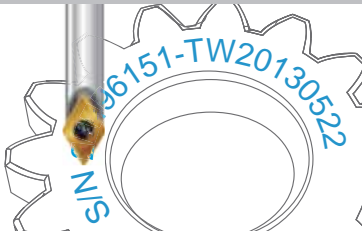
- Designed to run at high speed, up to 40,000 r.p.m.
- Feed rate 0.08mm (0.003") / rev. apply to aluminum; 0.05mm (0.002") / rev. apply to stainless steel.
- Reduces engraving cycle time!

► Economical

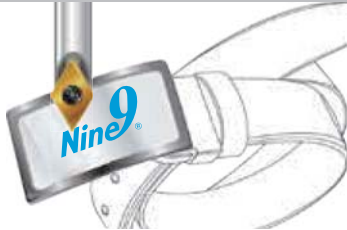
- Each indexable insert has 2 cutting edges.
- No resharpener required. Tool length is unchanged.
- No need to reset after changing insert or cutting edge.
- Excellent repeatability!



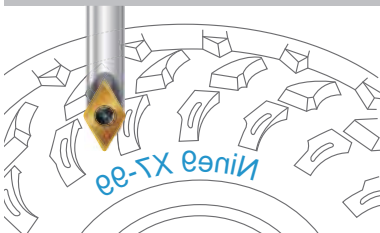
Serial number



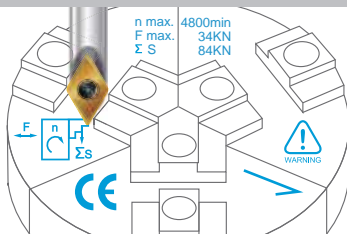
Logo outlines



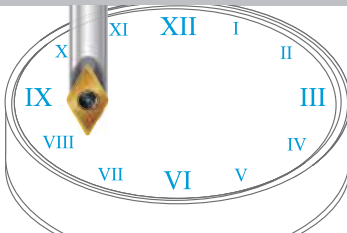
Mold & Die



Product info



Dial scales



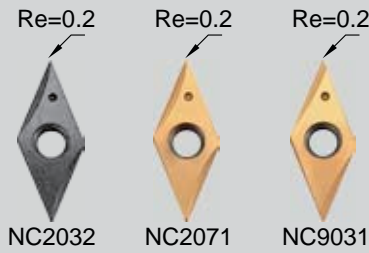
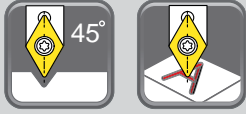
► Applications

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



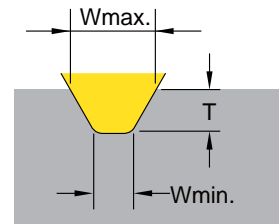
- ▲ Widely be used for marking on machine components, medical components, gun components, mold and die, automotive parts, gears, bearings and luxury goods.

Engraving Tool 45°



► Inserts >>

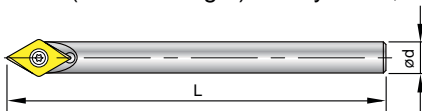
- NC2032:**
 - Long tool life
 - For all kinds of steel from 30~50 HRC, carbon steel, alloy steel, and cast iron.
- NC2071:**
 - Strong edge on chip groove best suited for min. DOC 0.2 mm
 - Universal grade for all kinds of steel <30 HRC, non-ferrous metal and stainless steel.
- NC9031:**
 - Fully positive ground rake angle, very sharp edge for shallow engraving.
 - For non-ferrous metal such as aluminum, brass, copper, titanium, plastic and acrylic.



Code	Parts No.	Coating	Grade	Dimensions			W		T	
				L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
0104501	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	Screw / Key
691001	00-99619-V045-06	45°	6	40	NS-22044 0.9Nm NK-T7
* 691002	00-99619-V045-06L			60	
* 691003	00-99619-V045-06XL			100	

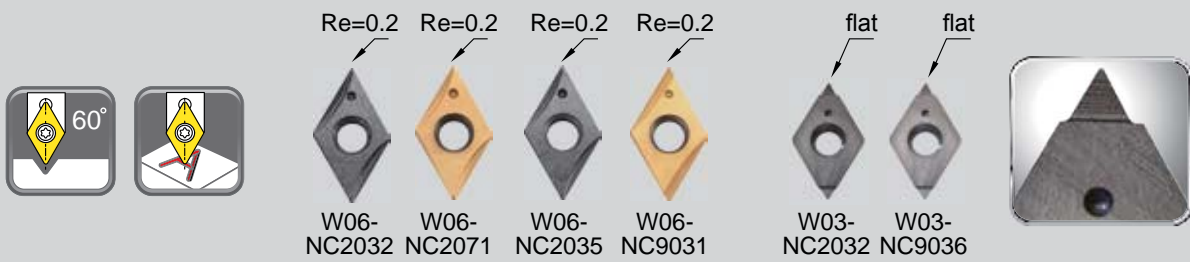
Note: • DC Slim chuck, see page 70.

► Starter Kit >>

Code	Parts No.	Shank Ø	Angle	Insert included	Content
691201-4501	00-99619-V045-03K-71	Ø6	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	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	

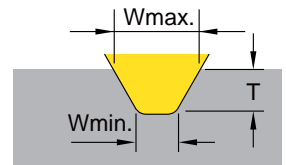


Engraving Tool 60°



▶ Inserts >>

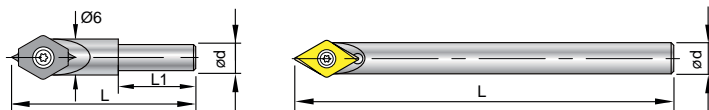
- NC2032:**
 - Long tool life
 - For all kinds of steel from 30~50 HRC, carbon steel, alloy steel, and cast iron.
- NC2071:**
 - Strong edge on chip groove best suited for min. DOC 0.2 mm
 - Universal grade for all kinds of steel <30HRC, non-ferrous metal and stainless steel.
- NC2035:**
 - ALDURA coating, 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 engraving.
 - For non-ferrous metals such as aluminum, brass, copper, titanium, plastic and acrylic.
- NC9036:**
 - DLC coating, very sharp edge produces excellent surface finish.
 - For non ferrous metals such as aluminum, brass, copper, titanium, plastic and acrylic.



Code	Parts No.	Coating	Grade	Image	Dimensions			W		T	
					L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
0106001	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	
Code	Parts No.	Coating	Grade	Image	Dimensions			W		T	
					L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
0106006	NC2032	TiAlN	K20F		6.35	2.0	---	0.25	1.1	0.05	0.8
0106007	NC9036	DLC						0.25		0.05	

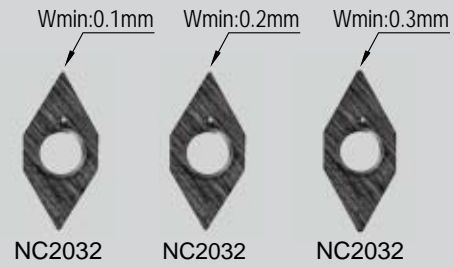
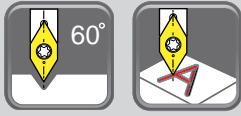
▶ Holder >>

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



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

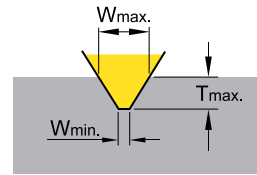
W060 Engraving Tools



▶ Inserts >>

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

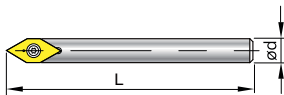
NC2032: • Universal grade for all unhardened steel.



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

- Made from steel.



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

N9MT080201W



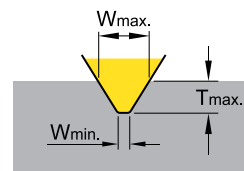
▶ Inserts >>

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

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

NC40: • Universal grade for all unhardened steel.

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



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




▶ Mini Spotting >>

- Engraving inserts can be used for small diameter spotting.
- *Best positioning accuracy!
- *Better surface with spotting by NC Spot Drill in advance.

Tool / Insert	Spindle Speed / Feed Rate	With Spotting	Without Spotting
99616-10 + N9MT080201W NC40	S 3,000 25,000 r.p.m.		
	f 0.01 0.02 mm/rev.		

Performance

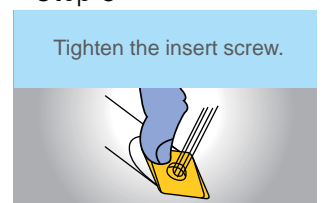
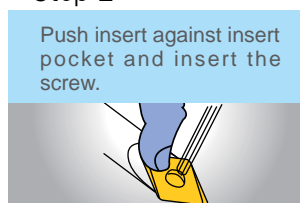
► Comparison >>

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

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

► Attention >>

- **Selecting the speed and feed rate**
 - Select the spindle speed and feed rate according to the selected material's cutting data.
 - The downward feed rate of the Z-axis should be reduced to **50%** of the table feed rate.
- **Cutting fluid and cooling condition**
 - Emulsion is recommended for engraving on steel, stainless steel, Al and Al-alloy.
 - Blown cooled air is recommended for engraving on cast iron and plastic.
- **Setting-up the tool holder**
 - The tool shank runout should be below 0.01 mm.
 - Shrink fit chucks, hydraulic chuck and high precision spring collet chucks are recommended.
 - Pre-balance the tool holder minimum G6.3/10,000 R.P.M. is necessary.
- **Clamping the engraving insert**
 - Place and hold the insert in the insert pocket against the positioning side.
 - See illustration below:
 - Step-1
 - Step-2
 - Step-3



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



Engraving Tool

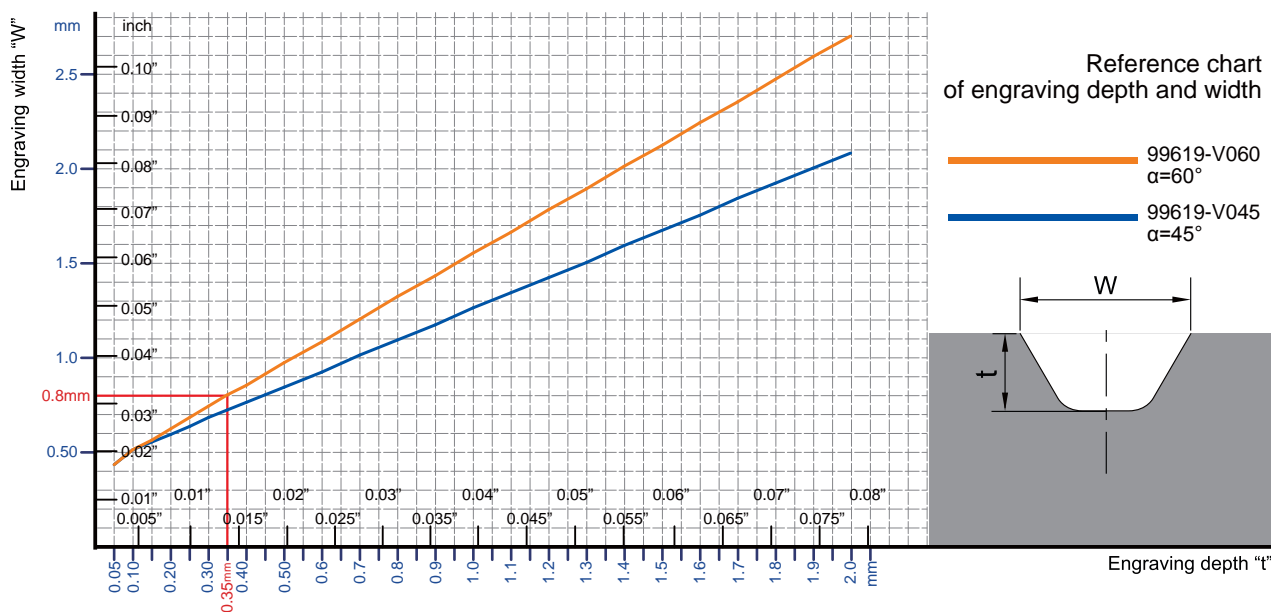
Cutting Data

▶ 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 >>



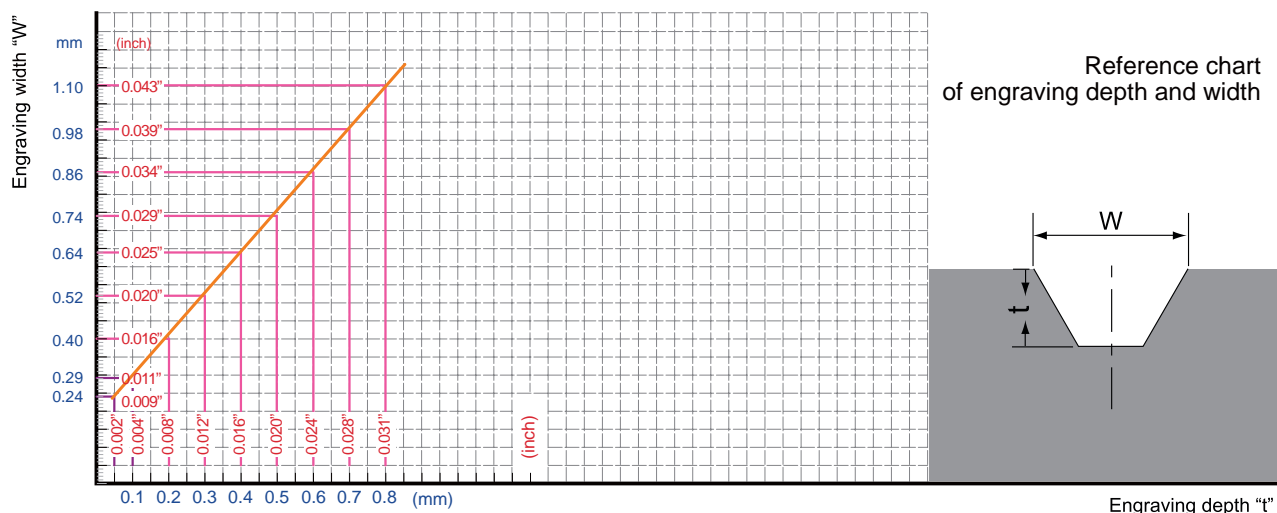
Work Material	S RPM	f (mm/rev.)	Grade of Insert
Carbon steel	5000~40000	0.008~0.05	NC2071,NC2032
Alloy steel	5000~40000	0.008~0.03	NC2032,NC2071
Stainless Steel	5000~40000	0.008~0.05	NC2071,NC9031
Cast iron	5000~40000	0.008~0.03	NC2032
Aluminum ≧ Non-Ferrous Metal	5000~40000	0.008~0.08	NC2071,NC9031
Hardened steel up to 56 HRC	6000~35000	0.003~0.01	NC2035

Tmax.:2mm

Material	Ap	Tmax.:2mm							
		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	Tmax.:0.8mm						
		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



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.

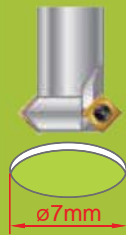
Features

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 $\varnothing 7$ 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.

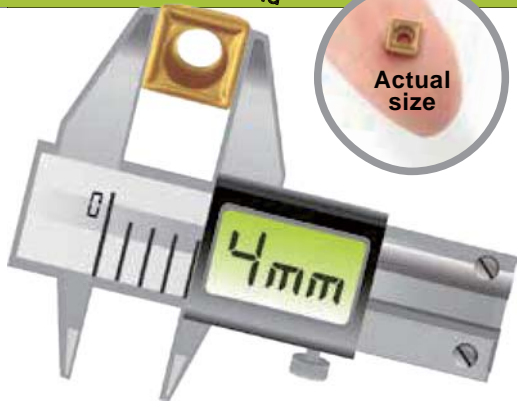


▶ Applications >>

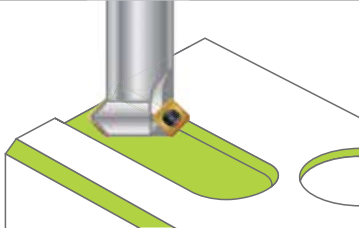
- 90° counter sink and 45° chamfering.
- For counter sink, circular chamfering, contour chamfering and face milling.



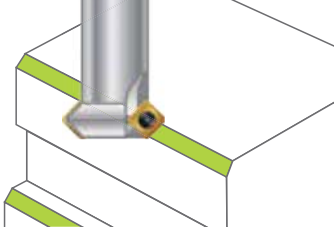
Smallest
in the world



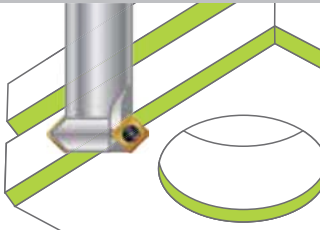
Face Milling



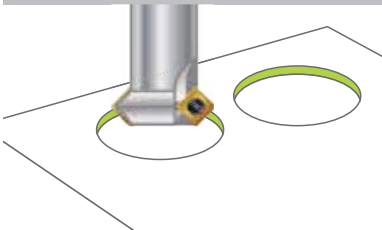
Chamfering



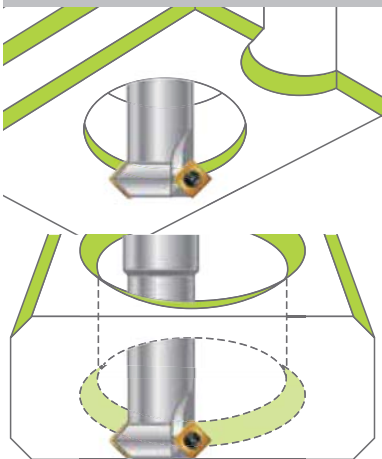
Back Chamfering



Countersink



Back Circular Chamfering



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

Indexable Chamfer Mill

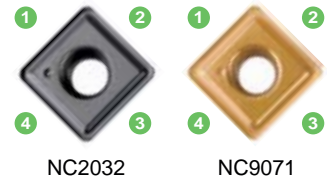
► Features >>

- 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 >>

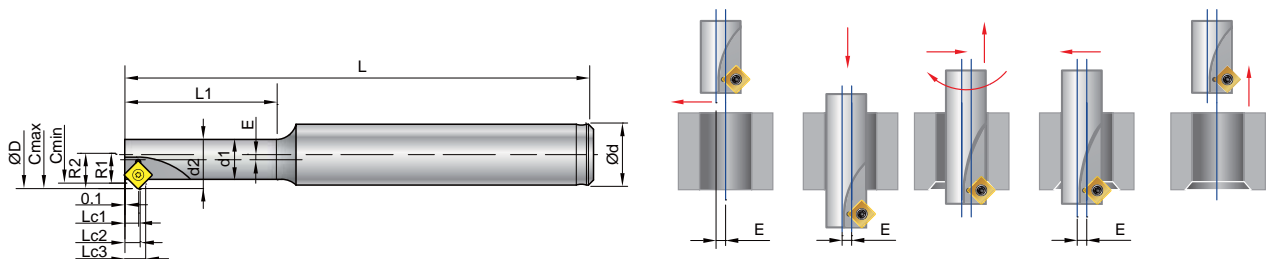
- NC2032:**
- AlTiN coating, very long tool life.
 - For carbon steel, alloy steel, cast iron and hardened steel up to 56HRC
 - Each insert has 4 cutting edges.
- NC9071:**
- TiN coating, very sharp cutting edge produces excellent surface finish
 - For non ferrous metal, aluminum, aluminum-alloy, brass, copper and stainless steel.
 - Each insert has 4 cutting edges.



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

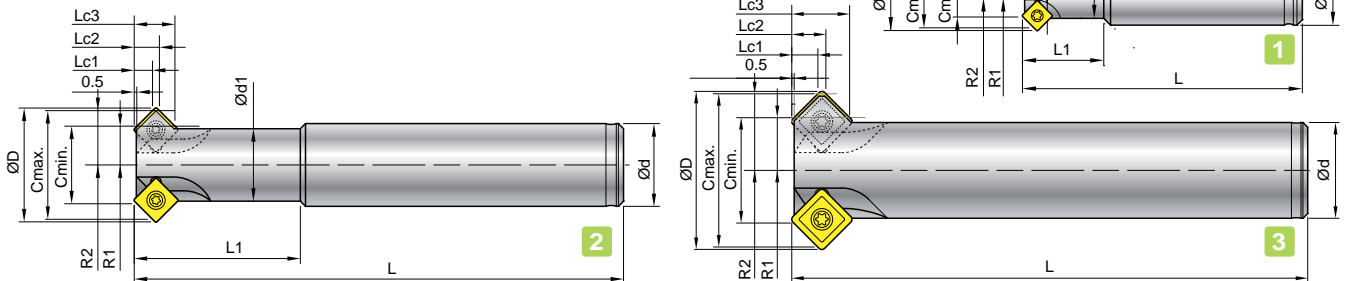
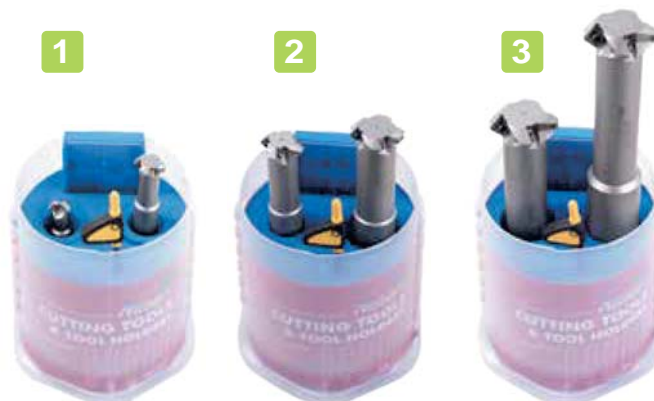


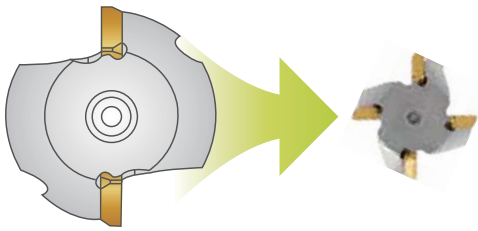
Fig	Code	Parts No.	Type	Cmin ø	Cmax ø	ød	ød1	øD	R1	R2	L	L1	Lc1	Lc2	Lc3	z	insert Screw / Key
1	701001	00-99616-C10	BC10-C07-60	7	11	10	7.5	12	3.8	4.3	60	15	2.6	2.9	4.6	2	N9GX04T002 NS-18037 0.6Nm NK-T6
	701002	00-99616-C20	BC12-C11-100	11	16	12	9.6	16.2	5.9	8	100	25	2.6	2.9	5.0	4	
2	703001	00-99616-C30	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
	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





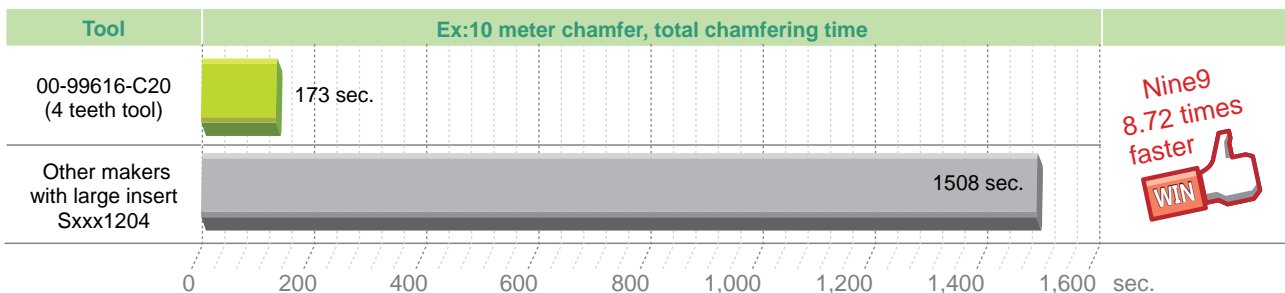
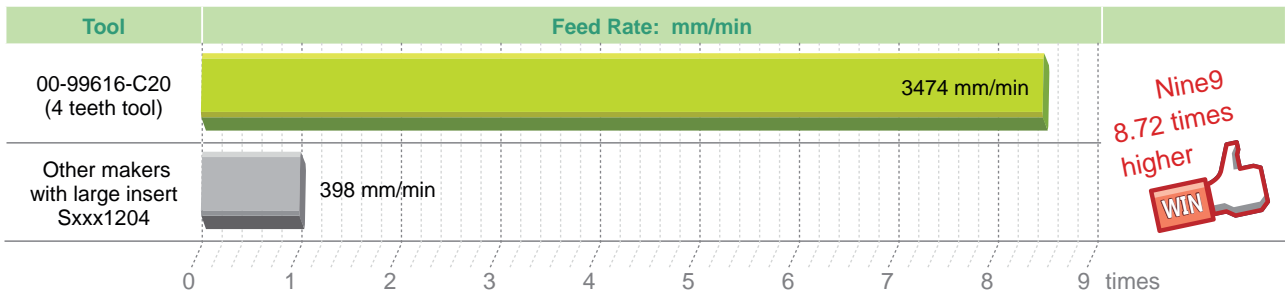
Feed Rate =
Feed per Tooth x Spindle Speed x **No. of Flute** mm/min.

UP **Spindle Speed =** $\frac{\text{Cutting Speed} \times 1000}{\pi \times C \text{min.}}$

► 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 >>



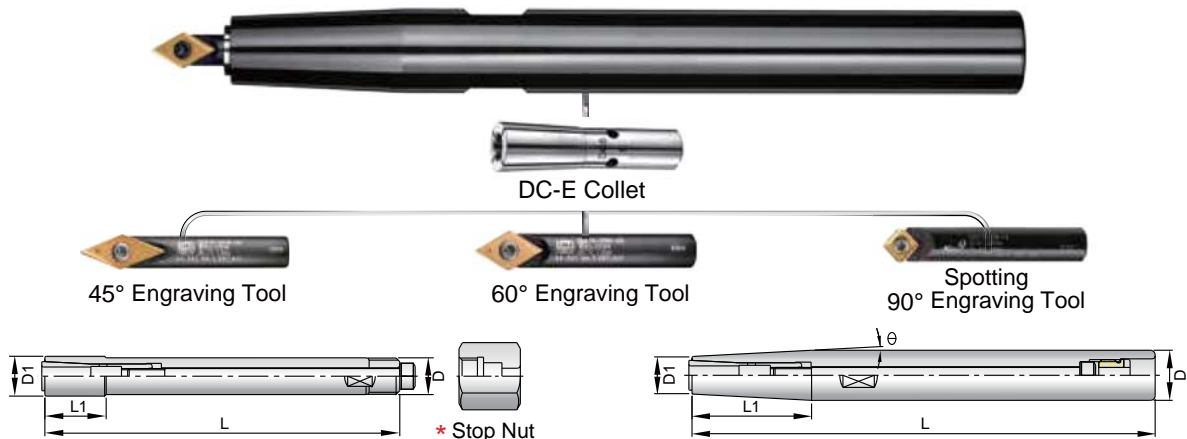
Workpiece Material		Grade of insert	Cutting Speed VC m/min.	Feed Rate mm / tooth	
Material Group	Sample Code (JIS)			N9GX04T002	
				Max. Chamfering 1.5mm	
Carbon steel C<0.3%	SS400	NC9071	60-80-120	0.02 ~ 0.07	
Carbon steel C>0.3%	S50C, P5	NC2032	60-80-120	0.02 ~ 0.07	
Low alloy steel C<0.3%	SCM420	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		
Material Group	Sample Code (JIS)			N9GX04T002	N9GX060204	N9GX090308
				Max. Chamfering 1.5mm	Max. Chamfering 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 >>

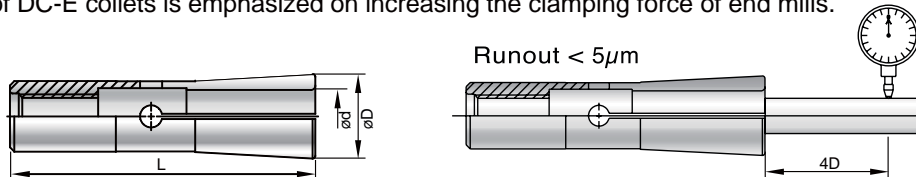


Parts No.	Type of Holder	d	L	L1	øD	D1	θ	Collet	Back Screw	Stop Screw	Hexagon Key	Stop Nut
0-329090-102	ST10-DC4-90	2~4	90	14	12	9	--	DC4	M4 * L60	--	0-301940~632	TP-M8
-112	ST12-DC4-120	2~4	120	38	12	9	3°		M4 * L85	OP-M8		--
0-329090-212	ST12-DC6-120	2~6	120	40	12	14	--		M5 * L95	--		TP-M12
-222	ST16-DC6-150	2~6	150	38	16	14	3°	DC6	M5 * L100	OP-M10	0-301940~642	--
-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.14)
99616-14-M8 (P.16)

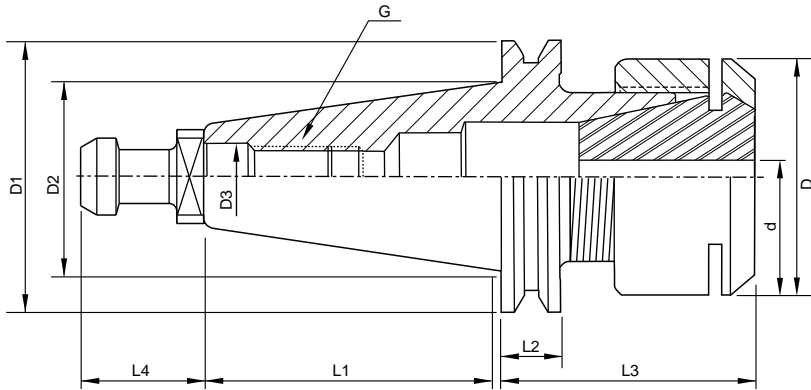


Order No.	Parts No.	øD	T	L	M
00-99801-12W	BC12-100M06W	12	60	100	M6xP1.0
00-99801-14W	BC14-120M08W	14	70	120	M8xP1.25
00-99801-16W	BC16-150M08W	16	80	150	M8xP1.25

ISO 20/25 Tool Holder for Engraving Machine

► Tool Holder >>

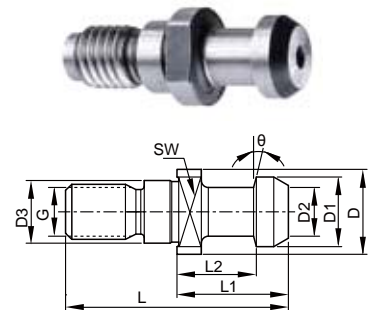
- Runout: 0.01mm (4xD).
- Max. speed: 50,000 r.p.m.
- Applied with pull stud and nut.



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

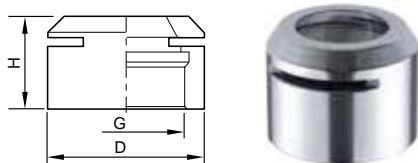
► Pull Stud >>

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		Parts No: 300100-4XX	
Size	Range	Size	Range
ER16-3*	3-2	ER20-3	3-2
ER16-4	4-3	ER20-4	4-3
ER16-5	5-4	ER20-5	5-4
ER16-6	6-5	ER20-6	6-5
ER16-7	7-6	ER20-7	7-6
ER16-8	8-7	ER20-8	8-7
ER16-9	9-8	ER20-9	9-8
ER16-10	10-9	ER20-10*	10-9
		ER20-11	11-10
		ER20-12	12-11
		ER20-13	13-12

* Ordering example
ER16-3:300100-303-AA

* Ordering example
ER20-10:300100-410-AA

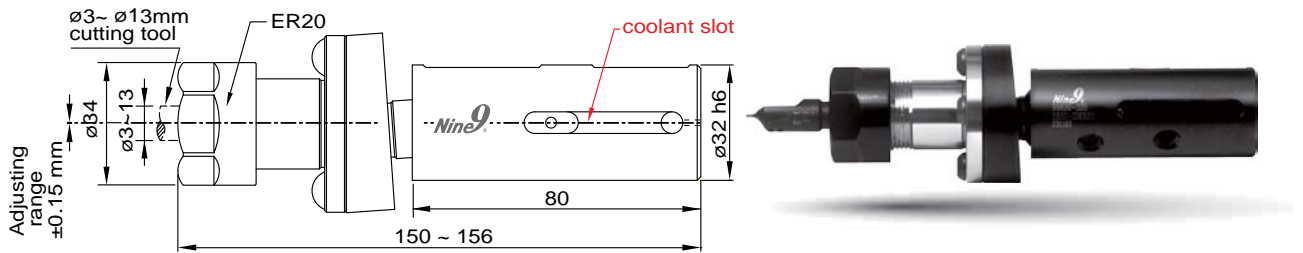
Center Height Adjusting Sleeve

▶ 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.

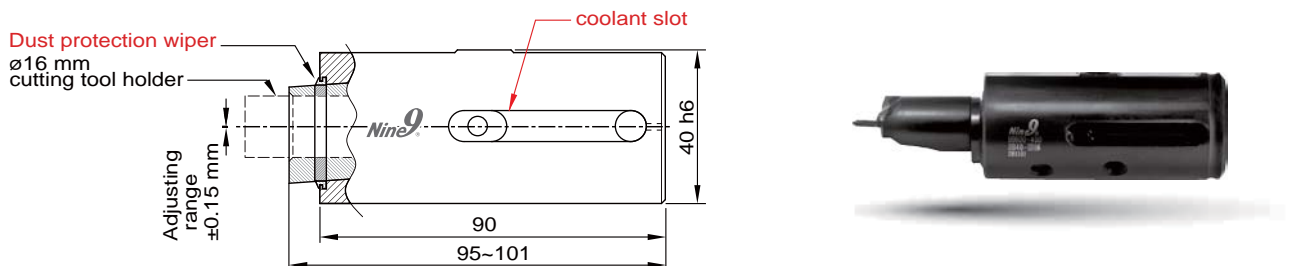
▶ Parts No.:00-99600-320H >>

▶ Type : SB32-IDER20



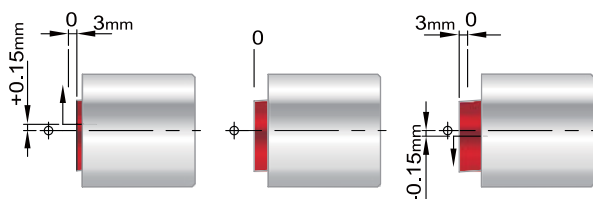
▶ Parts No.:00-99600-400H >>

▶ Type : SB32-ID16

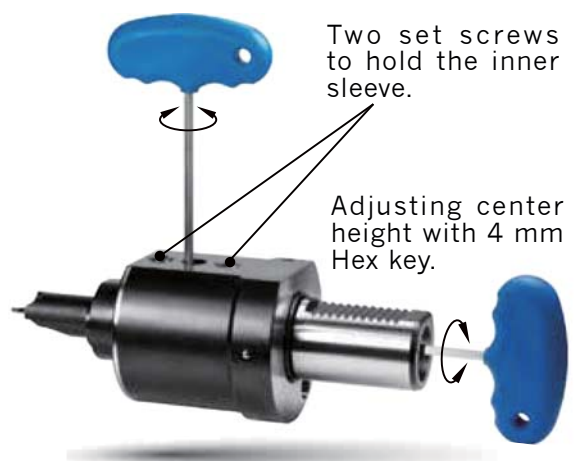


▶ Applications >>

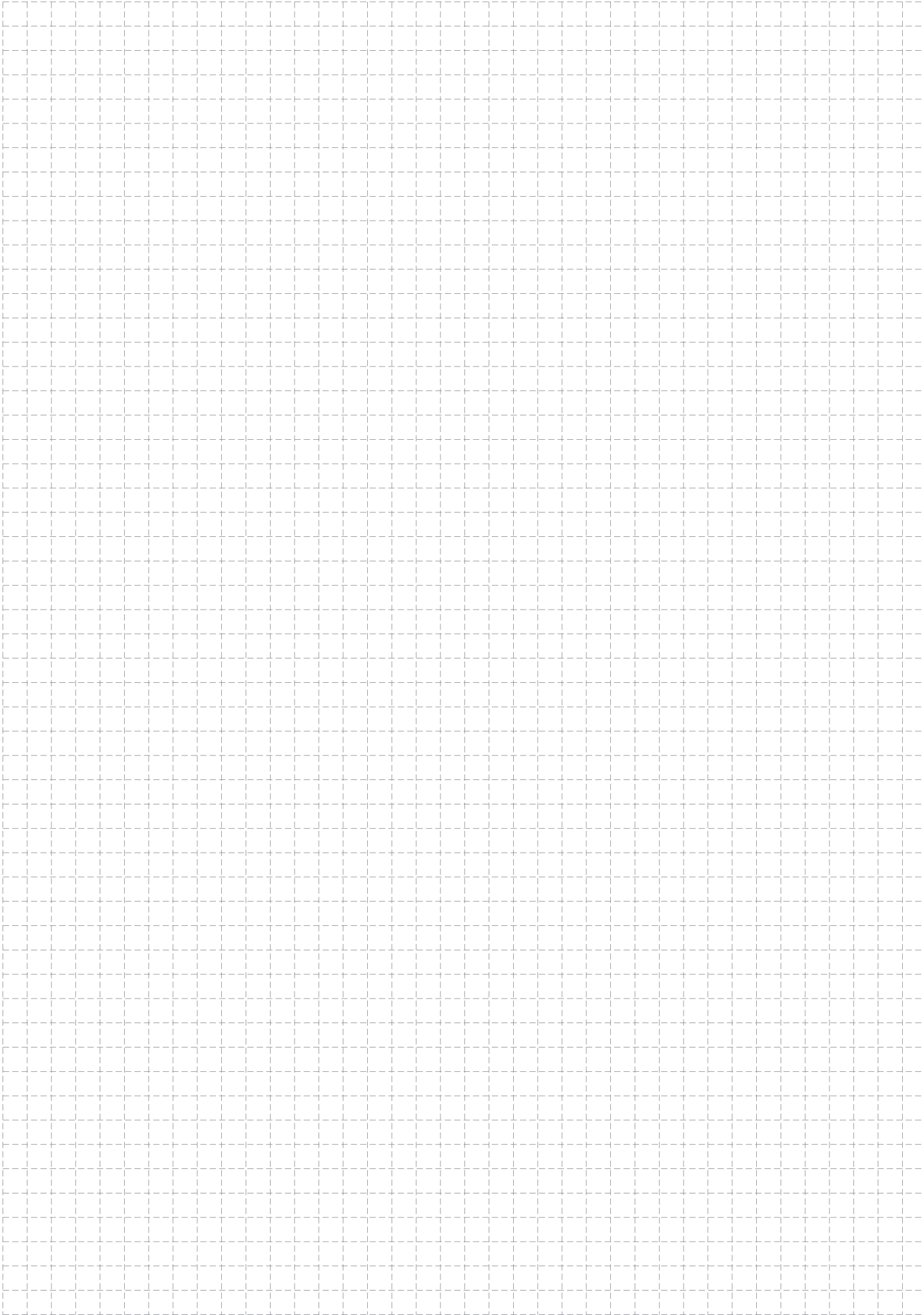
- Used when the CNC lathes need to adjust the center height.
- This sleeve can be clamped by VDI 40, VDI 50 E2 tool holders, and other type of internal turning tool holders.
- Center height adjusting range: $\pm 0.15\text{ mm}$ (.006").
- Total axial movement is 6mm (.236").



Tightening screw 4mm Hex key



Notes





JIMMORE International Corp.



Distributor