Nine9®

CUTTING TOOLS & TOOL HOLDERS

E®

2018

EVEREDE TOOL CO.®

Indexable tooling
since 1932

Nine9®

Everede Tool Company has been
the exclusive U.S.A. representative
since 2002.

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 , i-Center, Engraving, Super drill, Chamfer mill, Boring tool, NC Helix Drill. Those established Nine9 as a market leader and innovator in the cutting tool field.

Contents

Economy pack for larger end users. Do not miss it!

STARTER KITS

• NC Spot Drill-CT 60° / 82° / 90° / 100° / 120° / 142°

Fig.	Parts No.	Angle	Insert	Content	Page
1	99616-13V-5/8.12 2071 KIT	60°	V9MT12T3CT-NC2071	1 x 5/8” holder + 3 inserts + 1 key	P. 11
2	99619-V82-5/8.12 2071 KIT	82°	V08212T3-NC2071	1 x 5/8” holder + 3 inserts + 1 key	P. 12
3	99616-06-1/4.05 2071 KIT	90°	N9MT05T1CT-NC2071	1 x 1/4” holder + 6 inserts + 1 key	P. 13
	99616-3/8.08 NC40 KIT		N9MT080208CT-NC40	1 x 3/8” holder + 6 inserts + 1 key	P. 14
	99616-3/8.08 NC10 KIT		N9MT080204CT-NC10		
	99616-14-1/2.11 NC40 KIT		N9MT11T3CT-NC40	1 x 1/2” holder + 6 inserts + 1 key	P. 15
	99616-14-1/2.11 NC10 KIT		N9MT11T3CT-NC10		
	99616-14-1/2.11 NC60 KIT		N9MT11T3CT-NC60		
	99616-14-5/8.11 NC40 KIT		N9MT11T3CT-NC40	1 x 5/8” holder + 6 inserts + 1 key	P. 15
	99616-14-5/8.11 NC10 KIT		N9MT11T3CT-NC10		
	99616-14-5/8.11 NC60 KIT		N9MT11T3CT-NC60		
4	99616-22-3/4.17 2071 KIT	90°	N9MT1704CT-NC2071	1 x 3/4” holder + 3 inserts + 1 key	P. 16
5	99619-142-5/8.08 2071 KIT	142°	V1420803-NC2071	1 x 5/8” holder + 3 inserts + 1 key	P. 19

• NC Spot Drill Kit Package

Fig.	Parts No.	Ød	Content	Page
6	99616-3/8 PACK	3/8”	5 x tool holders + 1 key	P. 14
	99616-14-5/8 PACK	5/8”	5 x tool holders + 1 key	P. 15

1


2


3


4


5


6


STARTER KITS

• V045 / V060 Engraving Tool Kit

Parts No.	Angle	Insert included	Content	Page
99619-V045-03K-71	45°	V04506T1W06-2071	1 x 40 L holder + 3 inserts + 1 key	P. 44
99619-V045-03K-32		V04506T1W06-2032		
99619-V045-03K-31		V04506T1W06-9031		
99619-V060-03K-71	60°	V06006T1W06-2071		P. 45
99619-V060-03K-32		V06006T1W06-2032		
99619-V060-03K-35		V06006T1W06-2035		
99619-V060-03K-31		V06006T1W06-9031		

• SW 60° / 90° Engraving Tools Kit

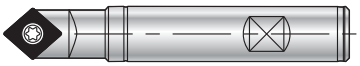
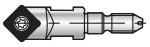
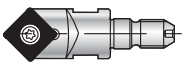
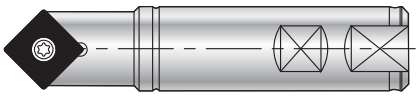
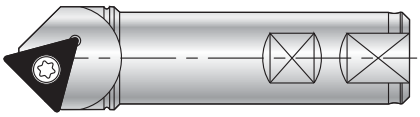
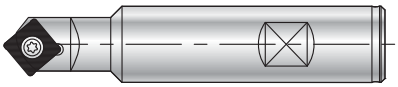
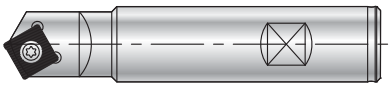
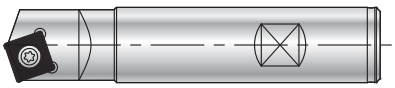
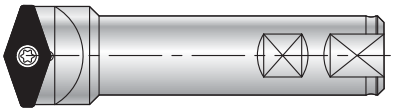
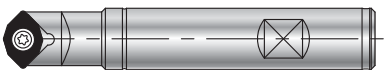
Parts No.	Angle	Insert included	Content	Page
99616-3/8.08W-60 NC40 KIT	60°	N9MT080201W60-NC40	1 x Ø3/8" holder + 2 inserts + 1 key	P. 46
99616-3/8.08W NC40 KIT	90°	N9MT080201W-NC40		
99616-3/8.08W NC10 KIT		N9MT080201W-NC10		

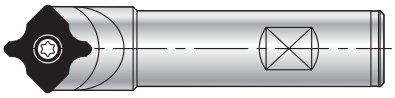
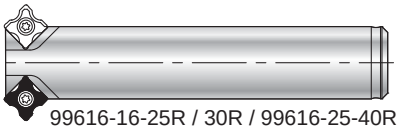
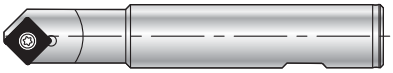
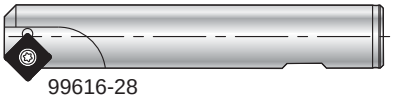
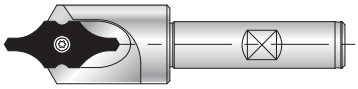
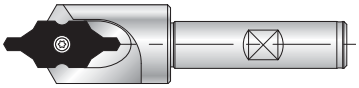
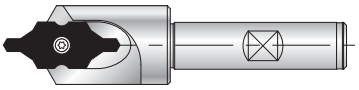
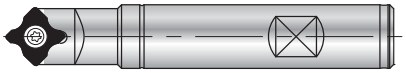
• NC Deburring Kit

Parts No.	Angle	Insert included	Content	Page
99619-X060-DB60-02K-32	60°	X060A60T6-NC2032	1 x 60 L Carbide holder 1 x T7 key 2 x inserts	P. 50
99619-X060-DB90-02K-32	90°	X060A90T6-NC2032		

• Chamfering Kit

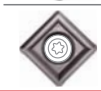
Fig	Parts No.	Insert included	Holder included	Content	Page
1	99616-C1020-32	N9GX04T002-NC2032	99616-C10 + 99616-C20	2 x holders + 10 inserts + 1 key	P. 53
	99616-C1020-71	N9GX04T002-NC9071			
2	99616-C3040-32	N9GX060204-NC2032	99616-C30 + 99616-C40		
	99616-C3040-71	N9GX060204-NC9071			
3	99616-C5052-32	N9GX090308-NC2032	99616-C50 + 99616-C52		
	99616-C5052-71	N9GX090308-NC9071			

Angle	Holder	Inserts	D min.	D max.	Spotting	Chamfering	Grooving	Engraving	Drilling	Page
	NC Spot Drill									
60°	 99616-14...P60	 N9MT11T3P60	2 (0.079")	6.2 (0.244")	●	●		●		10
	 99616-09V	 V9MT0802	1 (0.039")	9 (0.354")	●	●	●	● Tmin=0.1 (0.004")		11
	 99616-13V	 V9MT12T3	2 (0.079")	13 (0.512")	●	●	●	● Tmin=0.1 (0.004")		11
82°	 99619-V082-3/8	 V0820802	2 (0.079")	9 (0.354")	●	●	●	● Tmin=0.1 (0.004")		12
	 99619-V082-5/8	 V08212T3	2 (0.079")	14 (0.551")	●	●	●	● Tmin=0.1 (0.004")		12
90°	 99616-06 / 08...	 N9MT05T1 / N9MT0602	1 (0.039")	8 (0.315")	●	●		● Tmin=0.1 (0.004")		13
	 99616-3/8	 N9MT0802	2 (0.079")	10 (0.394")	●	●	●	● Tmin=0.1 (0.004")		14
	 99616-10-M6									
	 99616-14...	 N9MT11T3	3 (0.118")	14 (0.551")	●	●	●	● Tmin=0.1 (0.004") (2 Cutting edges)		15
	 99616-14-M8							● Tmin=1.0 (0.040") (4 Cutting edges)		
	 99616-22...	 N9MT1704	3 (0.118")	22 (0.866")	●	●	●			16
	 99616-25-CT28	 N9MT2204	4 (0.157")	25 (0.984")	●	●				17
100°	 99616-3/4-100		3 (0.118")	16 (0.630")	●	●				18
120°	 99616-3/4-120	 N9MT11T3	3 (0.118")	17 (0.669")	●	●				
142°	 99616-3/4-142		3 (0.118")	18 (0.728")	●	●				
	 99619-V142...	 V1421604	2 (0.079")	32 (1.260")	●					19
145° + 90°	 99616-10 / 14 / 22 ...	 WSP / M4~3/8-16 UNC	3.3 (0.130")	13 (0.512")	●	●	●			20

Angle	Holder	Inserts	D min.	D max.	Spotting	Chamfering	Grooving	Engraving	Drilling	Page
Corner Rounding										
RC	 99616-06 /14...RC	 N9MT05 / N9MT11..RC (2 Cutting edges)	R 0.5 R 1/64”	R 3.0 R 1/8”		•				22 23
	 99616-22...RC	 N9MT1704RC (2 Cutting edges)	R 3/16”	R 1/4”		•				24
R	 99616-16-25R / 30R / 99616-25-40R	 N9MT11T3R (4 Cutting edges)	R1.0	R3.0		•				26
Large 45° Chamfering										
45°	 99616-18	 N9MT11T308LA	6 (0.236”)	18 (0.709”)		•				27
	 99616-28		16 (0.236”)	28 (1.102”)		•	* *Side grooving			
Center Drilling / i-Center										
R	 99616-IC...	 DIN332 Form R	1.0 (0.039”)	10 (0.394”)					•	34
60° + 120°	 99616-IC...	 DIN332 Form A+B	1.0 (0.039”)	10 (0.394”)					•	34
60°	 99616-IC...	 ANSI 60°	5/64”	3/8”					•	35
PR	 99616-14...PR	 N9MT11T3PR	2.0 (0.079”)	3.0 (0.124”)			* Similar to DIN 332 Form R		•	37
Engraving Tools										
45°	 99619-V045...	 V04506T1W	0.45 (0.018”)	2.1 (0.083”)	•			•		44
60°	 99619-V060...	 V06006T1W	0.25 (0.010”)	2.7 (0.106”)	•			•		45
60°	 99616-10...SW	 N9MT0802	0.1 (0.004”)	1.1 (0.043”)	•			•		46
90°	 99616-10...SW	 N9MT0802	0.1 (0.004”)	2.0 (0.079”)	•			•		46
	 99616-06-6	 N9MT05T1	1.0 (0.039”)	6.0 (0.236”)	•	•		•		13
NC Deburring										
60°	 99619-X060...	 X060A60T6	0.3 (0.012”)	2.0 (0.079”)		•				50
90°	 99619-X060...	 X060A90T6	0.5 (0.020”)	3.5 (0.138”)		•				

Inserts >> Quick Pick

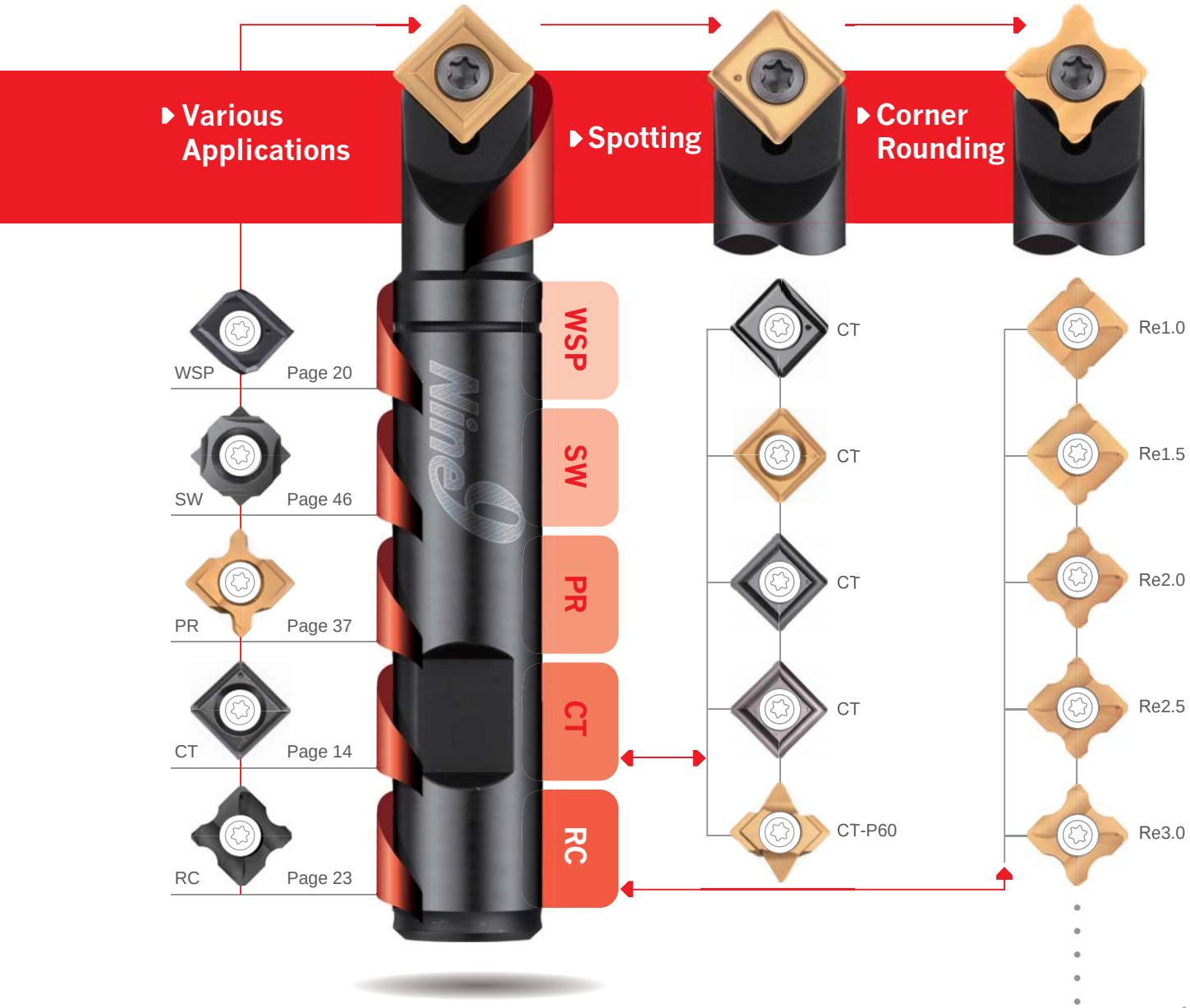
Nine9 inserts are designed to be used in today's modern machining practices providing patented unique highly productive solutions. Nine9 focuses on bringing indexable solutions utilizing today's latest carbide grades and coatings that reduce set-up time, tool change time and extend tool life. Nine9 - your productivity partner.

Products	Grade		Coating	P Steel	M Stainless Steel	K Cast Iron	N Non-Ferrous	H Hardened Steel Up to 56 HRC	S Titanium
NC Spot Drill	 NC10	K20F K10F	TiAlN		●	●	◎		
	 NC40	K20F P35	TiN	●	○	◎			
	 NC2071	K20F	TiN	●	◎	○	◎		
	 NC9076	K20F	DLC		◎		●		◎
	 NC60	-	Cermet	◎				●	
Corner Rounding	 NC2071	K20F	TiN	●	○	●			
	 NC9036	K20F	DLC		●		●		◎
i-Center	 NC2033	K20F	TiAlN	●	○	●		○	
	 NC5074	P40	Helica	●	○	◎			
Engraving	 NC2032	K20F	TiAlN	●	○	●			
	 NC2071	K20F	TiN	◎	●		◎		
	 NC9031	K20F	TiN		◎		●		
	 NC2035	K20F	ALDURA	◎		○		●	
	 NC9036	K20F	DLC		◎		●		◎
Chamfer Mill	 NC2032	K20F	TiAlN	●	○	●		◎	
	 NC9071	K20F	TiN	○	●		●		

● Best ◎ Better ○ Good

No Need To Choose Nine9 Does It All! >>

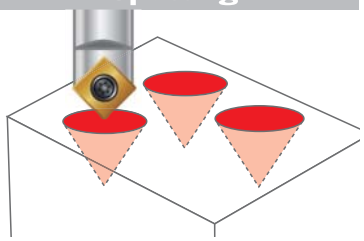
Cost Saving | Time Saving | Highly Efficient | Long Tool Life



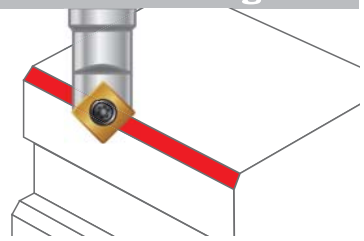
NC Spot Drill >>

NC Spot Drill with indexable carbide insert.
High efficiency! Low cost!
CNC lathes, CNC turning centers and machining centers.

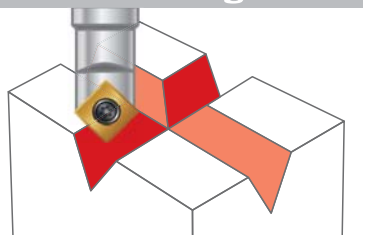
Spotting



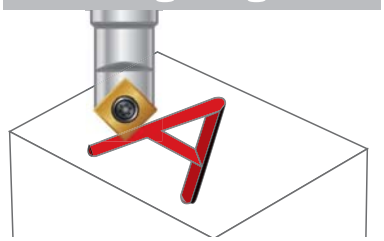
Chamfering



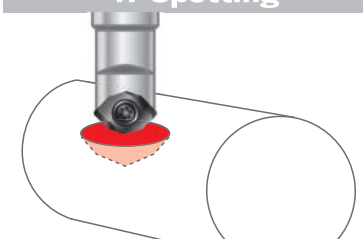
Grooving



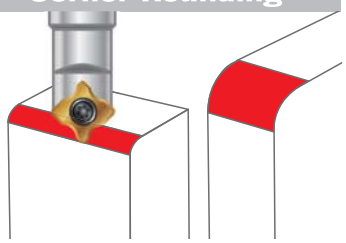
Engraving



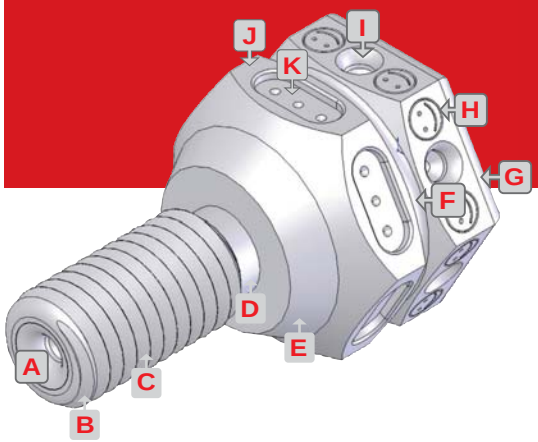
W Spotting



Corner Rounding



- **Spotting produces better hole position and geometrically uniform holes**
- **Available shank diameter- Ø5, Ø6, Ø8, Ø10, Ø12, Ø16, Ø20mm, Ø25mm, Ø3/8'', Ø1/2'', Ø5/8'', Ø3/4'', Ø1/4'', Ø1'', M5, M6, 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.
  - 60° / 82° / 90° / 100° / 120° / 142° angle for different applications.
  - Increase cutting speed with coated carbide inserts.



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

* Some features produced with a special insert

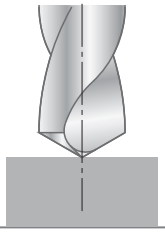
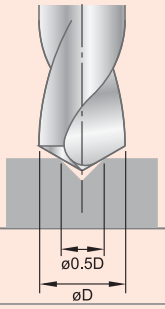
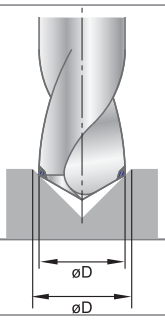
A New Drilling Concept!

0.5xD of spotting >>

Although today's drill manufacturers may not recommend spot drilling you can look forward to the following benefits when using the NC Spot Drill to drill a spot that is half of the drilling diameter.

Drill Benefits >>

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

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

Various Applications of NC Spot Drill >>

Use on CNC lathes, CNC turning centers, Machining centers, Milling machines, SPM machines.....

Turning Center

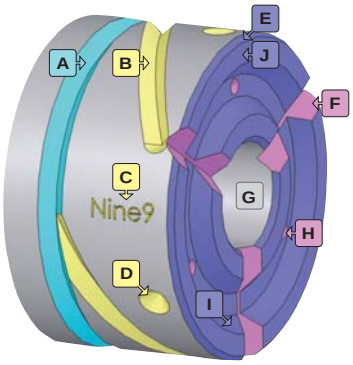


Fig	Applications
A	Grooving
B	Helical groove milling
C	Engraving
D	Spot drilling
E	Chamfer turning
F	Face groove milling
G	Internal turning
H	Spot drilling on end surface
I	Internal Chamfering
J	Facing grooveing

Machining Center

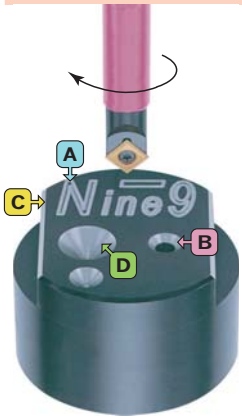
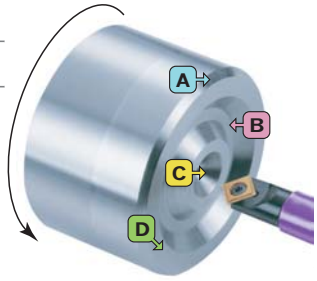


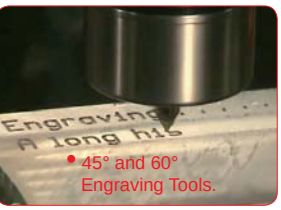
Fig	Applications
A	Engraving
B	Chamfering
C	Profile chamfering
D	Spotting

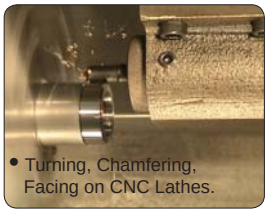
CNC Lathes

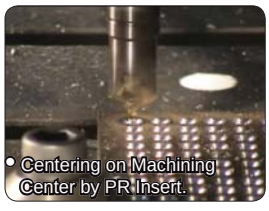


A	External and internal chamfering
B	Grooving
C	Spotting
D	Facing

Application Example >>







60°

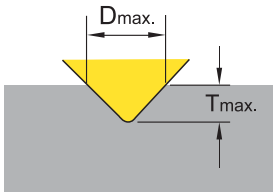
N9MT11T3P60

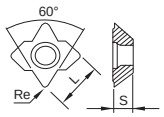
P60-NC40

Inserts >>

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

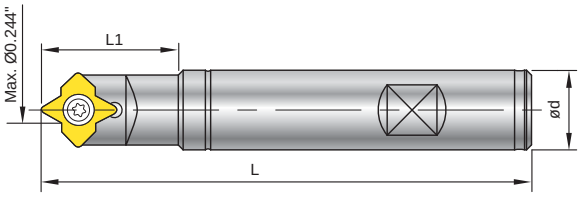
NC40:
- Universal grade for all unhardened steel and cast iron.
- P35 grade, TiN coated.
- Each insert has 2 cutting edges.



Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
				L	S	Re		
N9MT11T3P60-NC40	TiN	P35		11 (0.433")	3.97 (0.156")	0.8 (0.031")	6.2 (0.244")	4 (0.157")

Holder >>

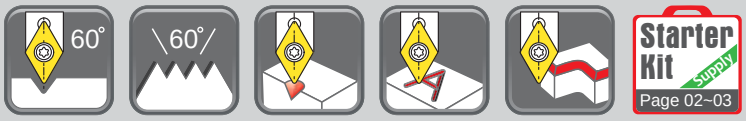
- 60 degree spotting drill with indexable insert.
- ***Using standard NC Spot Drill shank.***
- A single cutting edge design creates higher precision and position when spotting.
- Applications:
  - For spotting, engraving, small grooving on milling machines, machining centers.
  - For carbon steel, alloy steel and cast iron, general purpose.

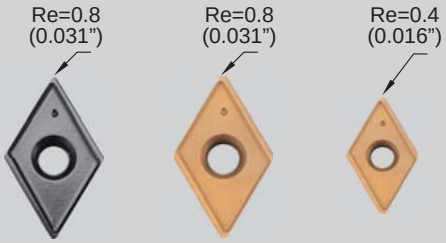


Ø1/2", Ø5/8"

Parts No.	Ød	L	L1	Screw	Key
99616-14-1/2	1/2"	4"	28.03 (1.103")	NS-35080 2.5 Nm	NK-T15
99616-14-5/8	5/8"	4"			

V9MT0802 / V9MT12T3



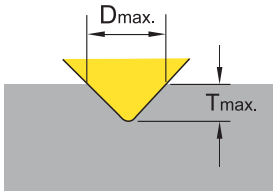


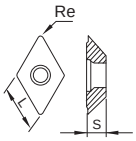
Inserts >>

- 60 degree indexable spotting insert, Dmax 0.512".
- Special geometry with supporting edges for use in high speed machining.
- Excellent tool for grooving and saving machining time!

NC9076:
- High positive geometry and sharp edge.
- DLC coating performs very well for AL, AL-alloy, copper, brass and bronze.
- Excellent performance on non-ferrous metal.
- Each insert has 2 cutting edges.

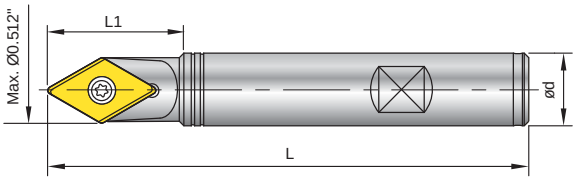
NC2071:
- K20F grade, TiN coated, high positive ground cutting edge and relief angle.
- Universal grade for carbon steel, alloy steel and cast iron.
- Each insert has 2 cutting edges.



Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
V9MT0802CT	NC2071	TiN	K20F		8 (0.315")	2.38 (0.094")	0.4 (0.016")	9 (0.354")	7.3 (0.287")
V9MT12T3CT	NC2071	TiN	K20F		12.7 (0.5")	3.97 (0.156")	0.8 (0.031")	13 (0.512")	10.3 (0.405")
	NC9076	DLC							

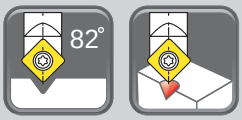
Holder >>

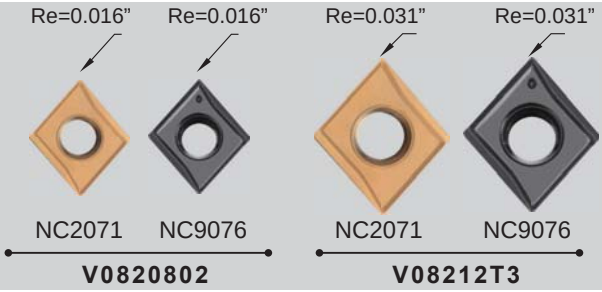
- 60° degree spotting drill with indexable insert.
- A single cutting edge creates higher precision and position when spotting.
- Applications:
  - Spotting, engraving, grooving and chamfering on milling machines, machining centers.
  - Spotting, facing on CNC Lathes.



Parts No.	Ød	L	L1	Insert Type	Screw	Key
99616-09V	8 (0.315")	60 (2.362")	-	V9MT08	NS-25045 0.9Nm	NK-T7
99616-13V-5/8	5/8"	4"	30 (1.181")	V9MT12	NS-35080 2.5Nm	NK-T15

V0820802 / V08212T3



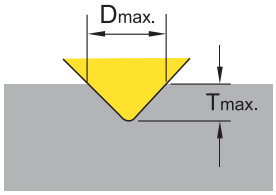


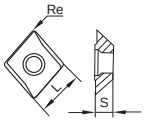
Inserts >>

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

NC2071:
- K20F grade, TiN coated, high positive ground cutting edge and relief angle.
- Universal grade for carbon steel, alloy steel and cast iron.
- Each insert has 2 cutting edges.

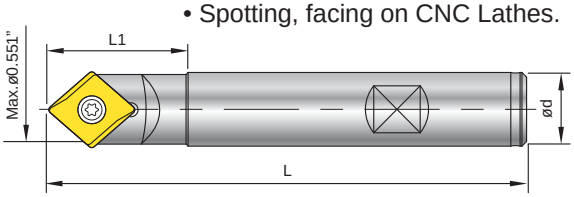
NC9076:
- High positive geometry and sharp edge.
- DLC coated, super good for Al, Al-alloy, copper, brass and bronze.
- Produces excellent surface finish on non-ferrous metal.
- Each insert has 2 cutting edges.



Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
V0820802	NC2071	TiN	K20F		8 (0.315")	2.38 (0.094")	0.4 (0.016")	9 (0.354")	4.8 (0.189")
	NC9076	DLC							
V08212T3	NC2071	TiN	K20F		12.7 (0.5")	3.97 0.156")	0.8 (0.031")	14 (0.551")	7.5 (0.295")
	NC9076	DLC							

Holder >>

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



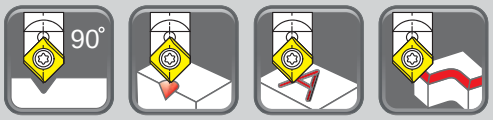
Ø3/8"

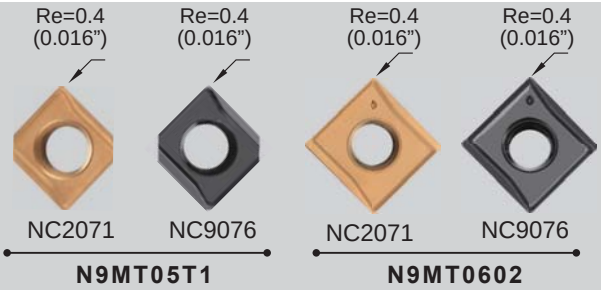
Ø5/8"

Parts No.	Ød	L	L1	Insert Type	Screw	Key
99619-V082-3/8	3/8"	3.5"	28 (0.102")	V0820802	NS-30055 2.0 Nm	NK-T8
99619-V082-5/8	5/8"	4"	30 (1.181")	V08212T3	NS-35080 2.5 Nm	NK-T15

N9MT05T1 / N9MT0602

NEW



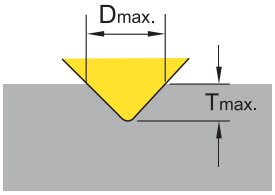


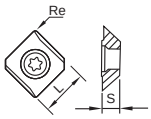
Inserts >>

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

NC2071:
- K20F grade, TiN coated, fully ground cutting edge and relief angle.
- Geometry with supporting edges to stabilize the cutting condition on low power machine.
- Each insert has 2 cutting edges, for carbon steel, alloy steel and cast iron.

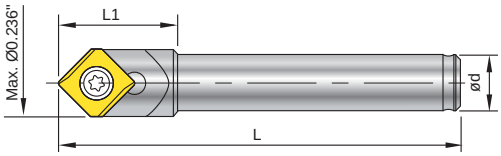
NC9076:
- High positive geometry and sharp edge.
- DLC coated, super good for Al, Al-alloy, copper, brass and bronze.
- Produces an excellent surface finish on non-ferrous metal.
- Each insert has 2 cutting edges.



Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
N9MT05T1CT	NC2071	TiN	K20F		5 (0.197")	1.8 (0.071")	0.4 (0.016")	6 (0.236")	2.8 (0.110")
	NC9076	DLC							
New N9MT0602CT	NC2071	TiN	K20F		6.35 (0.250")	2.38 (0.094")	0.4 (0.016")	8 (0.315")	3.8 (0.150")
	NC9076	DLC							

Holder >>

- Smallest indexable spotting drill holder.
- Spotting produces better hole positioning and geometrically uniform holes.
- Applications :
  - Spotting, engraving, and chamfering on milling machines, machining centers.
  - Spotting, facing on CNC Lathes.



Ø5 (0.197")

Ø6 (0.236")

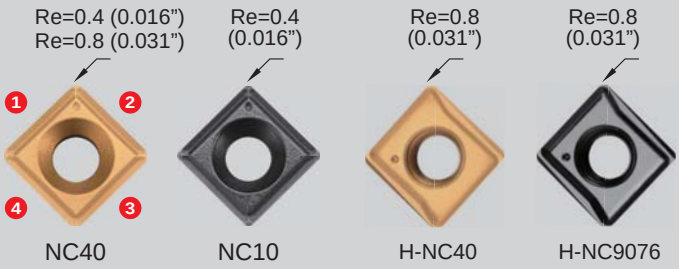
Ø6 (0.236")

Ø8 (0.315")

Parts No.	Ød	L	L1	Insert Type	Screw	Key
99616-06-5	5 (0.197")	35 (1.378")	10 (0.394")	N9MT05	NS-20036 0.6 Nm	NK-T6
99616-06-6	6 (0.236")	35 (1.378")	--			
99616-06-1/4	1/4"	35 (1.378")	--			
99616-06-6L	6 (0.236")	60 (2.362")	--			
New 99616-08-8	8 (0.315")	60 (2.362")	--	N9MT06	NS-22044 0.9 Nm	NK-T7

Note: 99616-06-6L is carbide shank holder.

N9MT0802



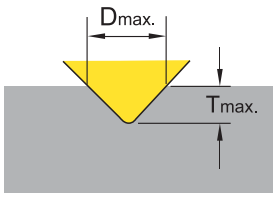
Inserts >>

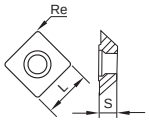
NC40:
- General purpose, universal grade for all unhardened steel and cast iron.
- Each insert has 4 cutting edges.

NC10:
- High positive angle and fully ground cutting edge and relief angle.
- Universal grade for Al, Al-alloy, non-ferrous metal 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.
- Sharp edge good for long cutting chip metals, such as low carbon steel, stainless steel and Ti, Ti-alloy.
- Each insert has 2 cutting edges.

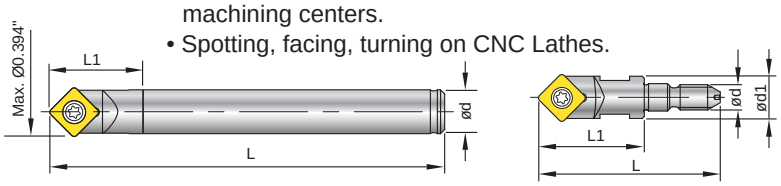
H-NC9076:
- High positive geometry and sharp edge. DLC coated, super good for Al, Al-alloy, copper, brass and bronze.
- Produces excellent surface finish when chamfering non-ferrous metal.
- Each insert has 2 cutting edges.



Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
N9MT080208CT	NC40	TiN	K20F		8.31 (0.327")	2.38 (0.094")	0.8 (0.031")	10 (0.394")	4.5 (0.177")
N9MT080204CT	NC40	TiN	K20F				0.4 (0.016")		
	NC10	TiAlN							
N9MT0802CT2T	H-NC40	TiN	K20F				0.8 (0.031")		
	H-NC9076	DLC							

Holder >>

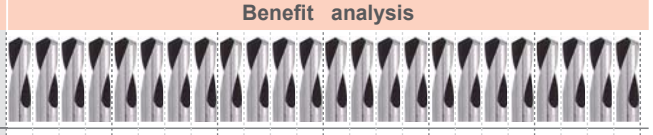
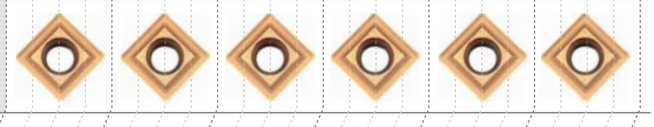
- Single cutting edge design gives higher precision when spotting.
- Applications : • Spotting, engraving, grooving and chamfering on milling machines, machining centers.
  • Spotting, facing, turning on CNC Lathes.

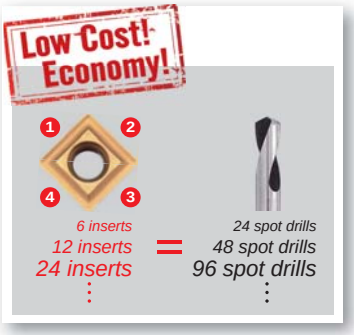


Parts No.	Ød	Ød1	L	L1	Screw	Key
99616-10	10 (0.394")	-	90 (3.543")	18.31 (0.720")	NS-30055 2.0 Nm	NK-T8
99616-3/8	3/8"	-	90 (3.543")	18.31 (0.720")		
99616-10-M6	M6	10 (0.394")	43 (1.693")	25.00 (0.984")		

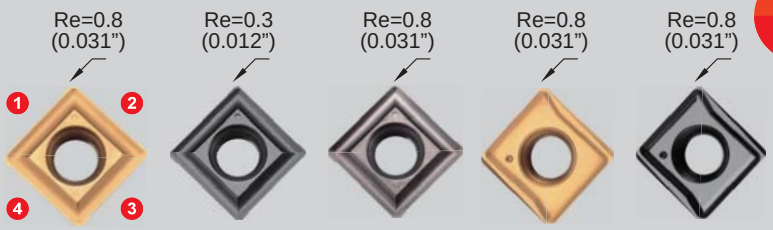
Note: • Balanced type holder is on request. • Nine9 extension bar for M6 screw fit holder, see page 51.

Comparison >>

Tool		Benefit analysis
24 spot drills		
6 inserts		



N9MT11T3



Inserts >>

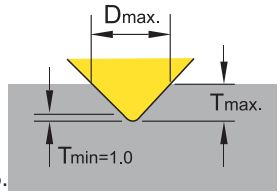
NC40: • General purpose, universal grade for all unhardened steel and cast iron.
• Each insert has 4 cutting edges.

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

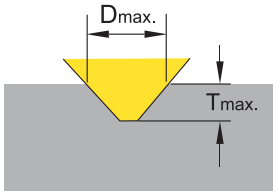
NC60: • Cermet insert, fully ground cutting and relief angle, for hardened steel up to HRC55.
• Each insert has 4 cutting edges.

H-NC40: • Best choice for spotting application.
• Special geometry with supporting edges for use in high speed machining.
• Sharp edge good for long cutting chip metals, such as low carbon steel, stainless steel and Ti, Ti-alloy.
• Each insert has 2 cutting edges.

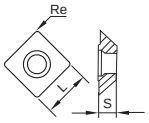
H-NC9076: • High positive geometry and sharp edge same as grade H-NC40. DLC coated, super good for Al, Al-alloy, copper, brass and bronze.
• Produces excellent surface finish when chamfering non-ferrous metal.
• Each insert has 2 cutting edges.



NC40 / NC10 / NC60

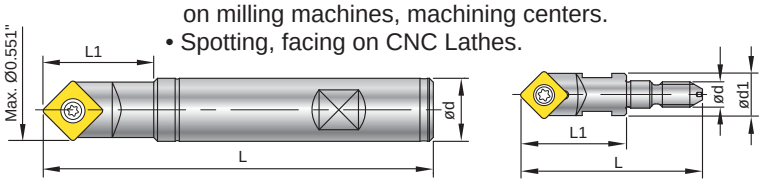


Other grade

Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Dmax.	Tmax.
N9MT11T3CT	NC40	TiN	P35		11.11 (0.433")	3.97 (0.156")	0.8 (0.031")	14 (0.551")	7 (0.276")
	NC10	TiAlN	K10F				0.3 (0.012")		
	NC60	CERMET					0.8 (0.031")		
N9MT11T3CT2T	H-NC40	TiN	K20F				0.8 (0.031")		
	H-NC9076	DLC	K20F				0.8 (0.031")		

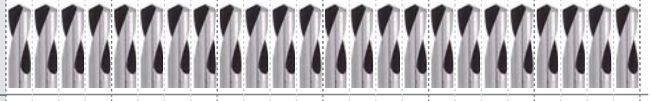
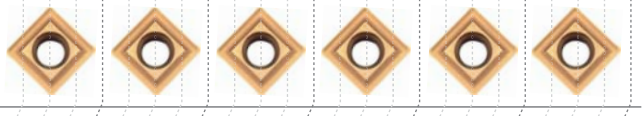
Holder >>

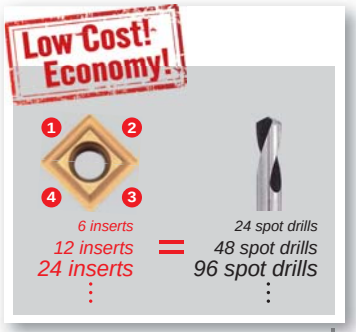
• The widest range of inserts for spot drilling, milling and turning see page 6.
• Applications : • Spotting, engraving, grooving and chamfering on milling machines, machining centers.
• Spotting, facing on CNC Lathes.



Parts No.	Ød	Ød1	L	L1	Screw	Key
99616-14-150L	16 (0.630")	-	150 (5.906")	29.03 (1.143")	NS-35080 2.5 Nm	NK-T15
99616-14-220L	20 (0.787")	-	220 (8.661")	28.03 (1.103")		
99616-14-1/2	1/2"	-	4"	28.03 (1.103")		
99616-14-5/8	5/8"	-	4"	28.03 (1.103")		
99616-14-M8	M8	14 (0.551")	48 (1.890")	30.00 (1.181")		

Comparison >>

Tool		Benefit analysis
24 spot drills		
6 inserts		



N9MT1704

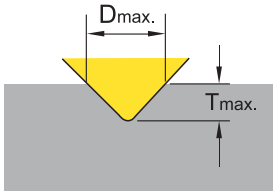
Re=1.2 (0.047")

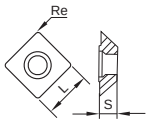
NC2071

Inserts >>

- 90 degree indexable spot drill insert, Dmax 0.87 inch.

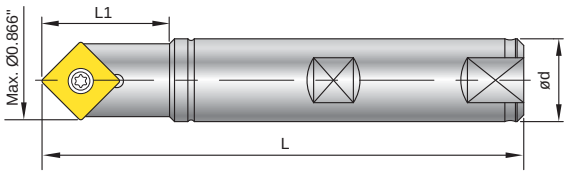
NC2071 :
- K20F grade, TiN coated, high positive geometry, fully ground cutting edge and relief angle.
- Each insert has 2 cutting edges.
- Universal grade for all unhardened steel and cast iron.



Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
				L	S	Re		
N9MT1704CT-NC2071	TiN	K20F		17 (0.669")	4.76 (0.187")	1.2 (0.047")	22 (0.866")	10.4 (0.409")

Holder >>

- 90 degree spotting drill with indexable insert.
- Spotting produces better hole positioning and geometrically uniform holes.
- Applications :
  - Spotting, engraving, grooving and chamfering on milling machines, machining centers.
  - Spotting, facing on CNC Lathes.



Ø3/4", Ø1"

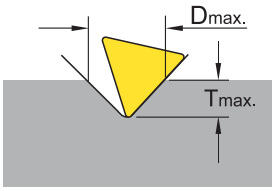
Parts No.	Ød	L	L1	Screw	Key
99616-22-3/4	3/4"	4"	35 (1.378")	 NS-50125 5.5 Nm	 NK-T20
99616-22-1	1"	6"	34 (1.339")		

N9MT220408

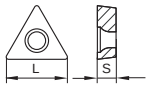
NC40

Inserts >>

- For spotting diameter up to 1 Inch.
- Fully ground cutting edge and relief angle.

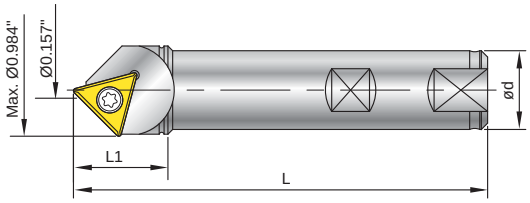


NC40:
- P35, TiN coated.
- Universal grade for carbon steel, alloy steel and cast iron.
- Each insert has 3 cutting edges.

Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
				L	S	Re		
N9MT220408CT-NC40	TiN	P35		20.83 (0.820")	4.76 (0.187")	---	25 (0.984")	12.2 (0.480")

Holder >>

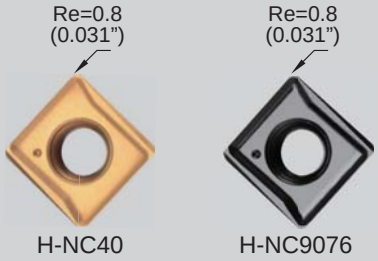
- Large spotting diameter with indexable insert.
- Spotting produces better hole positioning and geometrically uniform holes.
- Applications : • Spotting and chamfering on milling machine, machining centers.

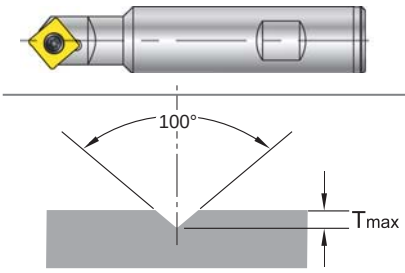
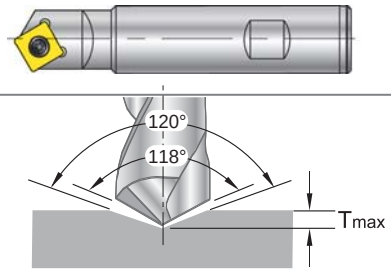
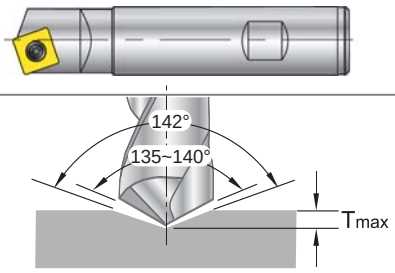


Parts No.	Ød	L	L1	Screw	Key
99616-1-CT28	1"	4.72"	30 (1.181")	NS-40100 3.5Nm	NK-T15

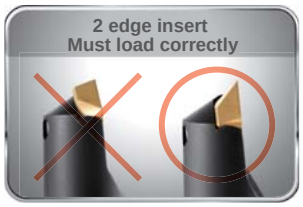
100°
120°
142°

N9MT11T3CT2T-H



100 degree	120 degree	142 degree
		
• 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.

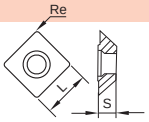
Inserts >>



• Special geometry with supporting edges to reduce the vibration in high speed machining.

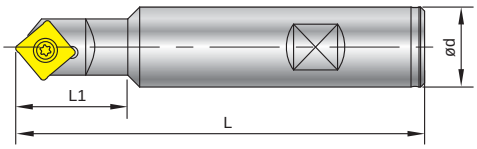
H-NC40:
- K20F grade, TiN coated.
- General purpose for all kinds of steel and cast iron.
- Each insert has 2 cutting edges.

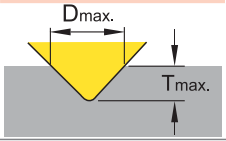
H-NC9076:
- High positive geometry and sharp edge.
- DLC coated, specially developed for Al, Al-alloy, copper, brass and bronze.
- Produces excellent surface finish when chamfering non-ferrous metal.
- Each insert has 2 cutting edges.

Parts No.		Coating	Grade		Dimensions		
					L	S	Re
N9MT11T3CT2T	H-NC40	TiN	K20F		11.11 (0.437")	3.97 (0.156")	0.8 (0.031")
	H-NC9076	DLC					

Holder >>

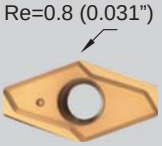
• Indexable insert spotting drill holders for 100°/120°/142° spotting.
• Reduces spotting time. Increases tool life and position accuracy of the next drilling operation.



Parts No.	Angle	Ød	L	L1	Screw / Key	Dmax.	Tmax.	
99616-3/4-100	100°	3/4"	4"	31 (1.220")	NS-35080 2.5 Nm	16 (0.630")	6.3 (0.248")	
99616-3/4-120	120°			30 (1.181")	NK-T15	17 (0.669")	4.76 (0.187")	
99616-3/4-142	142°			30 (1.181")		18.5 (0.728")	3.16 (0.124")	

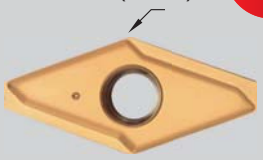
V14208 / V14216

Re=0.8 (0.031")



V1420803-NC2071

Re=1.2 (0.047")

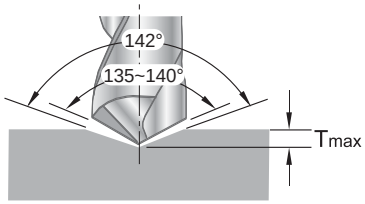


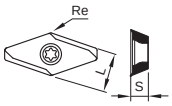
V1421604-NC2071

Inserts >>

- For spotting before drilling by 135° - 140° point angle high performance drill.
- 142 degree indexable spotting drills. Maximum diameter up to 1.26".

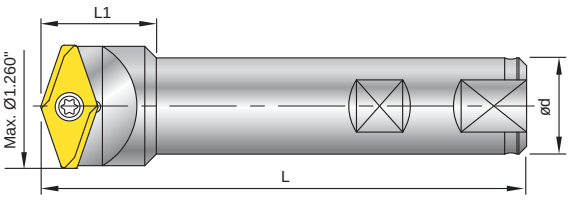
NC2071:
- K20F grade, TiN coated, high positive geometry, fully ground cutting edge and relief angle.
- Each insert has 2 cutting edges.
- Universal grade for all unhardened steel and cast iron.



Parts No.	Coating	Grade		Dimensions			Dmax.	Tmax.
				L	S	Re		
V1420803-NC2071	TiN	K20F		8 (0.315")	2.38 (0.094")	0.8 (0.031")	16 (0.630")	2.8 (0.110")
V1421604-NC2071	TiN	K20F		14 (0.551")	4.76 (0.187")	1.2 (0.047")	32 (1.260")	5.5 (0.217")

Holder >>

- Spot drilling prior to drilling may allow for higher drill rates.
- Save total machining time!
- Extend your drill life with 142 degree spotting. Reduce your drilling costs!
- Higher accuracy of positioning and diameter tolerance!

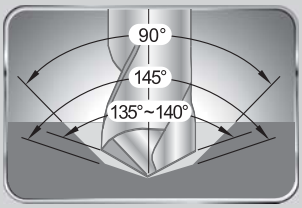


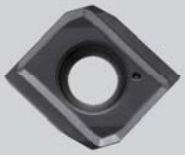
Ø5/8"

Ø1"

Parts No.	Ød	L	L1	Insert Type	Screw	Key
99619-V142-5/8	5/8"	4"	25 (0.984")	V1420803-NC2071	NS-30072 2.0 Nm	NK-T9
99619-V142-1.000	1"	4.75"	30 (1.181")	V1421604-NC2071	NS-50125 5.5 Nm	NK-T20

W Spotting New Geometry of Spotting Tool





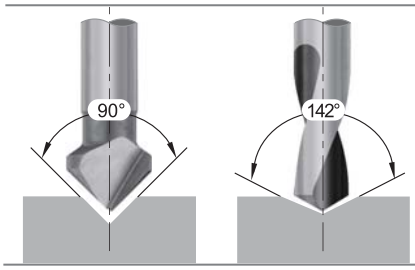
NC2033

Combined spotting and chamfering 145° + 90° >>

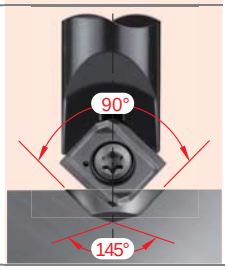
- Reduces process to one operation. Shortens cycle time.
- Use to spot prior to drilling with high performance drills for higher accuracy of hole position.
- ***Utilizes standard NC Spot Drill holders.***

1 process provides 2 applications

90° Chamfering + 142°Spot Drilling

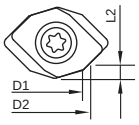
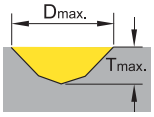


W Spotting



Inserts >>

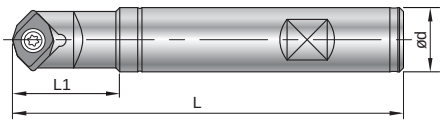
NC2033:
- Fully ground cutting edge and relief angle.
- Universal grade for steel and cast iron.
- Each insert has 2 cutting edges.

Parts No.	Coating	Grade		Thread Size	*D1±0.05 (±0.002")	D2	L2	Dmax.	Tmax.
N9MT0802M04C-NC2033	TiAlN	K20F		M4	3.30 (0.130")	4.20 (0.165")	0.93 (0.037")	8 (0.315")	2.83 (0.111")
N9MT0802M05C-NC2033				M5	4.20 (0.165")	5.25 (0.207")	1.14 (0.045")		2.52 (0.099")
N9MT0802M06C-NC2033				M6	5.00 (0.197")	6.30 (0.248")	1.39 (0.055")		2.24 (0.088")
N9MT11T3M08C-NC2033	TiAlN	K20F		M8	6.80 (0.266")	8.40 (0.331")	1.81 (0.071")	13 (0.512")	4.11 (0.162")
N9MT11T3M10C-NC2033				M10	8.50 (0.335")	10.50(0.413")	2.28 (0.090")		3.53 (0.139")
N9MT11T3UNC25-NC2033	TiAlN	K20F		1/4	5.08 (0.200")	6.70 (0.264")	1.55 (0.061")	13 (0.512")	4.70 (0.185")
N9MT11T3UNC31-NC2033				5/16	6.53 (0.257")	8.40 (0.331")	1.90 (0.075")		4.20 (0.165")
N9MT11T3UNC38-NC2033				3/8	7.94 (0.313")	10.00(0.394")	2.22 (0.087")		3.72 (0.146")
N9MT1704M12C-NC2033	TiAlN	K20F		M12	10.25(0.404")	12.60(0.496")	2.91(0.115")	20 (0.787")	6.61(0.260")
N9MT1704M14C-NC2033				M14	12.00(0.472")	14.70(0.579")	3.22(0.127")		5.87(0.231")
N9MT1704M16C-NC2033				M16	14.00(0.551")	16.80(0.661")	3.51(0.138")		5.11(0.201")

Note: * D1 refer to the Tap Pre-drilling sizes. * Technical information, please refer to page 30.

Holder >>

- Holders and inserts are interchangeable.
- Applications: Spotting, grooving and chamfering.



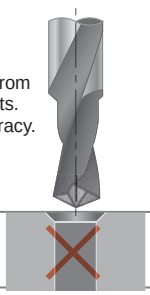
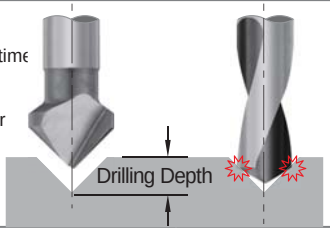
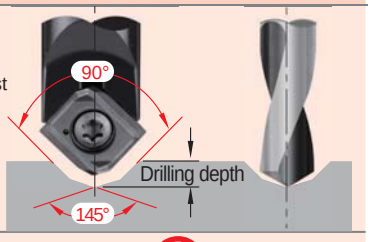
Parts No.	Ød	L	L1	Insert Type	Thread Size	Screw	Key
99616-10	10 (0.394")	89.08±0.29 (3.507" ±0.011")	16.95±0.29 (0.667" ±0.011")	N9MT0802	M4~M6	NS-30055 2.0Nm	NK-T8
99616-3/8	3/8"						
99616-14-1/2	1/2"	97.55±0.55 (3.839" ±0.021")	26.73±0.55 (1.052" ±0.021")	N9MT11T3	M8~M10	NS-35080 2.5Nm	NK-T15
99616-14-5/8	5/8"				1/4~3/8		
99616-22-3/4	3/4"	96.24±0.64 (3.780" ±0.025")	31.4±0.64 (1.236" ±0.025")	N9MT1704	M12~M16	NS-50125 5.5Nm	NK-T20

Ø10 (0.394"), Ø3/8"

Ø1/2", Ø5/8"

Ø20(0.787"), Ø3/4"

Comparison >>

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

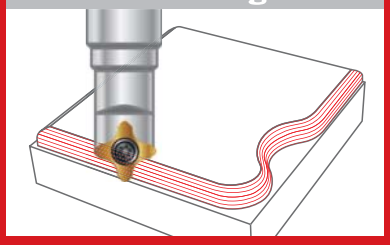
Corner Rounding >> Type of RC

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.

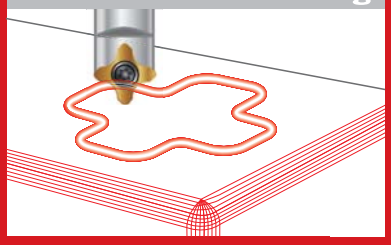
Features

- 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.

Corner Rounding



Circular Corner Rounding



◀ Applications

- a Radius 0.5
- b Radius 1.0
- c Radius 2.0

N9MT05T1RC

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

mini


NC2071

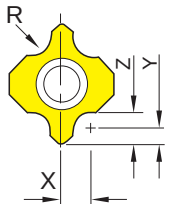

NC9036

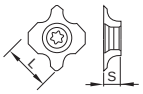
Inserts >>

- 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.

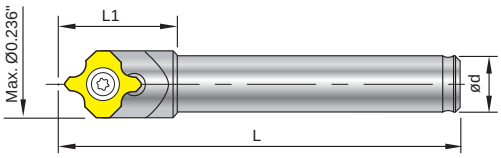
NC9036:
- For non-ferrous material such as aluminum, acrylic, titanium, brass, copper and stainless steel.
- High positive geometry and sharp edge produces excellent surface finish.
- Each insert has 2 cutting edges.



Insert Radius	Parts No.		Coating	Grade	offset X	offset Y	offset Z		Dimensions L	Dimensions S
0.5	N9MT05T1RC05	NC2071	TiN	K20F	1.25 (0.05")	0.75 (0.03")	1.25 (0.05")		5 (0.197")	1.8 (0.070")
		NC9036	DLC							
0.75	N9MT05T1RC075	NC2071	TiN	K20F	1.50 (0.059")	0.75 (0.03")	1.50 (0.059")			
		NC9036	DLC							
1.0	N9MT05T1RC10	NC2071	TiN	K20F	1.75 (0.069")	0.75 (0.03")	1.75 (0.069")			
		NC9036	DLC							

Holder >>

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



Ø5 (0.197")

Ø6 (0.236")

Ø6(0.236")

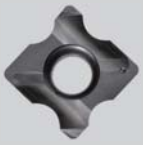
Parts No.	Ød	L	L1	Screw	Key
99616-06-5	5 (0.197")	35 (1.378")	10 (0.394")	 NS-20036 0.6 Nm	 NK-T6
99616-06-6	6 (0.236")	35 (1.378")	-		
99616-06-1/4	1/4"	35 (1.378")	-		
99616-06-6L	6 (0.236")	60 (2.362")	-		

* 99616-06-6L is carbide shank holder

N9MT11T3RC

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

NC40



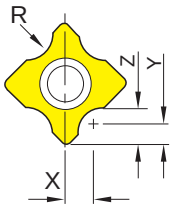
NC9036

Inserts >>

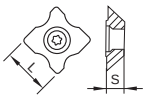
- Higher cutting speed and feed rate.
- Combination corner rounding and 45° chamfering application on same insert.
- Various corner radius inserts can fit on same holder.
- Carbide insert provides for long tool life.

NC40:
- Submicron carbide insert, K20F, TiN coated, universal design for all kinds of materials.
- 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	Parts No.		Coating	Grade	offset X	offset Y	offset Z		Dimensions L	Dimensions S
1.0	N9MT11T3RC10	NC40	TiN	K20F	2.75 (0.108")	1.5 (0.059")	2.5 (0.098")		11.11 (0.433")	3.97 (0.156")
		NC9036	DLC							
1.5	N9MT11T3RC15	NC40	TiN	K20F	3.25 (0.128")	1.5 (0.059")	3 (0.118")			
		NC9036	DLC							
2.0	N9MT11T3RC20	NC40	TiN	K20F	3.75 (0.148")	1.5 (0.059")	3.5 (0.138")			
		NC9036	DLC							
2.5	N9MT11T3RC25	NC40	TiN	K20F	4.25 (0.167")	1.5 (0.059")	4 (0.157")			
		NC9036	DLC							
3.0	N9MT11T3RC30	NC40	TiN	K20F	4.75 (0.187")	1.4 (0.055")	4.4 (0.173")			
		NC9036	DLC							
1/64	N9MT11T3RC1/64	NC40	TiN	K20F	0.086"	0.059"	0.0747"		0.437"	0.156"
		NC9036	DLC							
1/32	N9MT11T3RC1/32	NC40	TiN	K20F	0.101"	0.059"	0.090"			
		NC9036	DLC							
1/16	N9MT11T3RC1/16	NC40	TiN	K20F	0.133"	0.059"	0.122"			
		NC9036	DLC							
3/32	N9MT11T3RC3/32	NC40	TiN	K20F	0.164"	0.059"	0.153"			
		NC9036	DLC							
1/8	N9MT11T3RC 1/8	NC40	TiN	K20F	0.199"	0.055"	0.180"			
		NC9036	DLC							

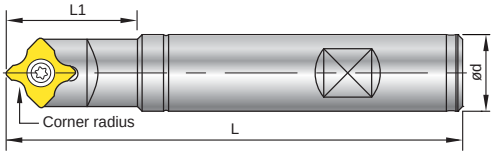


Holder >>

- For corner rounding using ***NC Spot Drill*** shank.
- Good for small workpieces.
- Same insert can also be used to produce a 45 degree edge chamfer.

Parts No.	Ød	L	L1	Screw	Key
99616-14-1/2	1/2"	4"	28.03 (1.103")	NS-35080 2.5 Nm	NK-T15
99616-14-5/8	5/8"				

* additional holder found on page 15.



Ø1/2", Ø5/8"

N9MT1704RC

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

NC2071

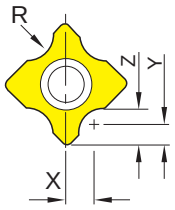
NC9036

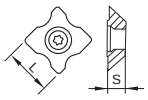
Inserts >>

- 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.
- Carbide insert provides for long tool life.

NC2071:
- Submicron carbide insert, K20F, TiN coated, universal design for all kinds of materials.
- Inserts are CNC ground for precision radius location.
- Each insert has 2 cutting edges.

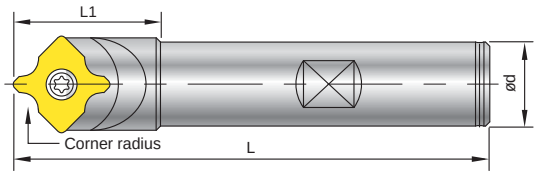
NC9036:
- For non-ferrous material such as aluminum, acrylic, titanium, brass, copper and stainless steel.
- High positive geometry and sharp edge produces excellent surface finish.
- Each insert has 2 cutting edges.



Corner radius(R)	Parts No.		Coating	Grade	offset				Dimensions	
					X	Y	Z		L	S
4.0	N9MT1704RC40	NC2071	TiN	K20F	6.15 (0.242")	2 (0.079")	6 (0.236")		17 (0.669")	4.76 (0.187")
		NC9036	DLC							
5.0	N9MT1704RC50	NC2071	TiN	K20F	7.10 (0.280")	2 (0.079")	7 (0.276")			
		NC9036	DLC							
6.0	N9MT1704RC60	NC2071	TiN	K20F	8.10 (0.319")	2 (0.079")	8 (0.315")			
		NC9036	DLC							
3/16	N9MT1704RC3/16	NC2071	TiN	K20F	0.270"	0.078"	0.268"		0.669"	0.187"
		NC9036	DLC							
1/4	N9MT1704RC1/4	NC2071	TiN	K20F	0.333"	0.078"	0.330"			
		NC9036	DLC							

Holder >>

- For corner rounding using ***NC Spot Drill*** shank.
- Good for small workpieces, which need large corner rounding.
- 45 degree chamfering is available by using straight position of cutting edge.



Ø3/4", Ø1"

Parts No.	Ød	L	L1	Screw	Key
99616-22-3/4	3/4"	4"	34 (1.339")	 NS-50125 5.5 Nm	 NK-T20
99616-22-1	1"	6"			

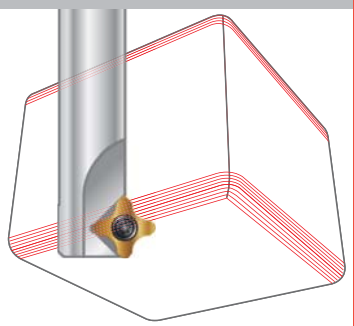
Corner Rounding >> Type of R

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.

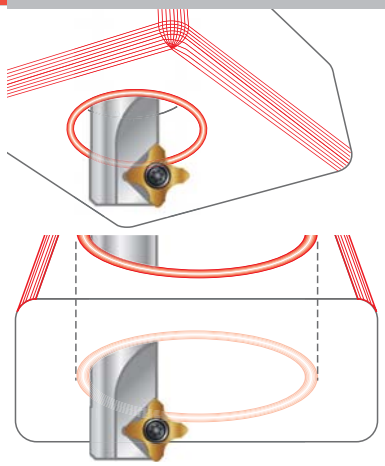
Features

- 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

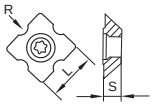
R1.0~R3.0
All are interchangeable
on same holder

R1.0 R1.5 R2.0 R2.5 R3.0

Inserts >>

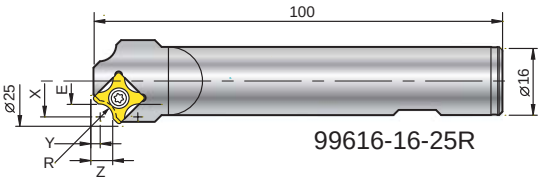
- For front and back corner rounding.
- Coated carbide inserts for excellent tool life.
- Each insert has 4 cutting edges.

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

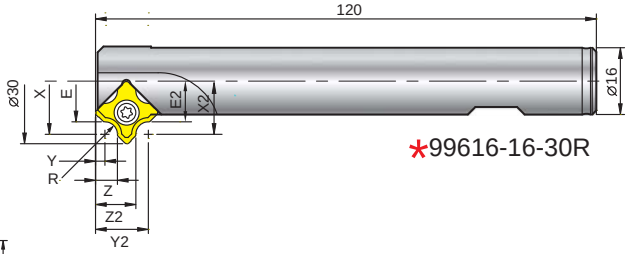
Corner radius(R)	Parts No.	Coating	Grade		Dimensions	
					L	S
1.0	N9MT11T3R10-NC2071	TiN	P35		11.11 (0.433")	3.97 (0.156")
1.5	N9MT11T3R15-NC2071					
2.0	N9MT11T3R20-NC2071					
2.5	N9MT11T3R25-NC2071					
3.0	N9MT11T3R30-NC2071					

Holder >>

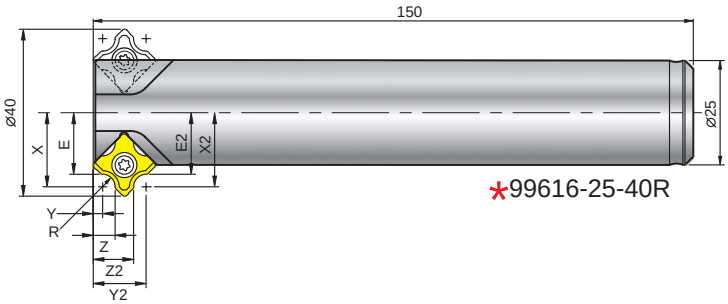
- Center of radius of each tool is dedicated.
- Tool offset can be set after measuring tool length by tool presetter or Z-Zero Setter.



99616-16-25R



*99616-16-30R



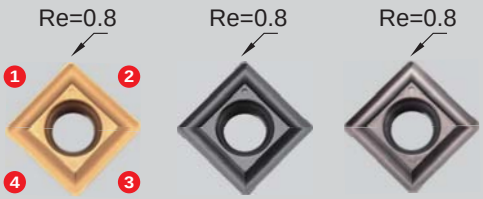
*99616-25-40R

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

Insert Radius	Holder	Ød	Front Chamfering						Back Chamfering						Z	Screw / Key
			E		X		Y	Z	E2		X2		Y2	Z2		
R1.0	99616-16-25R	16 (0.630")	8.25	(0.325")	9.25	(0.364")	3.25 (0.128")	4.25 (0.167")	----		----		----	----	1	
	99616-16-30R		10.75	(0.423")	11.75	(0.463")			10.75	(0.423")	11.75	(0.463")	11.65 (0.459")	10.65 (0.419")	1	
	99616-25-40R	25 (0.984")	15.75	(0.620")	16.75	(0.659")			15.75	(0.620")	16.75	(0.659")			4	
R1.5	99616-16-25R	16 (0.630")	8	(0.315")	9.5	(0.374")	3 (0.118")	4.5 (0.177")	----		----		----	----	1	
	99616-16-30R		10.5	(0.413")	12	(0.472")			10.5	(0.413")	12	(0.472")	11.9 (0.469")	10.4 (0.409")	1	NS-35080 2.5 Nm
	99616-25-40R	25 (0.984")	15.5	(0.610")	17	(0.670")			15.5	(0.610")	17	(0.670")			4	
R2.0	99616-16-25R	16 (0.630")	7.75	(0.305")	9.75	(0.384")	2.75 (0.108")	4.75 (0.187")	----		----		----	----	1	
	99616-16-30R		10.25	(0.404")	12.25	(0.482")			10.25	(0.404")	12.25	(0.482")	12.15 (0.478")	10.15 (0.400")	1	
	99616-25-40R	25 (0.984")	15.25	(0.600")	17.25	(0.680")			15.25	(0.600")	17.25	(0.680")			4	
R2.5	99616-16-25R	16 (0.630")	7.5	(0.295")	10	(0.394")	2.5 (0.098")	5 (0.197")	----		----		----	----	1	
	99616-16-30R		10	(0.394")	12.5	(0.492")			10	(0.394")	12.5	(0.492")	12.4 (0.488")	9.9 (0.390")	1	NK-T15
	99616-25-40R	25 (0.984")	15	(0.590")	17.5	(0.689")			15	(0.590")	17.5	(0.689")			4	
R3.0	99616-16-25R	16 (0.630")	7.25	(0.285")	10.25	(0.404")	2.25 (0.09")	5.25 (0.207")	----		----		----	----	1	
	99616-16-30R		9.75	(0.384")	12.75	(0.502")			9.75	(0.384")	12.75	(0.502")	12.65 (0.498")	9.65 (0.380")	1	
	99616-25-40R	25 (0.984")	14.75	(0.580")	17.75	(0.699")			14.75	(0.580")	17.75	(0.699")			4	

* Also can fit with N9MT11T308LA inserts for front and back chamfering. (Please see page 27)

N9MT11T308LA 45° Chamfering Tool

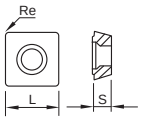


Inserts >>

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

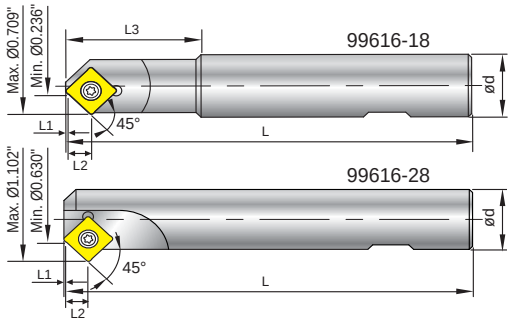
NC10: • High positive angle and fully ground cutting edge and relief angle.
• Universal grade for Al, Al-alloy, non-ferrous metal, cast iron and stainless steel.
• Each insert has 4 cutting edges.

NC60: • Cermet insert, for hardened steel up to HRC56 .
• Each insert has 4 cutting edges.

Parts No.		Coating	Grade		Dimensions		
					L	S	Re
N9MT11T308LA	NC40	TiN	P35		11.11 (0.433")	3.97 (0.156")	0.8 (0.031")
	NC10	TiAN	K10F				
	NC60	Cermet					

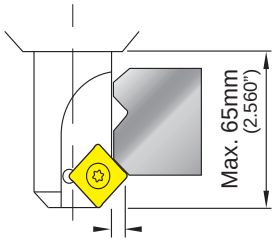
Holder >>

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

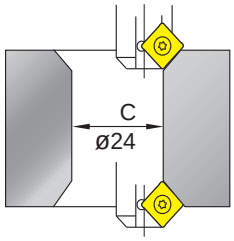


Parts No.	Chamfering	Ød	L	L1	L2	L3	Z	Insert type	Screw / Key
99616-18	Ø6-Ø18 (Ø0.236" ~ Ø0.709")	20 (0.787")	120 (4.724")	1.15 (0.045")	7.55 (0.297")	40 (1.632")	1	N9MT11T308LA	NS-35080 2.5 Nm NK-T15
99616-28	Ø16-Ø28 (Ø0.630" ~ Ø1.102")	20 (0.787")	120 (4.724")	1.15 (0.045")	7.55 (0.297")	--			

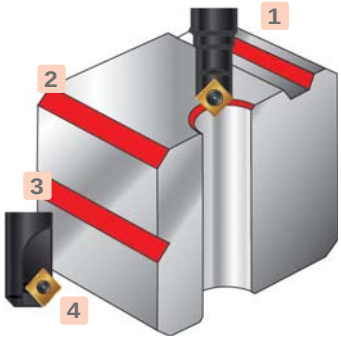
Example >>



For back chamfering
Max. 2mm (0.079")
CØ16-Ø28
(0.630" ~1.102")



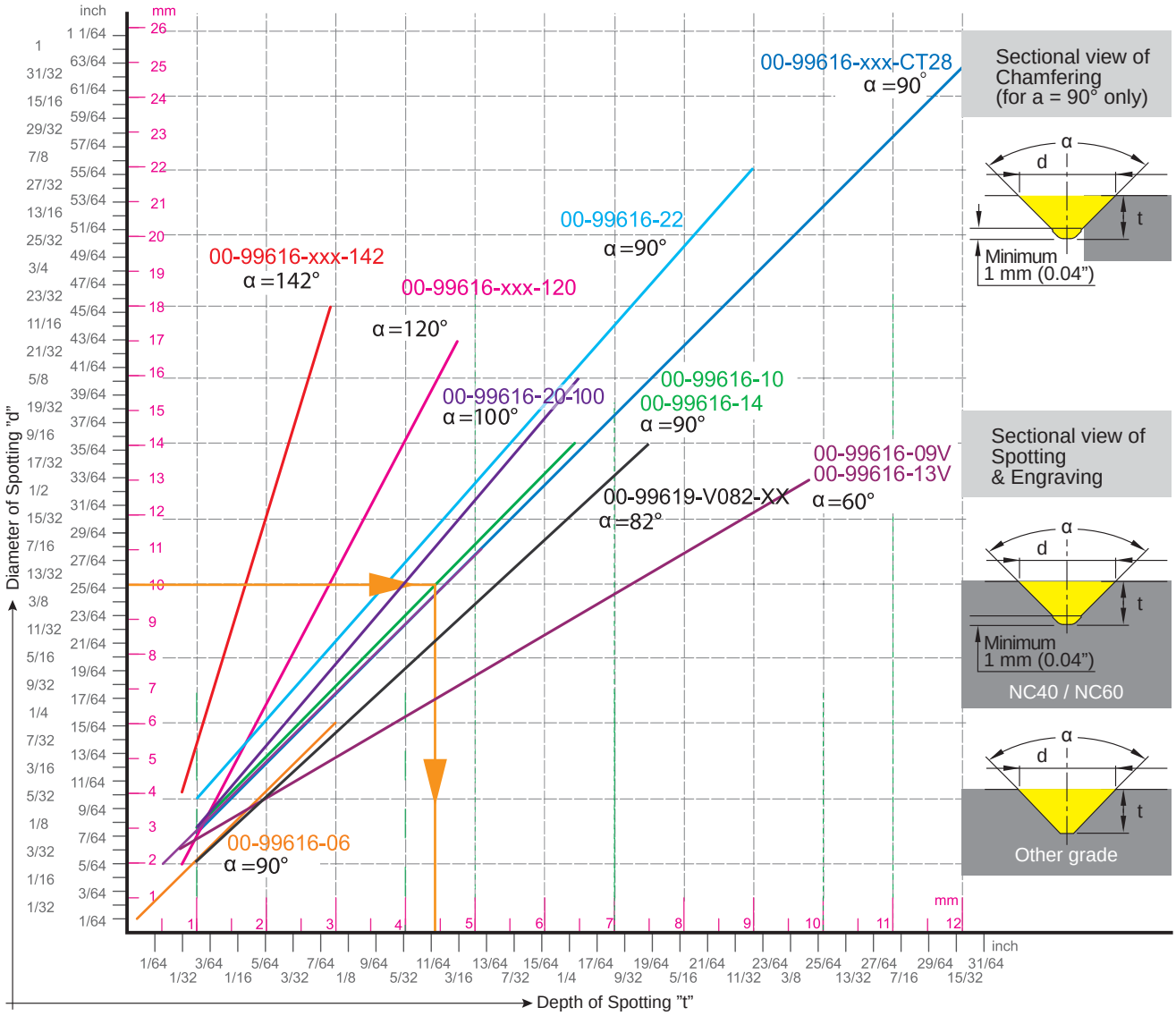
Min.diameter for shift
Ø24mm. (0.945")



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 Using >>

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

Calculate spindle speed and feed rate >>

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

Inch

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

$$F = f \times S$$

d = diameter-inch — **f = IPR =** inch/rev.

S = Spindle Speed-r.p.m. — **F =** inch/min.

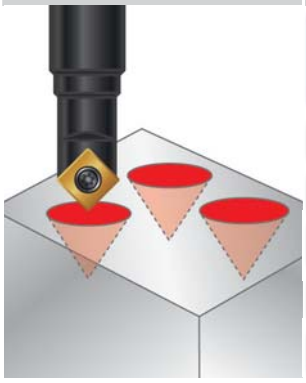
SFM = Surface Speed-ft./min. Vc (m/min.) x 3.28

Cutting Data

N9MT-CT >> Insert Multi-function

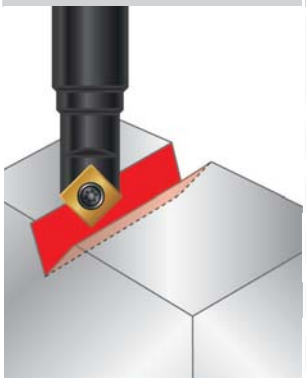
Determine spindle speed and feed rate:

- Choose spotting depth to decide spotting diameter according to the Diameter/Depth chart on page 28.
- The spindle speed should be calculated by the maximum diameter of spotting, chamfering and grooving.

Spotting	Work Material	SFM	IPR (inch/rev.)	Grade of Insert
	Carbon Steel	500~820	0.0020~0.0040	NC40, NC2071
	Alloy Steel	330~660	0.0016~0.0024	NC40, NC2071
	Stainless Steel	210~410	0.0010~0.0024	NC10, NC60, NC40, NC2071
	Cast iron	260~500	0.0020~0.0040	NC40, NC10, NC2071
	Non-Ferrous Metal (Al, Cu)	500~1050	0.0020~0.0040	NC10, NC9076, NC2071
	Ti, Ti-alloy	200~260	0.0012~0.0024	NC9076
	Hardened steel HRC 40°~56°	100~200	0.0012~0.0031	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%.

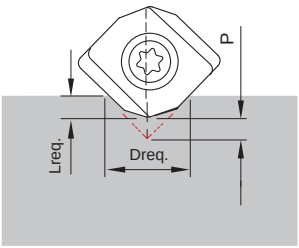
Chamfering	Work Material	SFM	IPR (inch/rev.)	Grade of Insert
	Carbon Steel	500~1050	0.0020~0.0040	NC40, NC2071
	Alloy Steel	330~820	0.0016~0.0024	NC40, NC2071
	Stainless Steel	210~410	0.0010~0.0024	NC10, NC60, NC40, NC2071
	Cast iron	500~820	0.0020~0.0040	NC40, NC10, NC2071
	Non-Ferrous Metal (Al, Cu)	500~1050	0.0020~0.0040	NC10, NC9076, NC2071
	Ti, Ti-alloy	200~260	0.0012~0.0024	NC9076
	Hardened steel HRC 40°~56°	100~200	0.0012~0.0031	NC60

Grooving	Work Material	SFM	IPR (inch/rev.)	Grade of Insert
	Carbon Steel	500~820	0.0020~0.0040	NC40, NC2071
	Alloy Steel	330~660	0.0016~0.0024	NC40, NC2071
	Stainless Steel	210~410	0.0010~0.0024	NC10, NC60, NC40, NC2071
	Cast iron	260~500	0.0020~0.0040	NC40, NC10, NC2071
	Non-Ferrous Metal (Al, Cu)	500~1050	0.0020~0.0040	NC10, NC9076, NC2071
	Ti, Ti-alloy	200~260	0.0012~0.0024	NC9076
	Hardened steel HRC 40°~56°	100~200	0.0012~0.0031	NC60

Cutting Data

W Spotting >>

W spotting	Formula



Lreq. = Dreq. x 0.5 - P

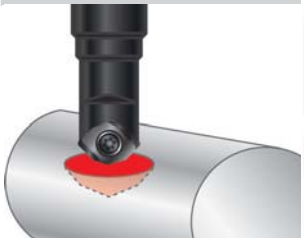
P = distance of theoretical intersection point to tip of insert.

0.5 = fixed factor for calculation

Lreq. = required drilling depth

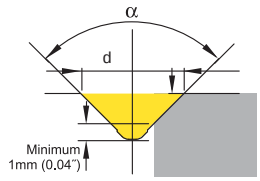
Dreq. = required diameter

	M4	M5	M6	M8	M10	M12	M14	M16	1/4-20 UNC	5/16-18 UNC	3/8-16 UNC
P =	0.046”	0.058”	0.069”	0.094”	0.117”	0.141”	0.165”	0.192”	0.071”	0.091”	0.109”

W spotting	Work Material	SFM	IPR (inch/rev.)
	Carbon Steel	500 ~ 1050	0.0020 ~ 0.0060
	Alloy Steel	410 ~ 820	0.0020 ~ 0.0040
	Stainless Steel	260 ~ 500	0.0015 ~ 0.0031
	Cast iron	330 ~ 660	0.0020 ~ 0.0040

LA Insert >> 45° Chamfering

45˚ Chamfering	Formula



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

$$F = f \times S$$

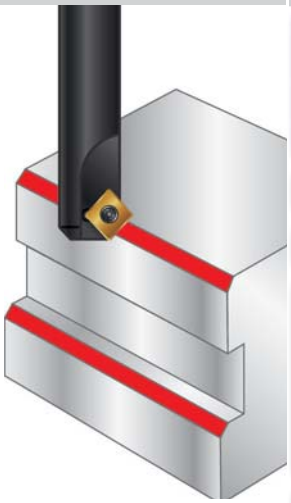
α = point angle 90°

d = effective diameter

SFM = Surface Speed-ft./min.. Vc (m/min.) x 3.28

S = Spindle Speed-r.p.m.

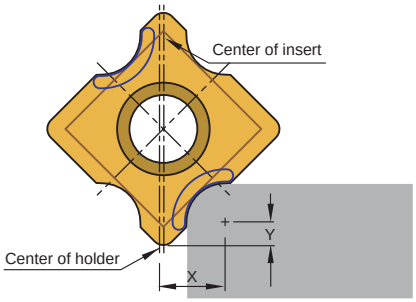
f = IPR= inch/rev.

45˚ Chamfering	Work Material	SFM	IPR (inch/rev.)	Grade of Insert
	Carbon Steel	500~1050	0.0020~0.0040	NC40
	Alloy Steel	330~820	0.0016~0.0031	NC40
	High alloy steel	200~260	0.0012~0.0023	NC40
	Stainless Steel	210~410	0.0012~0.0023	NC10
	Gray cast iron	500~820	0.0020~0.0040	NC10, NC40
	Aluminum, Al-alloy Si < 12%	500~1050	0.0020~0.0040	NC10
	Al-alloy Si >12%	330~1050	0.0020~0.0040	NC10
	Copper	600~820	0.0020~0.0040	NC10
	Brass and Bronze	500~820	0.0020~0.0040	NC10
	Hardened steel HRC 40~°56°	200~260	0.0020~0.0040	NC60

Cutting Data

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:

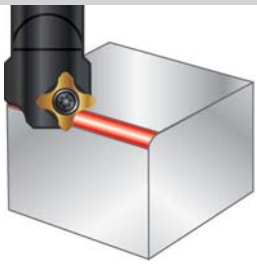
Corner Rounding	Calculate spindle speed	
	$d = 2 \times X$ inch	d = diameter of the tool for calculation purpose X = tool radius offset (ref. page 22~24 for RC inserts)
	$S = \frac{SFM \times 3.82}{d}$ r.p.m.	SFM = Cutting speed ft/min. S = Spindle Speed -r.p.m.
	$F = S \times f$ inch	F = Feed rate inch f = inch/rev.

Calculate tool length offest on machining center

TL = TL'-Y, H = X	X = tool radius offset (ref. page 22~24 for RC inserts) Y = distance to the center of radius. (ref. page 22~24 for RC inserts) TL' = tool length TL = tool length offset. H = tool radius offset

RC Insert	Work Material	SFM	IPR (inch/rev.)	Grade of Insert
	Carbon Steel	500~1050	0.0020~0.0040	NC40, NC2071
	Alloy steel	330~820	0.0020~0.0040	NC40, NC2071
	High alloy steel	260~500	0.0016~0.0031	NC40, NC2071
	Stainless Steel	210~410	0.0020~0.0040	NC9036
	Gray cast iron	500~820	0.0020~0.0040	NC40, NC2071
	Aluminum, Al-alloy Si < 12%	500~1050	0.0020~0.0040	NC9036
	Al-alloy Si >12%	330~1050	0.0020~0.0040	NC9036
	Copper	600~820	0.0020~0.0040	NC9036
	Brass and Bronze	500~820	0.0020~0.0040	NC9036
	Ti, Ti-alloy	130~260	0.0012~0.0031	NC9036

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

R Insert	Work Material	SFM	IPR (inch/rev.)	Grade of Insert
	Carbon Steel	500~1050	0.0020~0.0040	NC2071
	Alloy steel	330~820	0.0016~0.0031	NC2071
	High alloy steel	200~260	0.0012~0.0023	NC2071
	Cast iron	500~820	0.0020~0.0040	NC2071

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 r.p.m. and feed rate of 600 mm/min. (24 inch/min.), 0.1 mm/rev. (0.004 inch/rev.).

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.

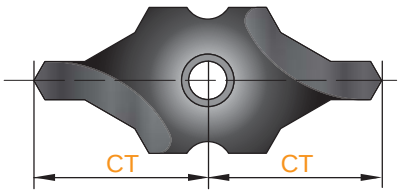
Excellent Repeatability

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

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

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.



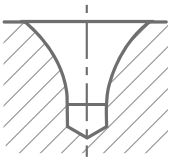
CT ±0.025mm *(0.001”)*

NC2033

NC5074

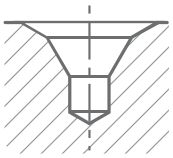
DIN 332 Form R

Ø1.0~Ø10



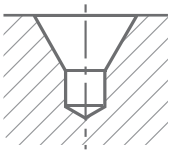
DIN 332 Form A + B

Ø1.0~Ø10



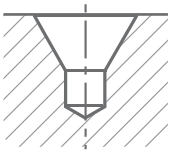
DIN 332 Form A

Ø2.0~Ø3.15

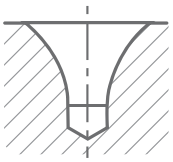


ANSI 60°

#2.0~#10



PR (Similar DIN332 R)



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.

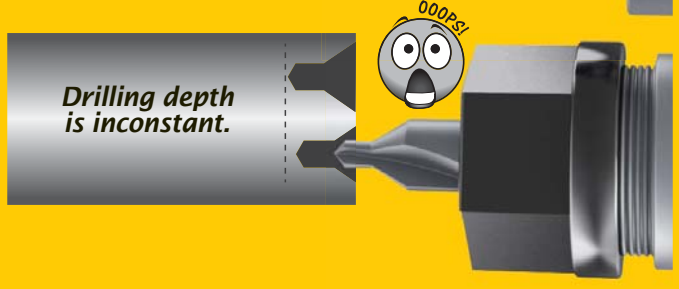
NC2033:

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

NC5074:

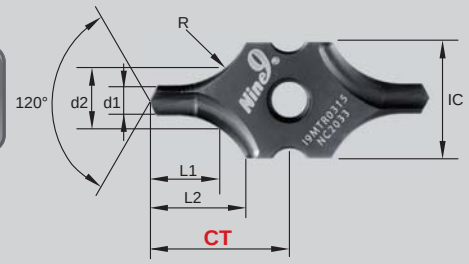
- P40 grade, Helica (AlCrN) coating , design for small diameter center drill (IC08 inserts).

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

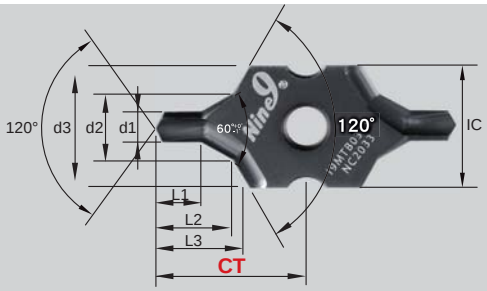


Indexable Center Drill

DIN332 Form R



DIN332 Form A+B



DIN332 Form R

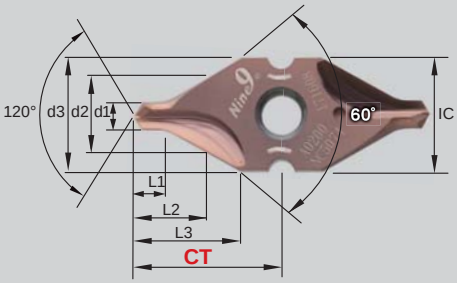
IC	Parts No.	Coating	Grade	d1		d2	L1	L2	R	CT ±0.025 (0.001")
08 (0.315")	I9MT08T1R0100-NC5074	Helica (AlCrN)	P40	1.00 (0.039")	+ 0.14 (0.006") 0	2.12 (0.083")	2.16 (0.085")	4.14 (0.163")	2.8 (0.110")	7.55 (0.297")
	I9MT08T1R0125-NC5074			1.25 (0.049")		2.65 (0.104")	2.74 (0.108")	4.64 (0.183")	3.5 (0.138")	7.90 (0.311")
	I9MT08T1R0160-NC5074			1.60 (0.063")		3.35 (0.132")	3.45 (0.136")	5.13 (0.202")	4.5 (0.177")	8.40 (0.331")
	I9MT08T1R0200-NC5074			2.00 (0.079")		4.25 (0.167")	4.45 (0.175")	6.08 (0.240")	5.65 (0.222")	9.10 (0.358")
12 (0.472")	I9MT12T2R0200-NC2033	TiAlN	K20F	2.00 (0.079")	+ 0.14 (0.006") 0	4.25 (0.167")	4.45 (0.175")	6.64 (0.261")	5.65 (0.222")	11.73 (0.462")
	I9MT12T2R0250-NC2033			2.50 (0.098")		5.3 (0.209")	5.59 (0.220")	8.11 (0.319")	7.15 (0.281")	13.00 (0.512")
	I9MT12T2R0315-NC2033			3.15 (0.124")	+ 0.18 (0.007") 0	6.7 (0.264")	7.21 (0.284")	9.63 (0.379")	9.0 (0.354")	14.00 (0.551")
16 (0.630")	I9MT1603R0400-NC2033			4.00 (0.157")		8.5 (0.335")	9.06 (0.357")	12.23 (0.481")	11.0 (0.433")	19.40 (0.764")
	I9MT1603R0500-NC2033			5.00 (0.197")		10.6 (0.417")	11.45 (0.450")	14.2 (0.481")	14.0 (0.551")	19.40 (0.764")
20 (0.787")	I9MT2004R0630-NC2033			6.30 (0.248")	+ 0.22 (0.009") 0	13.2 (0.520")	14.63 (0.576")	18.2 (0.717")	18.0 (0.709")	28.40 (1.118")
	I9MT2004R0800-NC2033			8.00 (0.315")		17.0 (0.669")	18.63 (0.733")	20.44 (0.805")	22.5 (0.886")	28.30 (1.114")
25 (0.984")	I9MT2506R1000-NC2033			10.00 (0.394")		21.2 (0.835")	23.51 (0.926")	25.8 (1.016")	28.0 (1.102")	34.20 (1.346")

DIN332 Form A+B

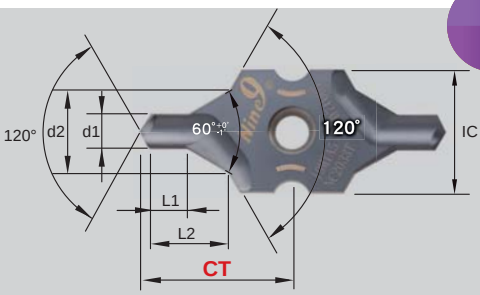
IC	Parts No.	Coating	Grade	d1		d2	d3	L1	L2	L3	CT ±0.025 (0.001")
08 (0.315")	I9MT08T1B0100-NC5074	Helica (AlCrN)	P40	1.00 (0.039")	+ 0.14 (0.006") 0	2.12 (0.083")	3.15 (0.124")	1.3 (0.051")	2.21 (0.087")	2.51 (0.099")	7.55 (0.297")
	I9MT08T1B0125-NC5074			1.25 (0.049")		2.65 (0.104")	4.0 (0.157")	1.6 (0.063")	2.75 (0.108")	3.14 (0.124")	7.90 (0.311")
	I9MT08T1B0160-NC5074			1.60 (0.063")		3.35 (0.132")	5.0 (0.197")	2.0 (0.079")	3.46 (0.136")	3.93 (0.155")	8.40 (0.331")
	I9MT08T1B0200-NC5074			2.00 (0.079")		4.25 (0.167")	6.3 (0.248")	2.5 (0.098")	4.39 (0.173")	4.98 (0.196")	9.10 (0.358")
12 (0.472")	I9MT12T2B0200-NC2033	TiAlN	K20F	2.00 (0.079")	+ 0.14 (0.006") 0	4.25 (0.167")	6.3 (0.248")	2.5 (0.098")	4.39 (0.173")	4.98 (0.196")	11.73 (0.462")
	I9MT12T2B0250-NC2033			2.50 (0.098")		5.3 (0.209")	8.0 (0.315")	3.1 (0.122")	5.53 (0.218")	6.28 (0.247")	13.00 (0.512")
	I9MT12T2B0315-NC2033			3.15 (0.124")	+ 0.18 (0.007") 0	6.7 (0.264")	10.0 (0.394")	3.9 (0.154")	6.90 (0.272")	7.85 (0.309")	14.00 (0.551")
16 (0.630")	I9MT1603B0400-NC2033			4.00 (0.157")		8.5 (0.335")	12.5 (0.492")	5.0 (0.197")	8.9 (0.350")	10.03 (0.395")	19.40 (0.764")
	I9MT1603B0500-NC2033			5.00 (0.197")		10.6 (0.417")	16.0 (0.630")	6.3 (0.248")	11.15 (0.439")	12.68 (0.499")	19.40 (0.764")
20 (0.787")	I9MT2004B0630-NC2033			6.30 (0.248")	+ 0.22 (0.009") 0	13.2 (0.520")	18.0 (0.709")	8.0 (0.315")	13.98 (0.550")	15.33 (0.604")	28.40 (1.118")
	I9MT2004B0800-NC2033			8.00 (0.315")		17.0 (0.669")	20 (0.787")	10.1 (0.398")	17.89 (0.704")	18.73 (0.737")	28.30 (1.114")
25 (0.984")	I9MT2506B1000-NC2033			10.00 (0.394")		21.2 (0.835")	25 (0.984")	12.8 (0.504")	22.5 (0.886")	23.57 (0.928")	34.20 (1.346")

NEW

DIN332 Form A



ANSI 60°



DIN332 Form A

IC	Parts No.	Coating	Grade	d1		d2	d3	L1	L2	L3	CT ±0.025 (0.001")
08 (0.315")	I9MT08T1A0200-NC5074	Helica (AlCrN)	P40	2.0 (0.079")	+ 0.14 (0.006") 0	4.25 (0.167")	8 (0.315")	2.15 (0.085")	4.10 (0.161")	7.35 (0.289")	10.5 (0.413")
	I9MT08T1A0250-NC5074			2.5 (0.098")		5.3 (0.209")		2.58 (0.102")	5.00 (0.197")	7.34 (0.289")	
	I9MT08T1A0315-NC5074			3.15 (0.124")	+ 0.18 (0.007") 0	6.70 (0.264")		3.23 (0.127")	6.30 (0.248")	7.43 (0.293")	

ANSI 60°

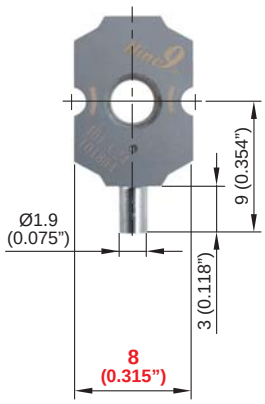
IC	Parts No.	Coating	Grade	Size	d1			d2		L1		L2	CT ±0.025 (0.001")
						mm			mm		mm	mm	
12 (0.472")	I9MT12T2A2-NC2033	TiAlN	K20F	#2	5/64	1.98	+0.14 (0.006") 0	3/16	4.76	5/64	1.98	4.4 (0.173")	12.6 (0.496")
	I9MT12T2A3-NC2033			#3	7/64	2.78		1/4	6.35	7/64	2.78	5.9 (0.232")	13.8 (0.543")
	I9MT12T2A4-NC2033			#4	1/8	3.18	+0.18 (0.007") 0	5/16	7.94	1/8	3.18	7.3 (0.287")	14.25 (0.561")
16 (0.630")	I9MT1603A5-NC2033			#5	3/16	4.76		7/16	11.11	3/16	4.76	10.3 (0.406")	20.0 (0.787")
20 (0.787")	I9MT2004A6-NC2033			#6	7/32	5.56		1/2	12.7	7/32	5.56	11.8 (0.465")	27.75 (1.093")
	I9MT2004A7-NC2033			#7	1/4	6.35	+0.22 (0.009") 0	5/8	15.88	1/4	6.35	14.6 (0.575")	28.5 (1.122")
	I9MT2004A8-NC2033			#8	5/16	7.94		3/4	19.05	5/16	7.94	17.6 (0.693")	29.0 (1.141")
25 (0.984")	I9MT2506A10-NC2033			#10	3/8	9.53		0.98"	25.0	3/8	9.53	22.9 (0.902")	34.9 (1.374")

New ▸ Measuring Master >>

- Apply on lathe to align the center of work spindle and tool.
- Each insert has just one measuring tip.

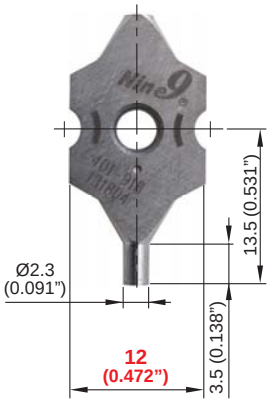
IC08 (0.315")

Parts No: I9MT08T1-PATTERN



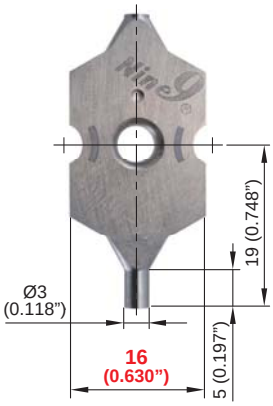
IC12 (0.472")

Parts No: I9MT12T2-PATTERN



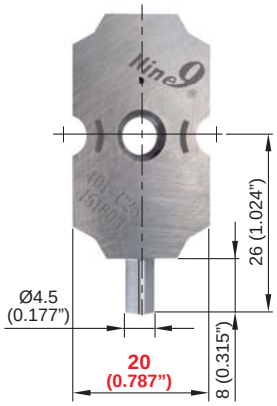
IC16 (0.630")

Parts No: I9MT1603-PATTERN



IC20 (0.787")

Parts No: I9MT2004-PATTERN



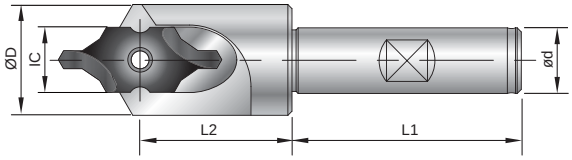
i-Center

Holders of Indexable Center Drill

NEW

Weldon Shank >>

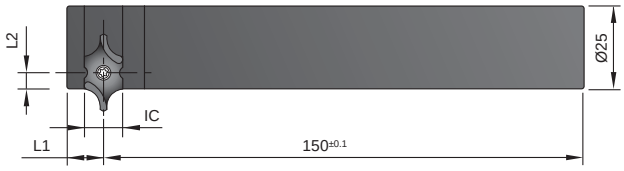
- Made of hardened high alloy steel, 58 HRC.
- Shank is ground to h6 tolerance.



IC	Parts No.	Type	Ød	L1	L2	ØD	Screw	Key
08 (0.315")	99616-IC08-10F	BC10-IC08F	10 (0.394")	30 (1.181")	18.5 (0.728")	12 (0.472")	NS-25060 0.9 Nm	NK-T7
	99616-IC08-3/8F	BC3/8"-IC08F	3/8"					
12 (0.472")	99616-IC12-16F	SB16-IC12F	16 (0.630")	48 (1.890")	30.5 (1.201")	21 (0.827")	NS-30072 2.0 Nm	NK-T9
	99616-IC12-5/8F	SB5/8"-IC12F	5/8"					
16 (0.630")	99616-IC16-16F	SB16-IC16F	16 (0.630")	48 (1.890")	37 (1.457")	27 (1.063")	NS-35080 2.5 Nm	NK-T15
	99616-IC16-5/8F	SB5/8"-IC16F	5/8"					
20 (0.787")	99616-IC20-20F	SB20-IC20F	20 (0.787")	50 (1.969")	51 (2.008")	32 (1.260")	NS-50125 5.5 Nm	NK-T20
	99616-IC20-3/4F	SB3/4"-IC20F	3/4"					
25 (0.984")	99616-IC25-25F	SB25-IC25F	25 (0.984")	56 (2.205")	56 (2.205")	43 (1.693")	NS-50125 5.5 Nm	NK-T20
	99616-IC25-1F	SB 1"-IC25F	1"					

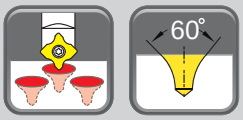
New Square Shank 25 x 25 Right / Left Hand >>

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



IC	Parts No.	L1	L2	Screw	Key
08 (0.315")	99616-IC08-R2525MF	8 (0.315")	3.25 (0.128")	NS-25060 0.9 Nm	NK-T7
	99616-IC08-L2525MF				
12 (0.472")	99616-IC12-R2525MF	11 (0.433")	4.9 (0.193")	NS-30072 2.0 Nm	NK-T9
	99616-IC12-L2525MF				
16 (0.630")	99616-IC16-R2525MF	13 (0.512")	4.9 (0.193")	NS-35080 2.5 Nm	NK-T15
	99616-IC16-L2525MF				

N9MT11T3PR Radius Center Drilling

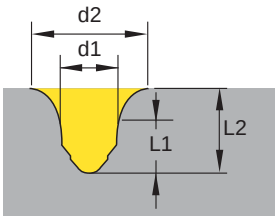


NC40

Inserts >>

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

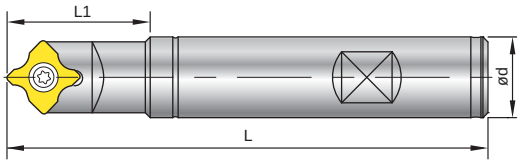
NC40:
- Universal grade for all unhardened steel and cast iron.
- Radius curve eliminates the sharp transition from drill point to countersink angle.
- The risk of breakage is reduced.
- Each insert has 2 cutting edges.



Parts No.	Coating	Grade	Dimensions			
			d1	d2	L1	L2
N9MT11T3PR20-NC40	TiN	P35	2.0 (0.078")	5.4 (0.213")	2.7 (0.106")	3.3 (0.130")
N9MT11T3PR25-NC40			2.5 (0.098")	5.9 (0.232")	3.0 (0.118")	3.7 (0.146")
N9MT11T3PR30-NC40			3.0 (0.118")	6.4 (0.252")	3.3 (0.130")	4.0 (0.157")

Holder >>

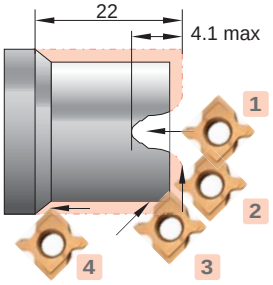
- PR holder has small offset value.
- Also apply as a 90° spotting drill while fitted with N9MT11T3CT2T-H insert (page 18).



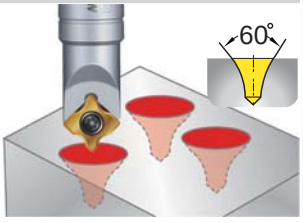
Parts No.	Ød	L	L1	Screw	Key
99616-14-PR	16 (0.630")	100 (3.94")	30 (1.224")	NS-35080 2.5 Nm	NK-T15

Turning and Centering Capacity on CNC Lathes

	Action
1	Center Drilling
2	Facing
3	Chamfering
4	External Turning



Cutting Data >>

Center Drilling	Work Material	SFM	IPR (inch/rev.)	Grade of Insert
	Carbon Steel	260 ~ 500	0.0020~0.0040	NC40
	Alloy steel	260 ~ 500	0.0020~0.0040	
	High alloy steel	260 ~ 500	0.0020~0.0040	
	Cast iron	260 ~ 500	0.0020~0.0040	

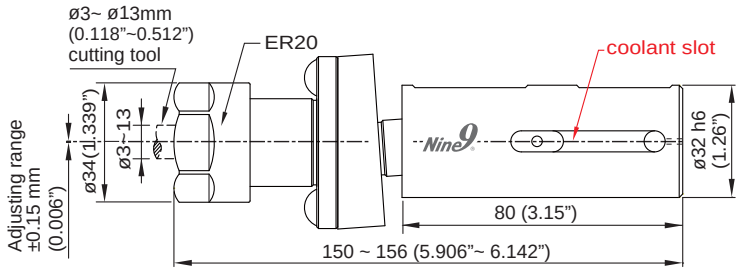
Center Height Adjusting Sleeve

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.

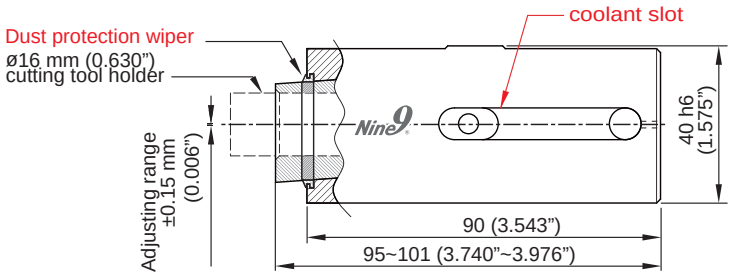
Parts No.:99600-320H >>

Type : SB32-IDER20



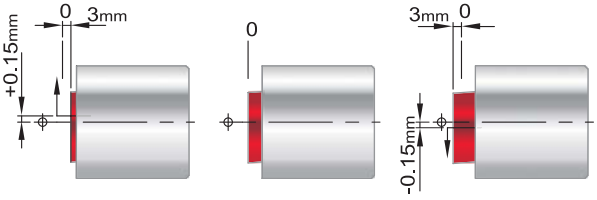
Parts No.:99600-400H >>

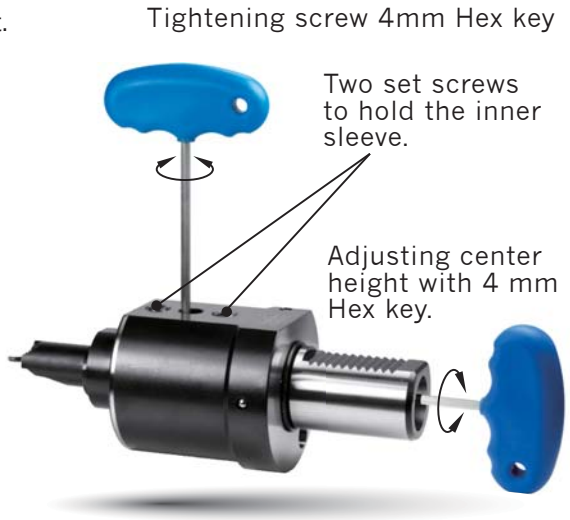
Type : SB32-ID16



Applications >>

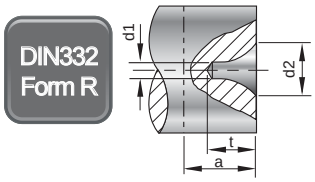
- Used when the CNC lathes need to adjust the center height.
- This sleeve can be clamped by VDI 40, VDI 50 E2 tool holders,and other types internal turning tool holders.
- Center height adjusting range: ±0.15 mm(.006").
- Total axial movement is 6mm(.236").

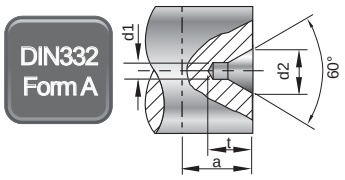


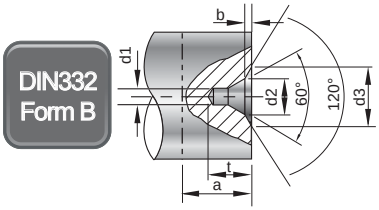


Technical Specifications

60° Center holes

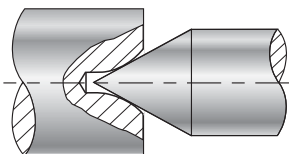
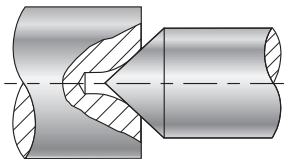
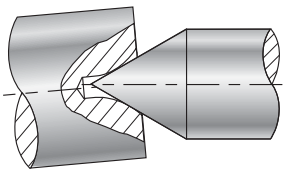




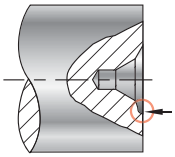
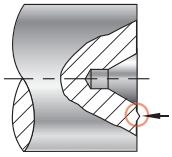
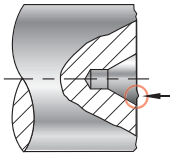
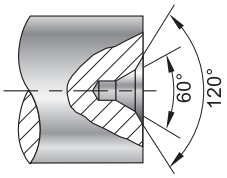


STD	DIN332 Form R ISO 2541-1972			DIN332 Form A ISO 866-1975			DIN332 Form B ISO 2540 1973				
d1	d2	t	a	d2	t	a	d2	b	d3	t	a
1	2.12	1.9	3	2.12	1.9	3	2.12	0.3	3.15	2.2	3.5
1.25	2.65	2.3	4	2.65	2.3	4	2.65	0.4	4	2.7	4.5
1.6	3.35	2.9	5	3.35	2.9	5	3.35	0.5	5	3.4	5.5
2	4.25	3.7	6	4.25	3.7	6	4.25	0.6	6.3	4.3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

Advantage of Form R Center hole

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

Advantage of Form B center hole

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

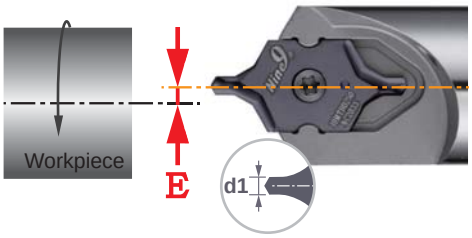
Technical Guide

Before you start, please pay attention the following conditions

1

The center misalignment

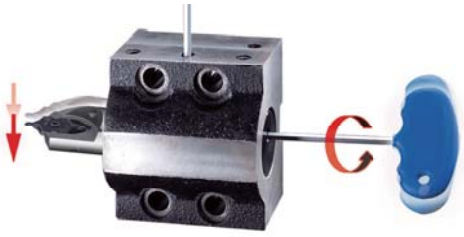
d1: Ø1~Ø2 (#2)，**E** must be< 0.0008".
d1: Ø2.5(#3)~Ø4(#5)，**E** must be< 0.0020".



2

CNC lathe turret center's misalignment is above 0.006".

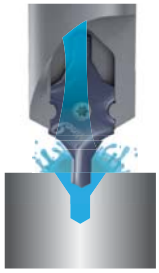
please use the center height adjusting sleeve. **(See page 38)**



3

Internal coolant

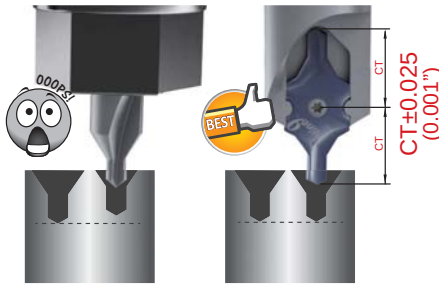
Internal coolant is recommended.



4

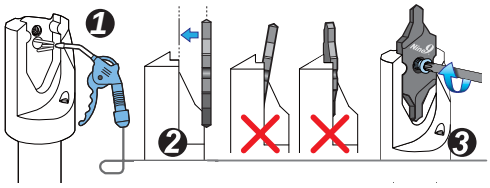
No need to reset

Tool length maintain while changing the insert or cutting edge.

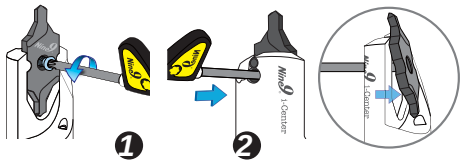


5

Clamping insert



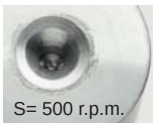
Loosen insert



6

In low spindle speed machines or lathes

Choose highest spindle speed in accordance with your machine.
Feed rate: refer to page 41.



It runs well both in high & low spindle speed machines!

Applications

Various centering applications and products - shafts of engine, transmission gear boxes, bearings, motors, grinding parts, spindles, gear reducers, cooling fan, universal joints...

Cutting Data

Ø1~Ø3.15 (#2~#4)

● Best ○ Possible

Workpiece material	d1	IC08		IC12				
		Ø1~1.25mm (0.039"~0.049")	Ø1.6~3.15 (0.063"~0.124")	Ø2mm #2 (0.079")	Ø2.5 #3 (0.098")	Ø3.15 #4 (0.124")		
Carbon steel C<0.3%	SFM	21 ~ 125	30 ~ 255	35 ~160	40 ~180	40 ~ 195	●	○
	IPR inch/rev.	.0008 ~ .0020	.0012 ~ .0024	.0016 ~ .0031	.0024 ~ .0039	.0031 ~ .0047		
Carbon steel C>0.3%	SFM	21 ~115	30 ~ 230	35 ~145	40 ~180	40 ~175	●	○
	IPR inch/rev.	.0008 ~ .0020	.0012 ~ .0020	.0012 ~ .0020	.0024 ~ .0039	.0031 ~ .0047		
Low alloy steel C<0.3%	SFM	21 ~100	30 ~200	35~ 130	40 ~160	40 ~155	●	○
	IPR inch/rev.	.0004 ~ .0016	.0008 ~ .0020	.0008 ~ .0020	.0016 ~ .0031	.0024 ~ .0039		
High alloy steel C>0.3%	SFM	11 ~75	15 ~155	20 ~95	21 ~ 120	20 ~115	●	○
	IPR inch/rev.	.0004 ~ .0008	.0004 ~ .0016	.0004 ~ .0016	.0008 ~ .0024	.0016 ~ .0031		
Stainless Steel	SFM	11 ~ 35	15 ~75	20 ~ 45	21 ~60	20 ~55	● ≥ 5 bar	○
	IPR inch/rev.	.0001 ~ .0004	.0002 ~ .0008	.0004 ~ .0008	.0004 ~ .0012	.0008 ~ .0020		
Grey cast iron	SFM	21 ~115	30 ~ 230	35 ~145	41 ~180	40 ~175	Air	
	IPR inch/rev.	.0004 ~ .0016	.0008 ~ .0024	.0008 ~ .0024	.0016 ~ .0031	.0024 ~ .0039		
Al, and non-ferrous metal	SFM	62 ~255	80 ~ 515	100 ~515	121 ~400	118~ 390	●	○
	IPR inch/rev.	.0004 ~ .0012	.0004 ~ .0016	.0004 ~ .0016	.0008 ~ .0020	.0008 ~ .0024		

Ø4~Ø10 (#5~#10)

● Best ○ Possible

Workpiece material	d1	IC16		IC20		IC25		
		Ø4 #5 (0.157")	Ø5 (0.197")	#6 (0.197")	Ø6.3 #7 (0.248")	Ø8 #8 (0.315")	Ø10 #10 (0.394")		
Carbon steel C<0.3%	SFM	50 ~ 245	52 ~ 255		55 ~ 260	58 ~ 285	60 ~ 290	●	○
	IPR inch/rev.	.0031 ~ .0055	.0039 ~ .0063		.0039 ~ .0063	.0047 ~ .0071	.0055 ~ .0079		
Carbon steel C>0.3%	SFM	50 ~ 220	52 ~ 230		55 ~ 235	58 ~ 255	60 ~ 265	●	○
	IPR inch/rev.	.0031 ~ .0055	.0039 ~ .0063		.0039 ~ .0063	.0047 ~ .0071	.0055 ~ .0079		
Low alloy steel C<0.3%	SFM	50 ~ 195	52 ~ 205		55 ~ 205	58 ~ 225	60 ~ 235	●	○
	IPR inch/rev.	.0024 ~ .0039	.0031 ~ .0047		.0031 ~ .0055	.0039 ~ .0063	.0047 ~ .0079		
High alloy steel C>0.3%	SFM	25 ~ 145	26 ~ 150		30 ~ 155	30 ~ 170	30 ~ 175	●	○
	IPR inch/rev.	.0016 ~ .0031	.0024 ~ .0039		.0031 ~ .0047	.0039 ~ .0063	.0039 ~ .0063		
Stainless Steel	SFM	25 ~ 70	26 ~ 75		27 ~ 78	30 ~ 85	30 ~ 88	● ≥ 5 bar	○
	IPR inch/rev.	.0008 ~ .0024	.0008 ~ .0024		.0016 ~ .0031	.0016 ~ .0031	.0020 ~ .0039		
Grey cast iron	SFM	50 ~ 220	52 ~ 230		55 ~ 235	60 ~ 255	60 ~ 265	Air	
	IPR inch/rev.	.0024 ~ .0039	.0031 ~ .0047		.0031 ~ .0055	.0039 ~ .0063	.0047 ~ .0071		
Al, and non-ferrous metal	SFM	150 ~ 490	155 ~ 515		160 ~ 520	172 ~ 570	177 ~ 585	●	○
	IPR inch/rev.	.0008 ~ .0024	.0016 ~ .0031		.0016 ~ .0031	.0024 ~ .0039	.0024 ~ .0039		

Calculate spindle speed and feed rate >>

Using your “d1” value and Surface Speed SFM from the data sheet, calculate spindle speed “S” (r.p.m.).
Example: I9MT12T2T2A2 has d1: 0.078”, material: SS304
S (r.p.m.) = 3.82 x 35 / 0.078 = **1714 r.p.m.** ►► 3.82 x 160 / 0.078 =**7835 r.p.m.**

Inch

$$S = \frac{(3.82 \times SFM)}{d1}$$

F = IPR x r.p.m.

d1 = diameter-inch **f = IPR =** inch/rev.

S = Spindle Speed-r.p.m. **F =** inch/min.

SFM = Surface Speed-ft./min.

Engraving 45°/ 60° / 90°

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

Features

High Positive Rake Angle

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

Multi-Side Grinding

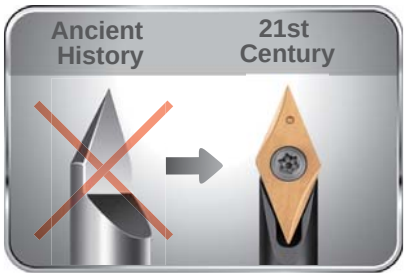
- Full peripherally ground insert to ensure efficient repeatability.
- It performs excellently without producing any burrs, especially in copper, aluminum and stainless steel.

High Speed, High Feed Rate

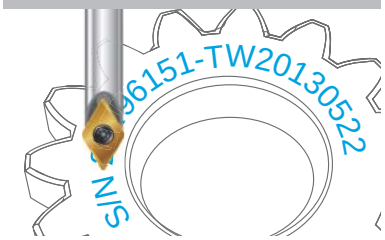
- Designed to run at high speed, up to 40,000 r.p.m.
- Feed rate 0.08mm (0.003") / rev. apply to aluminum; 0.05mm (0.002") / rev. apply to stainless steel.
- Reduces engraving cycle time!

Economical

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

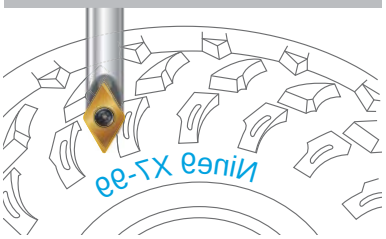


Serial number

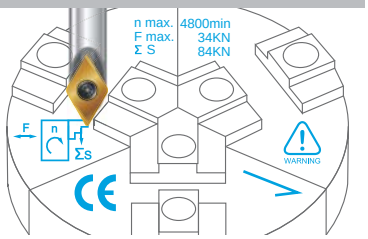


Logo outlines

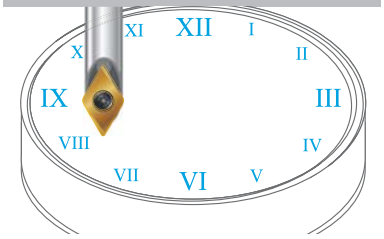
Mold & Die



Product info



Dial scales



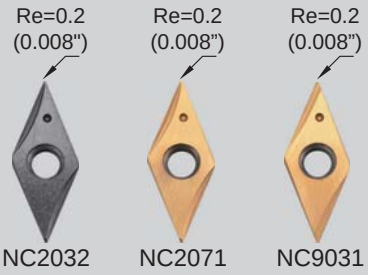
Applications

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

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

Engraving Tool 45°

Starter Kit Page 02~03

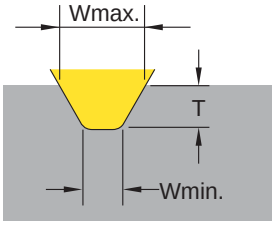


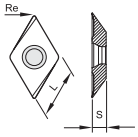
Inserts >>

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 .008".
• Universal grade for all kinds of steel <30HRC, non-ferrous metal and stainless steel.

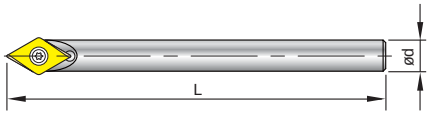
NC9031: • Fully positive ground rake angle, very sharp edge - first choice for shallow engraving.
• For non-ferrous metal such as aluminum, brass, copper, titanium, plastic and acrylic.



Angle	Parts No.		Coating	Grade		Dimensions			W		T	
						L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
45°	V04506T1W06	NC2071	TiN	K20F		6.35 (0.250")	2.0 (0.079")	0.2 (0.008")	0.65 (0.026")	2.1 (0.083")	0.2 (0.008")	2.0 (0.079")
		NC2032	TiAlN						0.65 (0.026")		0.2 (0.008")	
		NC9031	TiN						0.45 (0.018")		0.05 (0.002")	

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.

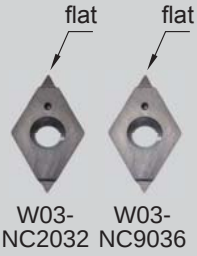


Ø6 (0.236")

Angle	Parts No.	Ød	L	Screw	Key
45°	99619-V045-06	6 (0.236")	40 (1.575")	 NS-22044 0.9Nm	 NK-T7
	* 99619-V045-06L		60 (2.462")		
	* 99619-V045-06XL		100 (3.937")		

Note: • DC Slim chuck, see page 51.

Engraving Tool 60°



Inserts >>

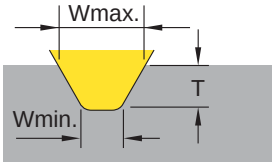
NC2032: • Long tool life
• For all kinds of steel from 30~50 HRC, carbon steel, alloy steel,and cast iron.

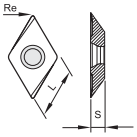
NC2071: • Strong edge on chip groove best suited for min. DOC .008".
• Universal grade for all kinds of steel <30HRC, non-ferrous metal and stainless steel.

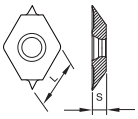
NC2035: • ALDURA coating, reduces heat and tool wear.
• For steel with heat treatment up to 56 HRC.

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

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

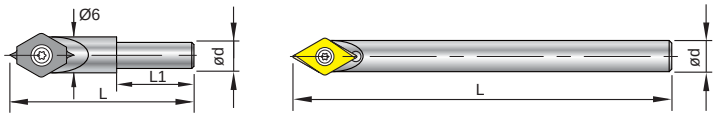


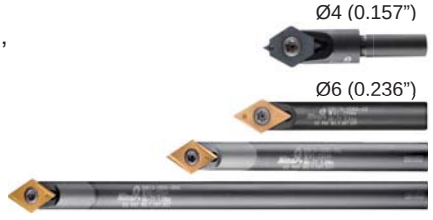
Angle	Parts No.		Coating	Grade		Dimensions			W		T	
						L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
60°	V06006T1W06	NC2071	TiN	K20F		6.35 (0.250")	2.0 (0.079")	0.2 (0.008")	0.65 (0.026")	2.7 (0.106")	0.2 (0.008")	2.0 (0.079")
		NC2032	TiAlN						0.65 (0.026")		0.2 (0.008")	
		NC2035	ALDURA						0.65 (0.026")		0.2 (0.008")	
		NC9031	TiN						0.45 (0.018")		0.05 (0.002")	

Angle	Parts No.		Coating	Grade		Dimensions			W		T	
						L	S	Re	Wmin.	Wmax.	Tmin.	Tmax.
60°	V06006T1W03	NC2032	TiAlN	K20F		6.35 (0.250")	2.0 (0.079")	---	0.25 (0.01")	1.1 (0.043")	0.05 (0.002")	0.8 (0.031")
		NC9036	DLC									

Holder >>

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





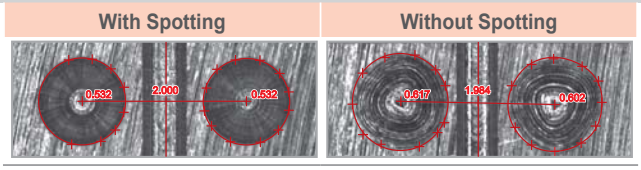
Angle	Parts No.	Ød	L	L1	Screw	Key
60°	99619-V060-04	4 (0.157")	30 (1.181")	12 (0.472")	 NS-22044 0.9Nm	 NK-T7
	99619-V060-06	6 (0.236")	40 (1.575")	---		
	* 99619-V060-06L		60 (2.462")	---		
	* 99619-V060-06XL		100 (3.937")	---		

Note: • DC Slim chuck, see page 51.

N9MT080201W

Inserts >>

- No resharpening required.
- For marking all types of workpieces.
- Also can be used for small diameter spotting.
- Each insert has 4 cutting edges.

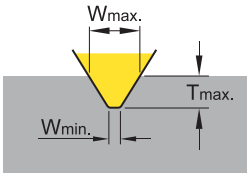


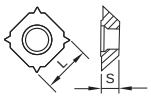
Best positioning accuracy!

60-NC40: • Submicron carbide insert, TiN coated,
very positive angle for 60° engraving for all kinds of steel and cast iron.

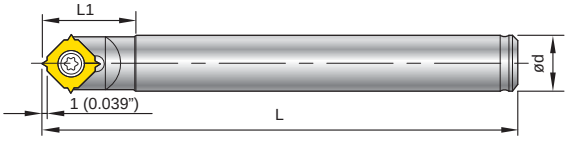
NC40: • Submicron carbide insert, TiN coated,
for all unhardened steel and cast iron, general purpose.

NC10: • Submicron carbide insert, TiAlN coated,
for Al, Al-alloy, hardened steel 40-50 HRC, stainless steel.

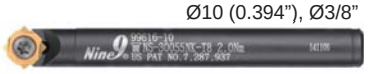


Angle	Parts No.		Coating	Grade		Dimensions L	Dimensions S	Wmin.	Wmax.	Tmax.
60°	N9MT080201W	60-NC40	TiN	K20F		8 (0.315")	2.38 (0.094")	0.1 (0.004")	1.1 (0.043")	0.8 (0.031")
90°		NC40	TiN	K20F		8 (0.315")	2.38 (0.094")	0.1 (0.004")	2.0 (0.079")	0.9 (0.035")
90°		NC10	TiAlN	K20F		8 (0.315")	2.38 (0.094")	0.1 (0.004")	2.0 (0.079")	0.9 (0.035")

Holder >>



Ø10 (0.394"), Ø3/8"



Parts No.	Ød	L	L1	Screw	Key
99616-10	10 (0.394")	90 (3.543")	18 (0.709")	NS-30055 2.0 Nm	NK-T8
99616-3/8	3/8"	90 (3.543")			

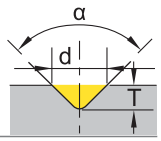
Cutting Data

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

• Tool shank runout should be below 0.01mm (0.0004")

Engraving

• For α = 90° insert, d=2xT
• For α = 60° insert, d=1.73xT

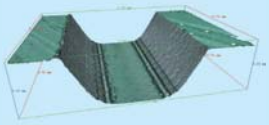
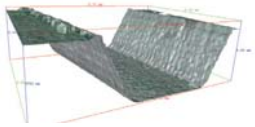
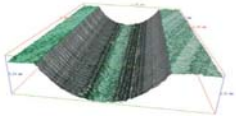


Mini spotting	Work Material	SFM	IPR (inch/rev.)	Grade of Insert	Depth of cut 1st	Depth of cut 2nd	Depth of cut 3th	Depth of cut Finishing
	All kinds of Steel, unhardened, Cast iron	66~260	0.0004~0.0008	NC40	0.3 (0.011")	0.2 (0.008")	0.2 (0.008")	0.1 (0.004")
	Non-Ferrous Metal (Al, Cu)	66~310	0.0004~0.0008	NC10				

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

Performance

Comparison >>

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

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

Attention >>

Selecting the speed and feed rate

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

Cutting fluid and cooling condition

- 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.(0.0004")
- Shrink fit chucks, hydraulic chuck and high precision spring collet chucks are recommended.
- Pre-balance the tool holder minimum G6.3/10,000 R.P.M. is necessary.

Clamping the engraving insert

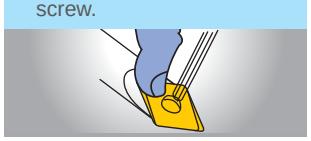
- Place and hold the insert in the insert pocket against the positioning side.
- See illustration below:

• Step-1

Place the insert in the insert pocket.

• Step-2

Push insert against insert pocket and insert the screw.



• Step-3

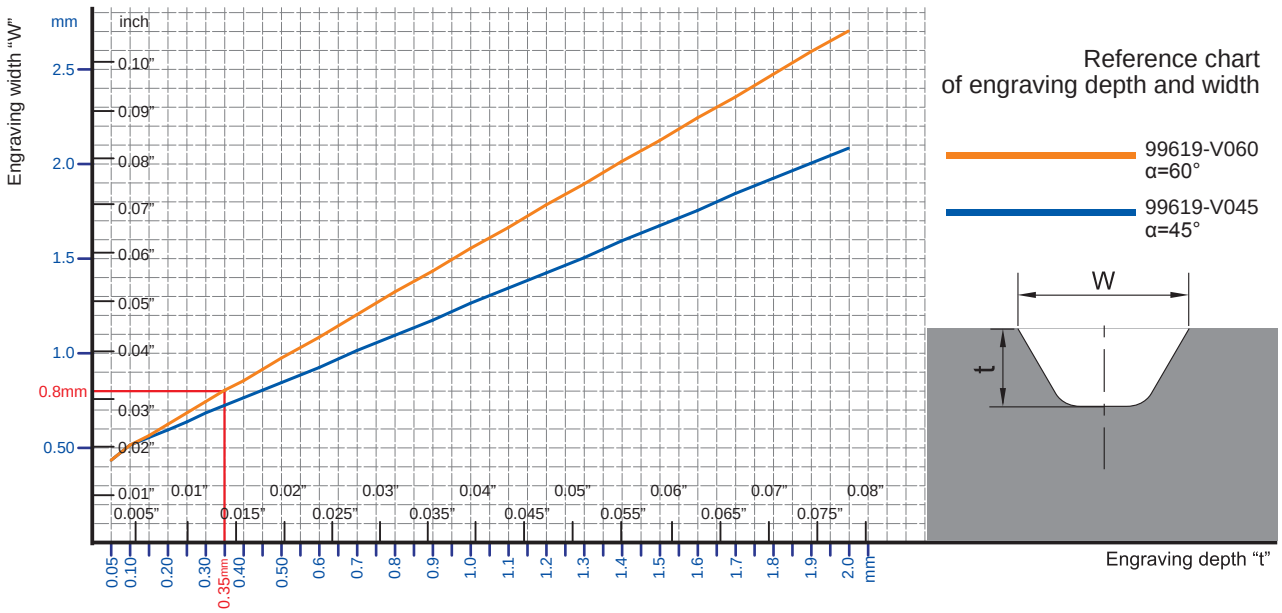
Tighten the insert screw.

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 >>



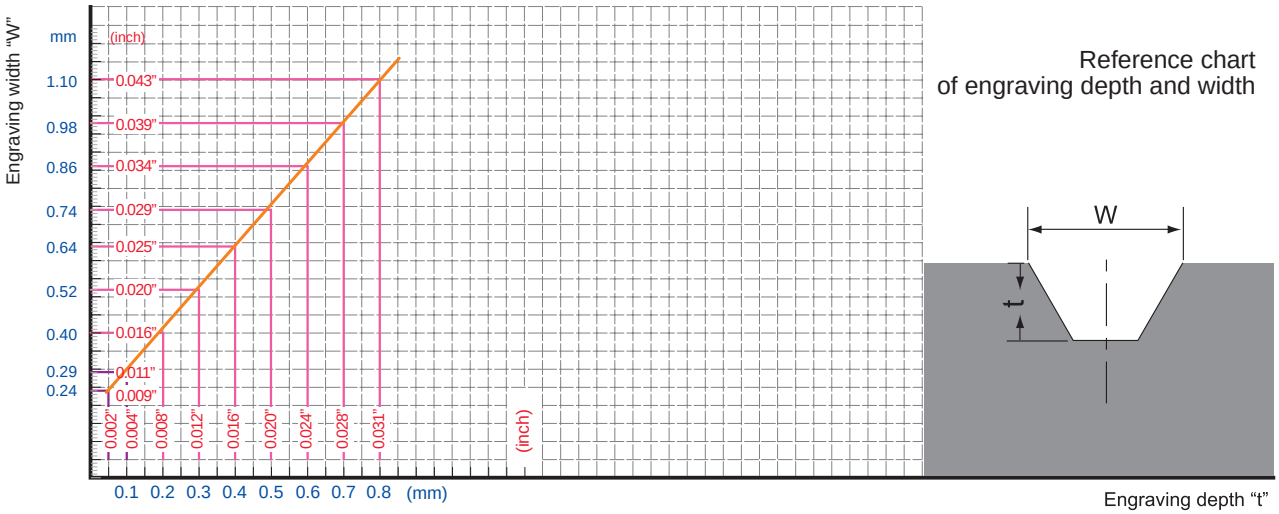
Work Material	S (r.p.m.)	IPR (inch/rev.)	Grade of Insert
Carbon steel	5000~40000	0.0003~0.0020	NC2071,NC2032
Alloy steel	5000~40000	0.0003~0.0012	NC2032,NC2071
Stainless Steel	5000~40000	0.0003~0.0020	NC2071,NC9031
Cast iron	5000~40000	0.0003~0.0012	NC2032
Aluminum≧Non-Ferrous Metal	5000~40000	0.0003~0.0031	NC2071,NC9031
Hardened steel up to 56 HRC	6000~35000	0.0001~0.0004	NC2035

Tmax.:0.079"

Material \ Ap	1st	2nd	3rd	4th	5th	6th	~	Fine finishing
Carbon steel	0.031"	0.024"	0.012"	0.008"	0.004"	~	~	0.004"
Alloy steel	0.020"	0.016"	0.012"	0.012"	0.008"	0.008"	0.004"	0.004"
Stainless Steel	0.020"	0.016"	0.012"	0.012"	0.008"	0.008"	0.004"	0.002"
Cast iron	0.031"	0.024"	0.012"	0.008"	0.004"	~	~	0.004"
Aluminum≧Non-Ferrous Metal	0.039"	0.031"	0.008"	~	~	~	~	0.004"
Hardened steel up to 56 HRC	0.008"	0.008"	0.006"	0.006"	0.004"	0.004"	0.004"	0.002"

Cutting Data

V060 T1W03 >>



Work Material	S (r.p.m.)	IPR (inch/rev.)	Grade of Insert
Carbon steel C<0.3%	8000 ~ 40000	0.0002 ~ 0.0004	NC2032
Carbon steel C>0.3%	8000 ~ 40000	0.0002 ~ 0.0006	NC2032
Alloy steel	6000 ~ 35000	0.0002 ~ 0.0004	NC2032
Stainless Steel	8000 ~ 35000	0.0001 ~ 0.0004	NC9036
Cast iron	6000 ~ 35000	0.0002 ~ 0.0006	NC2032
Aluminum	8000 ~ 40000	0.0002 ~ 0.0006	NC9036
Copper, Brass	8000 ~ 40000	0.0002 ~ 0.0004	NC9036
Titanium	6000 ~ 15000	0.0001 ~ 0.0004	NC9036

Tmax.:0.0315"

Material \ Ap	1st	2nd	3rd	4th	5th	~	Fine finishing
Carbon steel C<0.3%	0.0118"	0.0080"	0.0040"	0.0040"	0.0020"	0.0020"	0.0012
Carbon steel C>0.3%	0.0118"	0.0080"	0.0040"	0.0040"	0.0020"	0.0020"	0.0012
Alloy steel	0.0118"	0.0040"	0.0040"	0.0020"	0.0020"	0.0020"	0.0012
Stainless Steel	0.0080"	0.0040"	0.0040"	0.0040"	0.0020"	0.0020"	0.0012
Cast iron	0.0080"	0.0040"	0.0040"	0.0040"	0.0020"	0.0020"	0.0012
Aluminum	0.0080"	0.0040"	0.0040"	0.0040"	0.0020"	0.0020"	0.0012
Copper, Brass	0.0080"	0.0040"	0.0040"	0.0040"	0.0020"	0.0020"	0.0012
Titanium	0.0080"	0.0040"	0.0040"	0.0040"	0.0020"	0.0020"	0.0012

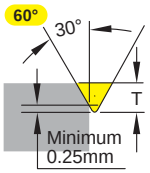
NC Deburring

60° 90° Starter Kit supply Page 02~03

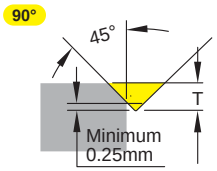
Achieve high speed and high feed deburring and countersinking on CNC machine.
Retain exceptional positional accuracy of the deburring depth and diameter.

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

Deburring

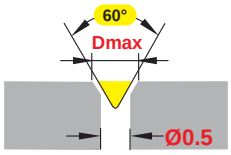


Tmin. :0.25 / Tmax.:1.75

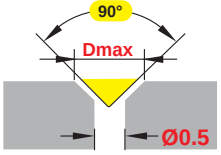


Tmin. :0.25 / Tmax.:1.75

Counter sinking



Dmax.:2.0

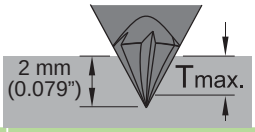


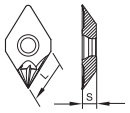
Dmax.:3.5

Inserts >>

- Ideal for fine hole deburring.
- Smallest counter sink diameter Ø0.5 mm.
- Each insert with 6 flutes, single edge.
- TiAlN coated carbide insert can stand very long life.

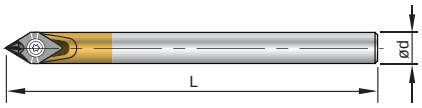
NC2032: • For all kinds of steel from < 40 HRC, carbon steel, alloy steel, cast iron, aluminum and non-ferrous metal.



Angle	Parts No.	Coating	Grade		Dimensions L	Dimensions S	Tmax.	AP min.	AP max.
60°	X060A60T6-NC2032	TiAlN	K20F		6 (0.236")	2.0 (0.079")	1.75 (0.069")	0.1 (0.004")	1.0 (0.040")
90°	X060A90T6-NC2032								

Holder >>

- Provides high rigidity and anti-vibration.



Steel Type

Carbide Type / Steel Type

Parts No.	Shank	Ød	L	Screw	Key
New BC04-CT-X060	Steel, 40 HRC	4 (0.157")	40 (1.575")	 NS-22044 0.9Nm	 NK-T7
99619-X060-06	Steel, 40 HRC	6 (0.236")	40 (1.575")		
99619-X060-06L	Carbide	6 (0.236")	60 (2.362")		
99619-X060-06LS	Steel, 40 HRC	6 (0.236")	60 (2.362")		

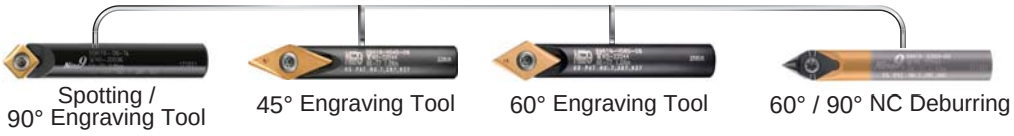
Cutting Data >>

Work Material	S (r.p.m.)	Feed Rate (inch / tooth)	Grade of Insert
Carbon Steel C<0.3%	8000 ~ 40000	0.00020 ~ 0.0020	NC2032
Alloy steel	6000 ~ 35000	0.00020 ~ 0.0016	
Stainless Steel	6000 ~ 25000	0.00020 ~ 0.0012	
Cast iron	6000 ~ 35000	0.00020 ~ 0.0012	
Aluminum, Non-Ferrous Metal	8000 ~ 40000	0.00020 ~ 0.0020	

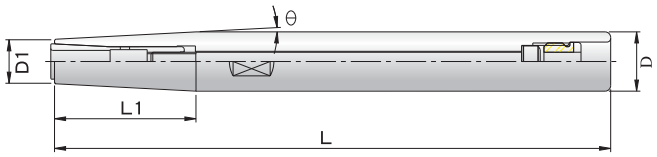
DC Slim Chuck

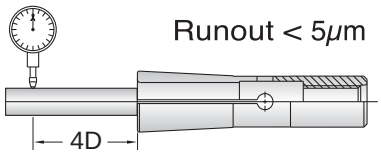
Extension Adaptor >>

DC-E Collet



Spotting / 90° Engraving Tool | 45° Engraving Tool | 60° Engraving Tool | 60° / 90° NC Deburring





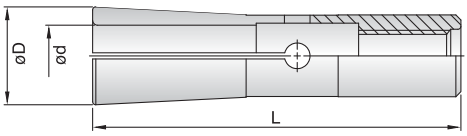
Parts No.	Type of Holder	d	L	L1	øD	D1	θ	Collet	Back Screw	Stop Screw	Hexagon Key	Stop Nut
0-329090-212	ST12-DC6-120	2~6	120	40	12	14	--	DC6	M5 * L95	--	0-301940~642	TP-M12
-222	ST16-DC6-150	2~6	150	38	16	14	3°		M5 * L100	OP-M10		--
-232	ST20-DC6-200	2~6	200	70	20	14	3°		M5 * L100	OP-M10		--
-242	ST25-DC6-250	2~6	250	115	25	14	3°		M5 * L100	OP-M10	0-301940~643	--

DC-E Collet >>

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

DC6-E	
Parts No.	Size(mm)
0-300090-203	3.0
0-300090-204	4.0
0-300090-206	6.0

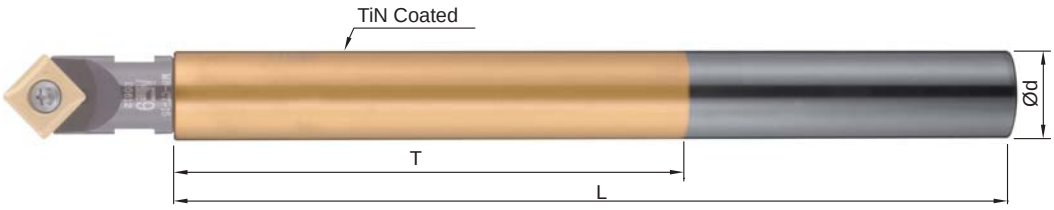
Type	DC6
D	9.6
L	36



Extension Bar For NC Spot Drill

Solid Carbide Extension Bar >>

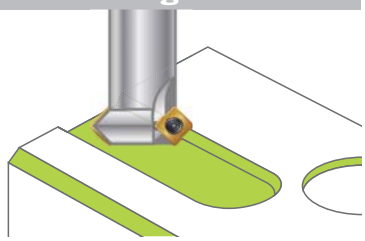
• TiN coated to identify the efficient length.



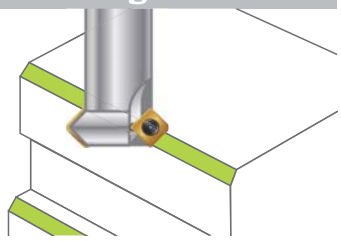
• NC Spot Drill
99616-10-M6 (P.14)
99616-14-M8 (P.15)

Parts No.	Type	ØD	T	L	M
99801-12W	BC12-100M06W	12	60	100	M6xP1.0
99801-16W	BC16-150M08W	16	80	150	M8xP1.25

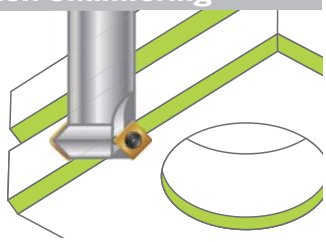
Face Milling



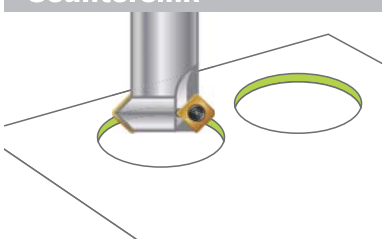
Chamfering



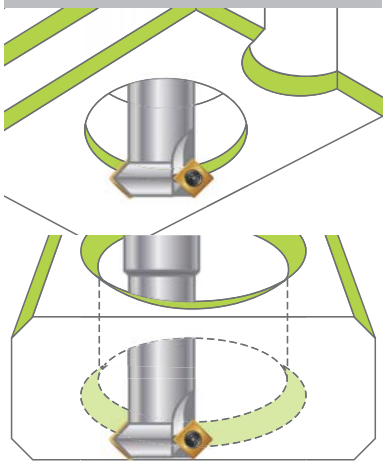
Back Chamfering



Countersink



Back
Circular Chamfering



Chamfer Mill 45° >>

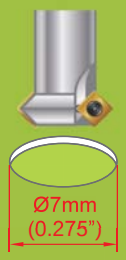
Designed for chamfering and countersinking with an indexable insert. The insert is a specifically designed for use in high speed machining ; the multiple flutes provide for increased feed rate, optimizing performance and reducing cutting time.

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 Ø7mm.
- 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.
- For front and back chamfering. Eliminates 2nd operation or deburring time.



Applications >>

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

Indexable Chamfer Mill

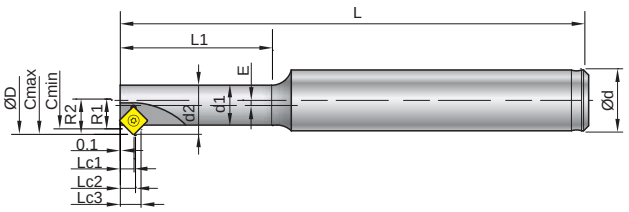
Features >>

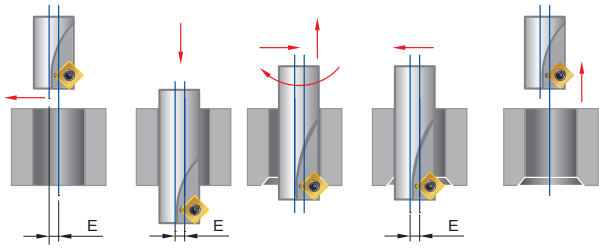
- Benefitting from the specially ground dual-relief insert and optimized coating, higher feed rates and cutting speeds can be achieved on chamfering operations.
- Each insert has 4 cutting edges, reducing cost of inserts.
- Fine edge honning cutting edge, good chip breaking condition and long tool life.

Starter Kit Supply
Page 02~03

99616-C02, C04, C06 >>

- Made from hot working steel and hardened. Shank is ground to h6 tolerance.
- Elliptical necked bar to optimize the tool strength.

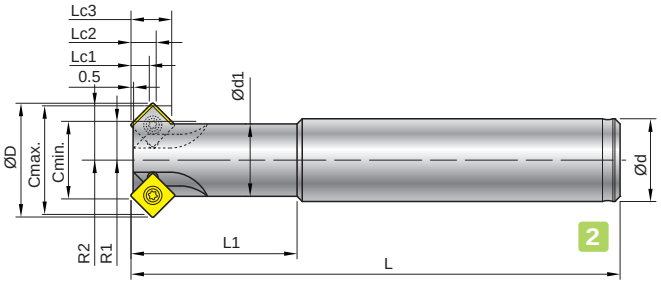




Parts No.	Thread Size	Cmin ø	Cmax ø	ød	ød1	ød2	øD	R1	R2	L	L1	Lc1	Lc2	Lc3	E	z	insert Screw / Key
99616-C02	M8	6.8 (0.268")	8.8 (0.346")	10 (0.394")	5.25 (0.207")	6.5 (0.256")	9 (0.354")	3.4 (0.134")	4.4 (0.173")	80 (3.15")	20 (0.787")	2.56 (0.100")	2.93 (0.115")	3.93 (0.155")	1.25 (0.049")	1	
99616-C04	M10	8.5 (0.335")	10.8 (0.425")	12 (0.472")	6.45 (0.254")	8 (0.315")	11.1 (0.437")	4.25 (0.167")	5.4 (0.212")	100 (3.94")	25 (0.984")	2.51 (0.099")	2.98 (0.117")	4.13 (0.163")	1.55 (0.061")	1	N9GX04T002 NS-18037 0.6Nm NK-T6
99616-C06	M12 1/2	10.26 (0.404")	13.2 (0.520")	12 (0.472")	7.88 (0.310")	9.75 (0.384")	13.5 (0.531")	5.13 (0.202")	6.6 (0.260")	100 (3.94")	30 (1.181")	2.51 (0.099")	2.98 (0.117")	4.45 (0.175")	1.88 (0.074")	1	

99616-C10~99616-C52 >>

- Made from tool steel.
- Shank is ground to h6 tolerance.



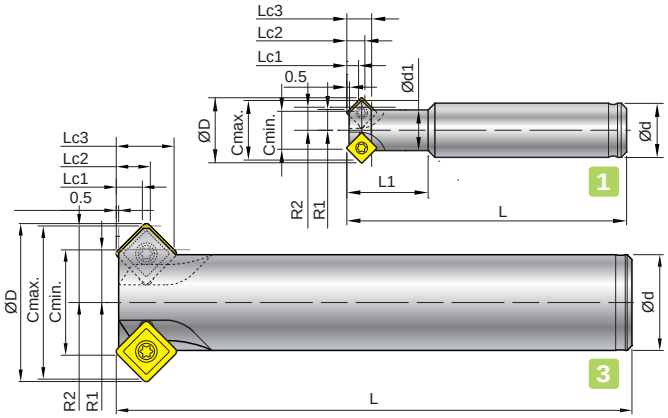
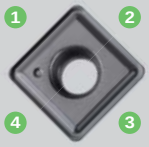


Fig	Parts No.	Type	Cmin ø	Cmax ø	ød	ød1	øD	R1	R2	L	L1	Lc1	Lc2	Lc3	z	insert Screw / Key
1	99616-C10	BC10-C07-60	7 (0.276")	11 (0.433)	10 (0.394")	7.5 (0.295")	12 (0.472")	3.8 (0.150")	4.3 (0.169")	60 (2.362")	15 (0.590")	2.6 (0.102")	2.9 (0.114")	4.6 (0.181")	2	N9GX04T002 NS-18037 0.6Nm NK-T6
2	99616-C20	BC12-C11-100	11 (0.433")	16 (0.630")	12 (0.472")	9.6 (0.378")	16.2 (0.638")	5.9 (0.232")	8 (0.315")	100 (3.937")	25 (0.984")	2.6 (0.102")	2.9 (0.114")	5.0 (0.197")	4	
2	99616-C30	BC16-C15-120	15 (0.590")	21 (0.827")	16 (0.630")	14 (0.551")	22 (0.866")	7.5 (0.295")	11.5 (0.453")	120 (4.724")	40 (1.575")	3.5 (0.138")	4.9 (0.193")	7.9 (0.311")	4	N9GX060204 NS-22055 0.9Nm NK-T7
2	99616-C40	BC20-C19-130	19 (0.748")	25 (0.984")	20 (0.787")	18 (0.709)	26 (1.024")	9.5 (0.374")	12.5 (0.492")	130 (5.118")	50 (1.969")	3.5 (0.138")	4.9 (0.193")	7.9 (0.311")	4	
3	99616-C50	BC20-C22-130	22 (0.866")	32 (1.260")	20 (0.787")	--	33 (1.299")	11 (0.039")	16 (0.630")	130 (5.118")	--	5.5 (0.217")	7.1 (0.280")	12.1 (0.476")	4	N9GX090308 NS-30072 2.0Nm NK-T9
2	99616-C52	BC25-C22-180	22 (0.866")	32 (1.260")	25 (0.984")	20 (0.787")	33 (1.299")	11 (0.039")	16 (0.630")	180 (7.090")	80 (3.150")	5.5 (0.217)	7.1 (0.280")	12.1 (0.476")	4	

Inserts >>

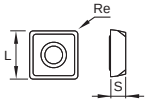
NC2032: • K20F grade, AlTiN coated. The 1st choice for high carbon, high alloy and hardened steels as well as cast iron.

NC9071: • K20F grade, TiN coated, high positive rake angle and honed sharp edge. The best choice for low carbon steel, low carbon alloy steel,stainless steel, Al, Al-alloy, Brass, Bronze and most of the non-ferrous metal.



NC2032


NC9071

Parts No.		Coating	Grade		Dimensions L	Dimensions S	Dimensions Re	Screw	Key
N9GX04T002	NC2032	AlTiN	K20F		4.0 (0.157")	1.8 (0.070")	0.2 (0.008")	NS-18037 0.6Nm	NK-T6
	NC9071	TiN							
N9GX060204	NC2032	AlTiN			6.35 (0.250")	2.38 (0.094")	0.4 (0.016")	NS-22055 0.9Nm	NK-T7
	NC9071	TiN							
N9GX090308	NC2032	AlTiN			9.52 (0.375")	3.18 (0.125")	0.8 (0.031")	NS-30072 2.0Nm	NK-T9
	NC9071	TiN							

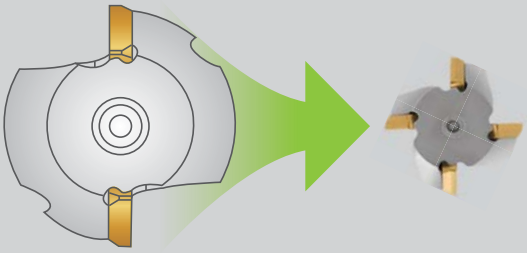
99616-C02, C04, C06 Cutting Data >>

Workpiece Material		Grade of insert	SFM	Feed Rate inch / tooth
Material Group	Sample Code (AISI)			N9GX04T002 Max. Chamfering 0.059 inch
Carbon steel C<0.3%	1050	NC9071	200-260-390	0.0007" ~ 0.0030"
Carbon steel C>0.3%	1050	NC2032	200-260-390	0.0007" ~ 0.0030"
Low alloy steel C<0.3%	4130	NC9071	200-260-390	0.0004" ~ 0.0020"
High alloy steel C>0.3%	D2	NC2032	200-260-390	0.0007" ~ 0.0030"
Stainless Steel	304	NC9071	100-200-330	0.0004" ~ 0.0020"
Cast iron	A48 35B / No 35B	NC2032	200-260-390	0.0007" ~ 0.0023"
Al, and non-ferrous metal	6061	NC9071	260-330-500	0.0011" ~ 0.0040"

99616-C10~C52 Cutting Data >>

Workpiece material		Grade of insert	SFM	Feed Rate inch / tooth		
				N9GX04T002	N9GX060204	N9GX090308
Material Group	Sample Code (AISI)			Max. Chamfering 0.059 inch	Max. Chamfering 0.098 inch	Max. Chamfering 0.157 inch
Carbon steel C<0.3%	1050	NC9071	500-820-1150	0.002"~0.005"	0.004"~0.010"	0.004"~0.010"
Carbon steel C>0.3%	1050	NC2032	660-1050-1310	0.002"~0.004"	0.004"~0.008"	0.004"~0.010"
Low alloy steel C<0.3%	4130	NC9071	590-790-860	0.002"~0.004"	0.004"~0.008"	0.004"~0.008"
High alloy steel C>0.3%	D2	NC2032	390-500-660	0.002"~0.004"	0.004"~0.006"	0.004"~0.006"
Stainless Steel	304	NC9071	390-500-590	0.002"~0.004"	0.002"~0.006"	0.004"~0.008"
Casting iron	A48 35B / No 35B	NC2032	390-500-590	0.002"~0.004"	0.004"~0.006"	0.004"~0.008"
Al, and non-ferrous metal	6061	NC9071	660-1310-1970	0.002"~0.006"	0.004"~0.010"	0.004"~0.010"
Hardened steel<HRC50°	H13	NC2032	265-300-330	0.002"~0.004"	0.002"~0.005"	0.004"~0.006"

Performance



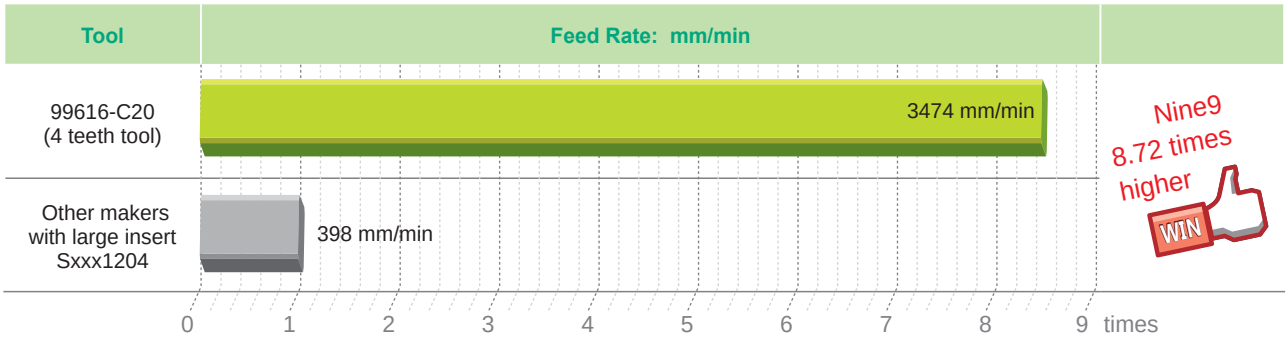
Feed Rate =
Feed per Tooth x Spindle Speed x **No. of Flute** mm/min.

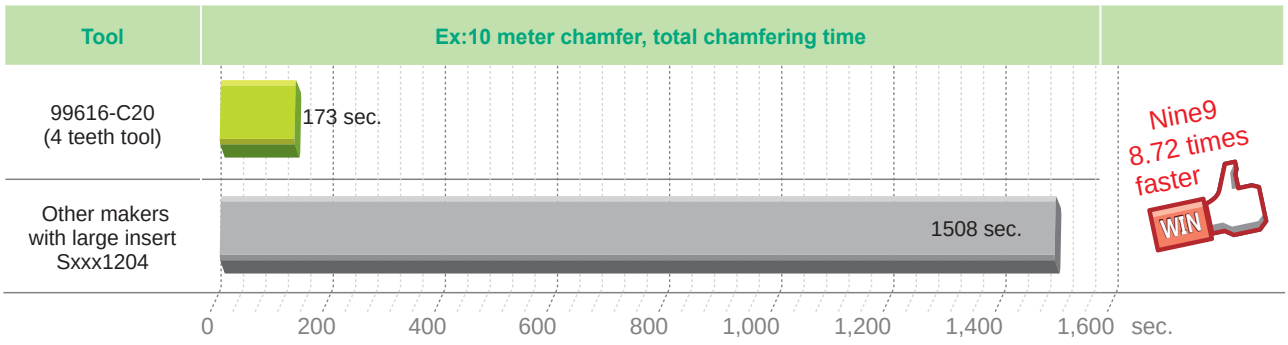
UP **Spindle Speed** = $\frac{\text{Cutting Speed x 1000}}{\pi \text{ x Cmin.}}$

Test Result >> Example 1

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

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





Super Drill

Ø10 ~ Ø30

- Smallest indexable drill from 10mm.
- 4 cutting edges per insert, same insert for outer and inner insert.

SMALLEST DIMENSION

3xD : Ø10 to Ø30 mm.

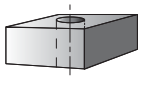
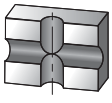
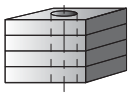
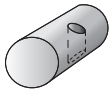
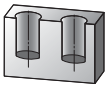
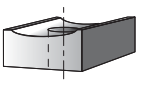
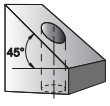
SMALLER CUTTING CHIP

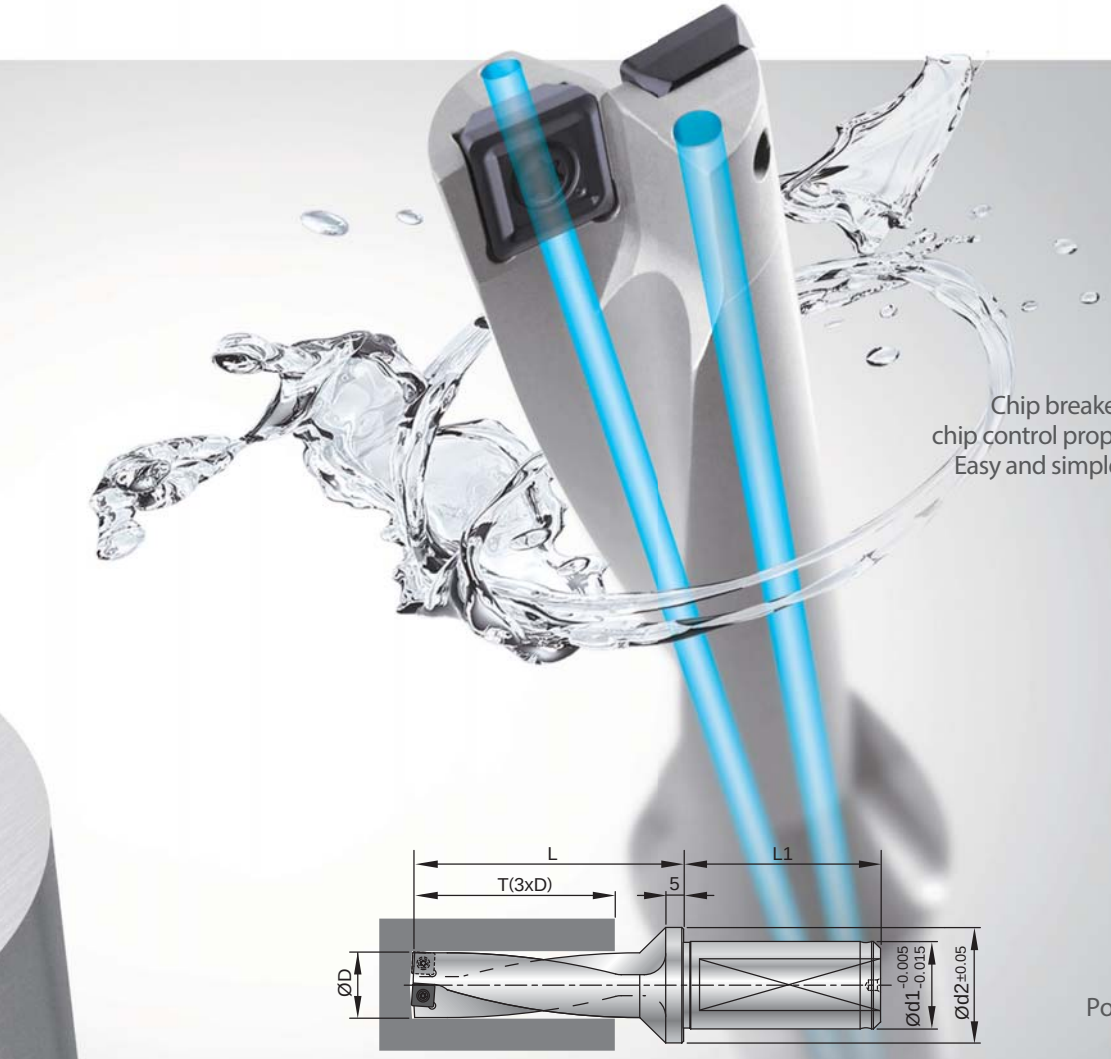
- The center and peripheral inserts are positioned in order to divide the cutting chips into smaller spiral shapes.
  It helps the cutting chips to be removed faster and easier.
- Designed for high productivity, high speed cutting.
  Coolant supply is needed.

BETTER SURFACE FINISH AND BETTER DIAMETER ACCURACY

- Special insert positioning to balance the cutting forces, better surface finish and diameter accuracy are achievable.

◘ Application & TECH. >>

Application	Regular Surface 100%	Cross Holes 80%	Stack Drilling 80%~70%	Round Workpiece Offset Drilling 80%~60%	Plunge Drilling 80%	Concave Surfaces 80%	Angled Surfaces 80%~70%	Cone Workpiece Offset Drilling 80%~70%
Workpiece Shape								



Ordering Code:
N9GX04T002-NC2032

4 cutting edges insert NC2032, K20F grade AlTiN coated

Chip breaker of SPD insert provides excellent chip control property due to its engineered design

Easy and simple change of cutting edge without inconvenience

≃ Flat bottom shape

Angled Surfaces

Possible to drill into angled surfaces without pre-drilling

Ordering code	ØD	T	L	d1	d2	L1	Insert Screw / Key	Radial Adjustment	D max
99313-10	10.0	30.0	49	20	27	49		0.25	10.5
99313-10.3	10.3	30.9	52	20	27	49		0.25	10.8
99313-10.5	10.5	31.5	52	20	27	49	N9GX04T002	0.25	11.0
99313-11	11.0	33.0	52	20	27	49	NS-18037 0.6Nm	0.20	11.4
99313-11.5	11.5	34.5	55	20	27	49		0.20	11.9
99313-12	12.0	36.0	55	20	27	49	NK-T6	0.15	12.3
99313-12.5	12.5	37.5	58	20	27	49		0.15	12.8

* 3/4" shank available upon request. Ordering code 99313-10.0-IN.

Work Material	SFM	IPR (inch / rev.)
Carbon Steel	200~985	0.0010 ~ 0.0030
Stainless Steel	200~500	0.0010 ~ 0.0020
Cast Iron	265~400	0.0020 ~ 0.0030
Hardened Steel	200~330	0.0010 ~ 0.0020

* Adjust speed and feed percentage by applications.

NC Helix Drill

One Tool Performs Multiple Applications

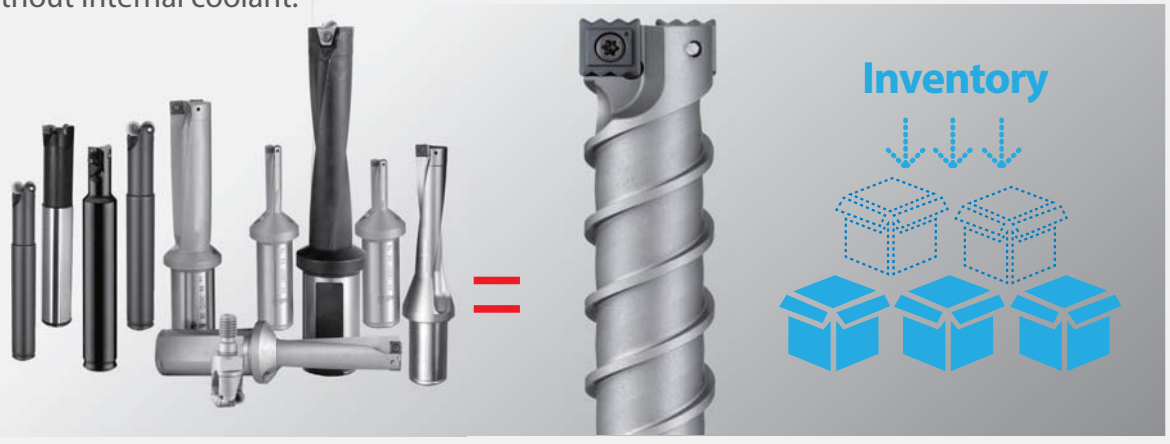
Rough Milling, Drilling & Slotting

Cuts material by helical interpolation;
serrated cutting edge minimizes chip length.
Low spindle power is required, good for drilling material that generates long, soft chips.

Reduce Your Tool Inventory

Only six tools for making Ø .512"~Ø2.65" (Ø13~Ø65mm) hole from solid.

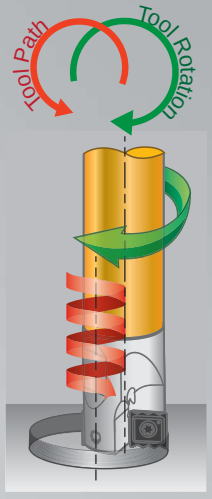
Each holder can machine different diameters and hole depths, saving your tool inventory and cost!
No need to peck drill or dwell in operation even machine without internal coolant.



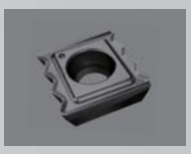
◀ **Cylindrical shank**
Apply external coolant

Screw fit type ▶
With center coolant hole
For 4xDc ~ 8xDc deep hole drilling

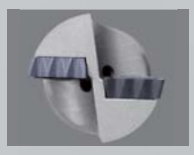
◀ Ti6Al4V, Titanium



All NC Helix Drill must be programmed by helical interpolation



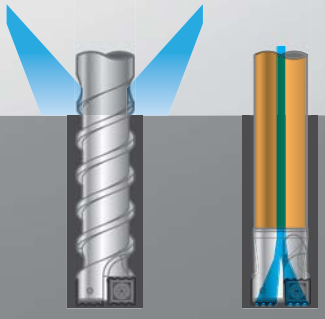
2 cutting edges insert

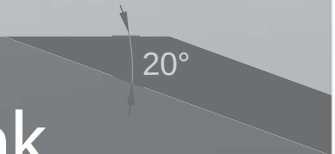


≃ Flat bottom shape

20° Ramping Angle

Either linear or circular ramping.





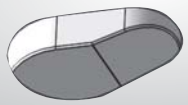
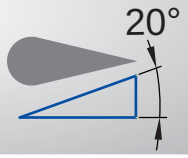
Two types of shank

01

Feature

<Page 70>

Lower spindle power consumption Easy to cut!

Circular milling	Ramping Angle
	

- Thanks to the small cutting load of the serrated cutting edge and helical interpolation lower power consumption. Work quicker, smarter and achieve better results.
- Circular ramping milling, maximum ramping angle is 20°.
  For example: tool HD27 machining Ø50 mm hole, 9 mm pitch for aluminum, 6 mm pitch for carbon steel.

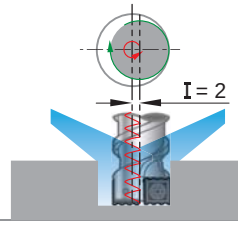
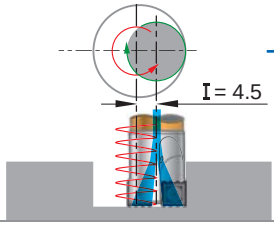
02

Feature

<Page 70>

Just six tools for drilling Ø.512"~Ø2.65"(Ø13~65mm)

Example :

Hole Ø15 / Tool Ø11	Hole Ø20 / Tool Ø11
	

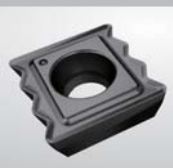
- Cuts by helical interpolation.
- Each holder can machine different diameters and hole depths.
- Enlarger hole is adaptable by using internal coolant cutter, please refer to Page 64.

03

Feature

<Page 69>

Special insert geometry - exceptional swarfs control.

Insert	Chip
	

- Serrated cutting edge makes the chips short and small, and easier to evacuate.
- Eliminate swarf and vibration problems while drilling difficult material or deeper holes.

"One tool" performs multiple applications

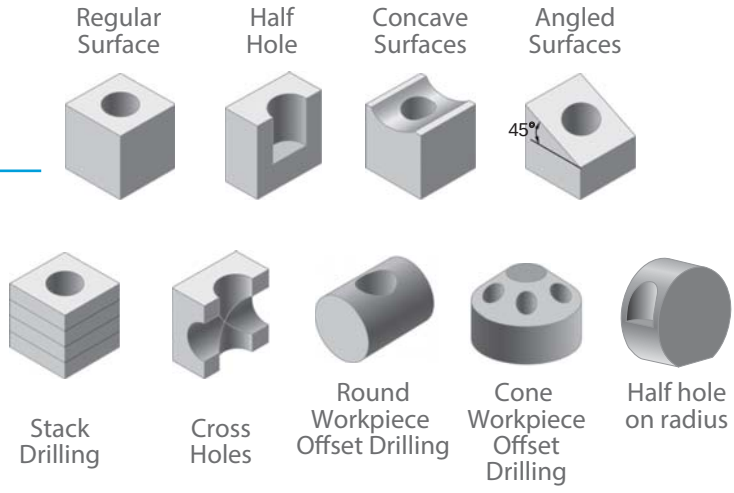
04 Feature
<Page 71>

Shape


- Not only a drill, but an end mill too.
- Small radius path to cut a hole or step hole, various curved cavity shapes on different materials.

Functions in variable conditions

05 Feature



Roughness Measuring

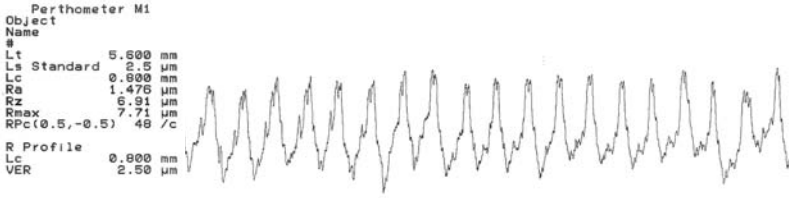
Feature 06
<Page 64>

- Making a flatness at bottom just by NC program, easy and smart!

Workpiece

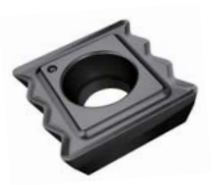

Make " One more turn" after reached the depth.
Ex :
⋮
G03 I-1.5 Z-30 P5
G03 I-1.5 <make one more turn >
G01 X0 Y0 < afterward, let tool back to center of hole >

Flatness



Specification

Insert



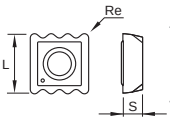
New NC5072 : P40, TiAlN coating.
General purpose, suitable for almost all kind of steel, stainless steel and Titanium.
Recommended while clamping devices is weak or apply on low power machines or deep hole drilling.

NC2032 : K20F, TiAlN coating.
Design for high performance cutting, special good for cast iron and hardened material <HRC50°.

● Best ◎ Suit ○ Possible

	P Steel	M SS	K Cast Iron	N Aluminum	S Titanium	H Hardened
NC5072	●	●	◎	◎	◎	○
NC2032	◎	○	●	◎	○	◎

Ordering code	Grade	Coating		Dimensions L	Dimensions S	Dimensions Re	Screw	Key
N9MX04T002	NC5072 / NC2032	P40 / K20F	TiAlN	4.75 (0.187″)	1.8 (0.071″)	0.2 (0.008″)	NS-18037 / 0.6 Nm (5.31 in.-lb.)	NK-T6
N9MX05T103	NC5072 / NC2032	P40 / K20F	TiAlN	5.75 (0.226″)	2.0 (0.079″)	0.3 (0.012″)	NS-20045 / 0.6 Nm (5.31 in.-lb.)	NK-T6
N9MX070204	NC5072 / NC2032	P40 / K20F	TiAlN	7.5 (0.295″)	2.4 (0.094″)	0.4 (0.016″)	NS-25045 / 0.9 Nm (7.97 in.-lb.)	NK-T7
N9MX100306	NC5072 / NC2032	P40 / K20F	TiAlN	10.0 (0.394″)	3.18 (0.125″)	0.6 (0.024″)	NS-30072 / 2.0 Nm (17.7 in.-lb.)	NK-T9
N9MX12T308	NC5072 / NC2032	P40 / K20F	TiAlN	12.5 (0.492″)	3.97 (0.156″)	0.8 (0.031″)	NS-35080 / 2.5 Nm (22.13 in.-lb.)	NK-T15

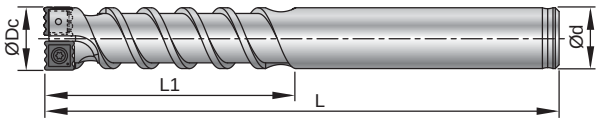


Holder

Cylindrical Shank (made from hardened high alloy steel)

▸ Helical chip-removing groove >>

- Designed for CNC machines with external coolant.
- Unique helical groove design generates chip-removing coolant stream.
- The helical groove is designed for the coolant to remove swarf from the cutting zone.



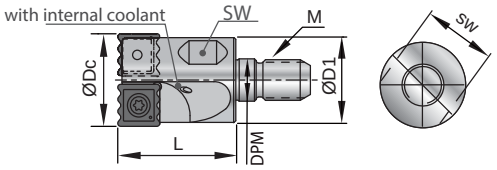
Ordering Code	Type	Capable of drill dia. Dmin.	Capable of drill dia. Dmax.	Ød	ØDc	L	L1	Max. Depth	Insert type	Max. ramping angle
99321-010-1320	BC10-HD11-1320	13 (0.512")	20 (0.787")	10 (0.394")	11 (0.433")	80 (3.150")	40 (1.575")	30 (1.181")	N9MX04T002	20°
99321-012-1525	BC12-HD13-1525	15 (0.591")	25 (0.984")	12 (0.472")	13 (0.512")	100 (3.937")	50 (1.969")	36 (1.417")	N9MX05T103	20°
99321-016-2030	BC16-HD17-2030	20 (0.787")	30 (1.181")	16 (0.630")	17 (0.669")	110 (4.331")	60 (2.362")	50 (1.969")	N9MX070204	20°
99321-020-2540	BC20-HD22-2540	25 (0.984")	40 (1.575")	20 (0.787")	22 (0.866")	125 (4.921")	70 (2.756")	60 (2.362")	N9MX100306	20°
99321-025-3050	BC25-HD27-3050	30 (1.181")	50 (1.969")	25 (0.984")	27 (1.063")	165 (6.496")	85 (3.346")	75 (2.953")	N9MX12T308	20°

Screw Fit Cutter

With Internal Coolant

- Designed for CNC machines with internal coolant.
- Standard screw-fit body adapts to almost any kind of the screw-fit tool holder or extension bar in the market.
- Use for enlarge hole.

* Use open ended spanner to tighten the cutter.

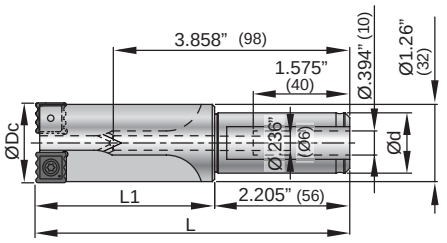


Ordering Code	Type	Capable of drill dia.		ØDc	ØD1	L	M	DPM	SW	Insert type	Max. ramping angle
		Dmin.	Dmax.								
99323-010-1320	M05-HD11-1320	13 (0.512")	20 (0.787")	11 (0.433")	10 (0.394")	20 (0.787")	M5	5.5 (0.217")	8 (0.315")	N9MX04T002	20°
99323-012-1525	M06-HD13-1525	15 (0.591")	25 (0.984")	13 (0.512")	12 (0.472")	25 (0.984")	M6	6.5 (0.256")	10 (0.394")	N9MX05T103	20°
99323-016-2030	M08-HD17-2030	20 (0.787")	30 (1.181")	17 (0.669")	16 (0.630")	25 (0.984")	M8	8.5 (0.335")	14 (0.551")	N9MX070204	20°
99323-020-2540	M10-HD22-2540	25 (0.984")	40 (1.575")	22 (0.866")	20 (0.787")	30 (1.181")	M10	10.5 (0.413")	18 (0.709")	N9MX100306	20°
99323-025-3050	M12-HD27-3050	30 (1.181")	50 (1.969")	27 (1.063")	25 (0.984")	35 (1.378")	M12	12.5 (0.492")	23 (0.906")	N9MX12T308	20°

Side Lock Shank

With Internal Coolant

- Special size is available on request.

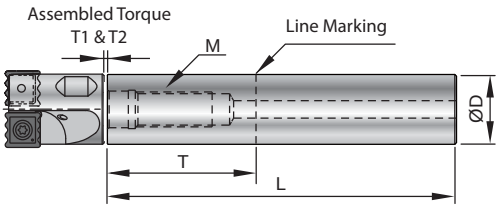


Ordering Code	Type	Capable of drill dia.		Ød	ØDc	L	L1	Max. Depth	Insert type	Max. ramping angle
		Dmin.	Dmax.							
99321-025-4265	SL25-HD33-4265	42 (1.654")	65 (2.559")	25 (0.984")	33 (1.299")	130 (5.118")	74 (2.913")	50 (1.969")	N9MX12T308	9°

Extension Bar

Steel Type

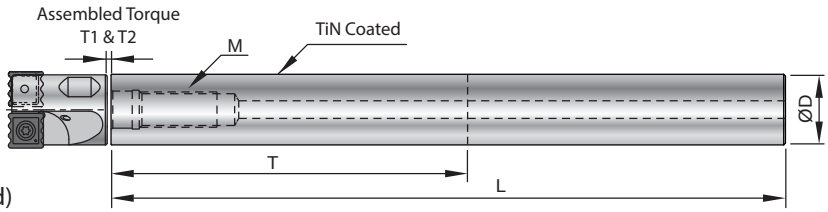
- T is the maximum overhang length.
- With internal coolant hole.



Ordering Code	Type	ØD	T	L	M	Assembled Torque	
						* T1	** T2
99801-10S	BC10-075M05S	10 (0.394")	25 (0.984")	75 (2.953")	M5	2.5 Nm	6.9 Nm
99801-12S	BC12-075M06S	12 (0.472")	25 (0.984")	75 (2.953")	M6	4 Nm	11.8 Nm
99801-16S	BC16-090M08S	16 (0.630")	35 (1.378")	90 (3.543")	M8	10 Nm	28.6 Nm
99801-20S	BC20-100M10S	20 (0.787")	40 (1.575")	100 (3.937")	M10	15 Nm	56.7 Nm
99801-25S	BC25-120M12S	25 (0.984")	50 (1.969")	120 (4.724")	M12	20 Nm	99 Nm

Solid Carbide Type

- T is the maximum overhang length.
- With internal coolant hole.
- Carbide extension bar with longer tool length is available on request. (REVA brand)



Ordering Code	Type	ØD	T	L	M	Assembled Torque	
						T1*	T2**
99801-10W	BC10-100M05W	10 (0.394")	60 (2.362")	100 (3.937")	M5	2.5 Nm	6.9 Nm
99801-12W	BC12-100M06W	12 (0.472")	60 (2.362")	100 (3.937")	M6	4 Nm	11.8 Nm
99801-16W	BC16-150M08W	16 (0.630")	80 (3.150")	150 (5.906")	M8	10 Nm	28.6 Nm
99801-20W	BC20-200M10W	20 (0.787")	100 (3.937")	200 (7.874")	M10	15 Nm	56.7 Nm
99801-25W	BC25-200M12W	25 (0.984")	125 (4.921")	200 (7.874")	M12	20 Nm	99 Nm

* T1: Assembled torque until touch

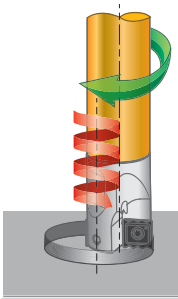
** T2: Assembled torque until secured lock

Technical Guide

※ Before you start, please pay attention the following conditions >>

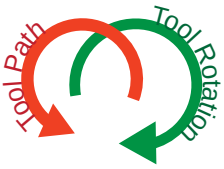
1 Programming

All NC Helix Drills must be programmed using helical interpolation



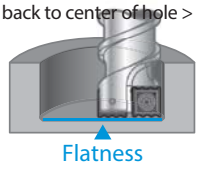
2 Recommend of Direction

Tool path of moving downward by CCW (G03) ,Tool Rotation by CW direction is recommended.



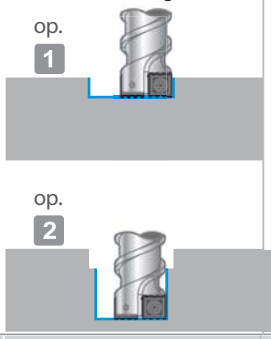
3 Flatness on blind hole bottom

Make one more turn after reaching depth.
Ex.:
⋮
G03 I-1.5 Z-30 P5
G03 I-1.5
<make one more turn >
G01 X0 Y0
< afterward return tool back to center of hole >



4 Step Hole

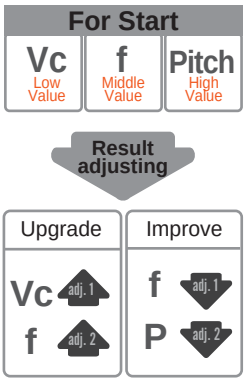
From solid is more safe and reduce the cutting time.



5 External coolant

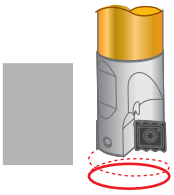
Lower pressure higher volume is recommended.
Minimum 73 psi.(5 bar).
Aim nozzle toward the tool body, let the coolant effectively enter the hole.

6



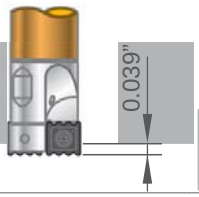
7 Through hole

Reduce Vc 50% at last cycle.



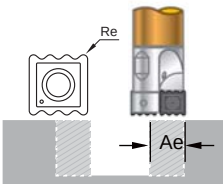
8 Through hole Add 1mm to the required depth (Z)

Failure to program beyond the through hole may result in insert breakage due to the force from circular interpolation.



9 Enlarge Hole

Choosing a drill body with internal coolant.
Max. Ae=Dc- (Rex2) for enlarging hole.



10 Internal coolant

High pressure is recommended.
Minimum 145 psi. (10 bar).
Recommended for 3xDc ~6xDc Use.

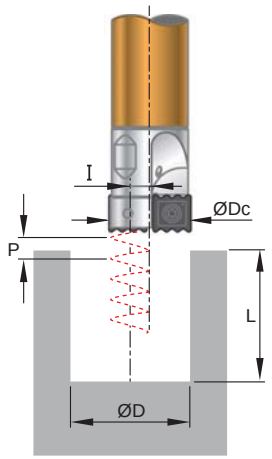
⚠ Choosing a suitable drill body.

- Required hole diameter is within the recommended range (**blue numbers**).
- Required hole diameters (more than one size), choose the drill can cover more different hole diameters. Example 0.709", 0.787" and 0.866" hole diameter, choose 99323-012-1525.
- 3xDc~6xDc drilling, 99323 series is recommended.

Drilling diameter	Coolant type	Max. drilling depth	Tool type	Dc	Insert type	Re	Max. pitch	Max. Ae
0.512"~ **0.590"~ 0.787"**	Internal	3.150"	99323-010-1320	0.433"	N9MX04T002	0.008"	0.118"	0.417"
	External	1.181"	99321-010-1320	0.433"				
0.590"~ **0.787"~ 0.984"**	Internal	3.346"	99323-012-1525	0.512"	N9MX05T103	0.012"	0.177"	0.488"
	External	1.417"	99321-012-1525	0.512"				
0.787"~ **0.984"~ 1.181"**	Internal	4.134"	99323-016-2030	0.669"	N9MX070204	0.016"	0.236"	0.638"
	External	1.969"	99321-016-2030	0.669"				
0.984"~ **1.181"~ 1.575"**	Internal	5.118"	99323-020-2540	0.866"	N9MX100306	0.024"	0.295"	0.819"
	External	2.362"	99321-020-2540	0.866"				
1.181"~ **1.575"~ 1.969"**	Internal	6.299"	99323-025-3050	1.063"	N9MX12T308	0.031"	0.354"	1.000"
	External	2.953"	99321-025-3050	1.063"				
1.654"~ **1.969"~ 2.559"**	Internal	1.969"	99321-025-4265	1.299"	N9MX12T308	0.031"	0.354"	1.236"

※ The NC Helix Drill is programmed using "Helical interpolation" on CNC machine, CNC controller must have 3-axis simultaneously motion function.

NC Helix Drill



Cutting Parameters (S & F)

$$S = \frac{3.82 \times SFM}{Dc} \quad r.p.m.$$

$$F = S \times IPR \quad IPM$$

$$d = D - Dc \quad Inch$$

$$I = \frac{(D-Dc)}{2} \quad Inch$$

Cutting time (T)

$$T = \frac{\pi \times d \times L \times 60}{F \times P} \quad sec.$$

Chip removal Volume rate (Q)

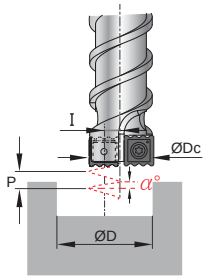
$$Q = \frac{\pi \times D^2 \times L \times 60}{4 \times T} \quad Inch^3/min.$$

Formula

Dc	=	Dia. of Drill	Inch
D	=	Dia. of Hole	Inch
L	=	Depth of Drilling	Inch
Vc	=	Cutting Speed	SFM
S	=	Spindle Speed	r.p.m.
I	=	Circular radius	Inch
f	=	Feed rate	IPR
F	=	Table feed rate	IPM
d	=	Circular diameter (D-Dc)	Inch
P	=	Pitch of helical interpolation	Inch
T	=	Cutting time	sec.
Q	=	Chip removal volume rate	$Inch^3$ / min.

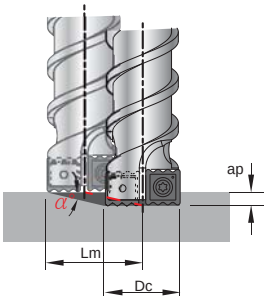
Ramping Angle

Circular ramping (α)

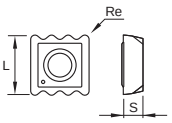


$$\alpha = \tan^{-1}\frac{P}{(D-Dc) \times \pi} \quad degree$$

Linear ramping (α)



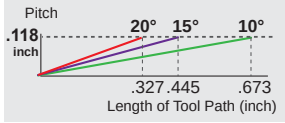
$$\alpha = \tan^{-1}\frac{ap}{Lm} \quad degree$$



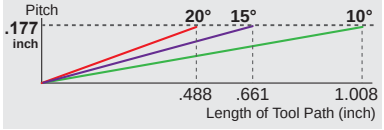
Max. ap < 3/4 of insert length

※ Length of tool path for linear ramping.
Length of tool path for Circular ramping= (D-Dc) x 3.14

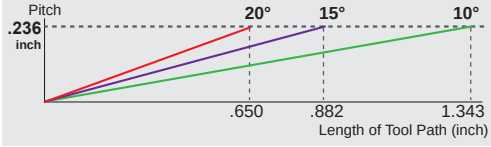
▪ N9MX04T002



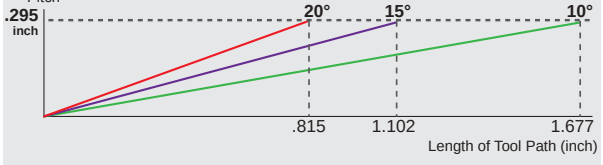
▪ N9MX05T103



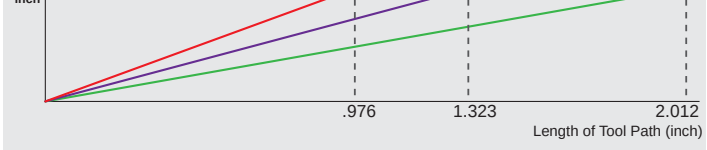
▪ N9MX070204



▪ N9MX100306



▪ N9MX12T308



Cutting Data

- Boldface number is recommended for start.
- Pitch is possible to increase 20% while cutting conditions are all fine.

99321-010-1320 / 99323-010-1320 >>

Workpiece material		SFM 99321	SFM 99323	Ø .512" f IPR	Ø .512" Pitch Inch	Ø .551" f IPR	Ø .551" Pitch Inch	Ø .630" f IPR	Ø .630" Pitch Inch	Ø .709" f IPR	Ø .709" Pitch Inch	Ø .787" f IPR	Ø .787" Pitch Inch
P	Carbon steel 0.25%C	**197**~295~426	**328**~525~722	.0016 **.0020** .0028	.0236 .0315 **.0394**	.0024 **.0031** .0039	.0276 .0374 **.0492**	.0031 **.0043** .0055	.0354 .0472 **.0591**	.0039 **.0055** .0071	.0394 .0551 **.0689**	.0047 **.0063** .0079	.0472 .0630 **.0787**
P	Carbon steel 0.45% C	**197**~295~394	**328**~492~656	.0016 **.0020** .0028	.0236 .0315 **.0394**	.0024 **.0031** .0039	.0276 .0374 **.0492**	.0031 **.0043** .0055	.0354 .0472 **.0591**	.0039 **.0055** .0071	.0394 .0551 **.0689**	.0047 **.0063** .0079	.0472 .0630 **.0787**
P	Carbon steel 0.60%C	**164**~230~361	**262**~426~590	.0016 **.0020** .0024	.0236 .0295 **.0354**	.0024 **.0028** .0035	.0276 .0354 **.0441**	.0028 **.0039** .0047	.0315 .0433 **.0531**	.0035 **.0047** .0063	.0354 .0472 **.0618**	.0039 **.0055** .0071	.0394 .0551 **.0709**
P	Low alloy steel	**131**~230~328	**262**~394~525	.0012 **.0016** .0020	.0197 .0256 **.0315**	.0020 **.0024** .0031	.0236 .0315 **.0394**	.0028 **.0039** .0047	.0276 .0374 **.0472**	.0031 **.0043** .0059	.0315 .0433 **.0551**	.0035 **.0047** .0063	.0394 .0512 **.0630**
P	High alloy steel	**131**~197~262	**197**~295~394	.0012 **.0016** .0020	.0197 .0256 **.0315**	.0020 **.0024** .0031	.0236 .0315 **.0394**	.0028 **.0039** .0047	.0276 .0374 **.0472**	.0031 **.0043** .0059	.0315 .0433 **.0551**	.0035 **.0047** .0063	.0394 .0512 **.0630**
M	Stainless steel	**131**~197~262	**197**~295~394	.0012 **.0016** .0020	.0197 .0256 **.0315**	.0020 **.0024** .0031	.0236 .0315 **.0394**	.0028 **.0039** .0047	.0276 .0374 **.0472**	.0031 **.0043** .0059	.0315 .0433 **.0551**	.0035 **.0047** .0063	.0394 .0512 **.0630**
K	Cast Iron	**131**~230~328	**262**~394~525	.0016 **.0020** .0028	.0236 .0315 **.0394**	.0024 **.0031** .0039	.0276 .0374 **.0492**	.0031 **.0043** .0055	.0354 .0472 **.0591**	.0039 **.0055** .0071	.0394 .0551 **.0689**	.0047 **.0063** .0079	.0472 .0630 **.0787**
N	Al	**262**~426~590	**394**~689~984	.0016 **.0020** .0028	.0354 .0472 **.0591**	.0024 **.0031** .0039	.0433 .0591 **.0736**	.0031 **.0043** .0055	.0512 .0709 **.0886**	.0039 **.0055** .0071	.0591 .0827 **.1031**	.0047 **.0063** .0079	.0709 .0945 **.1181**
N	Cu	**197**~344~492	**328**~558~787	.0016 **.0020** .0028	.0276 .0374 **.0472**	.0024 **.0031** .0039	.0354 .0472 **.0591**	.0031 **.0043** .0055	.0394 .0551 **.0709**	.0039 **.0055** .0071	.0472 .0669 **.0827**	.0047 **.0063** .0079	.0551 .0748 **.0945**
S	Ni- Alloy	**33** ~66~ 98	**49** ~92~ 131	.0004 **.0008** .0012	.0197 .0256 **.0315**	.0004 **.0008** .0016	.0236 .0315 **.0394**	.0008 **.0012** .0020	.0276 .0374 **.0472**	.0012 **.0020** .0028	.0315 .0433 **.0551**	.0016 **.0024** .0031	.0354 .0512 **.0630**
S	Titanium	**98**~131~164	**131**~197~262	.0004 **.0008** .0012	.0197 .0256 **.0315**	.0004 **.0008** .0016	.0236 .0315 **.0394**	.0008 **.0012** .0020	.0276 .0374 **.0472**	.0012 **.0020** .0028	.0315 .0433 **.0551**	.0016 **.0024** .0031	.0354 .0512 **.0630**
H	Hardened	**131**~197~262	**197**~295~394	.0012 **.0016** .0020	.0197 .0256 **.0315**	.0020 **.0024** .0031	.0236 .0315 **.0394**	.0028 **.0039** .0047	.0276 .0374 **.0472**	.0031 **.0043** .0059	.0315 .0433 **.0551**	.0035 **.0047** .0063	.0394 .0512 **.0630**

99321-012-1525 / 99323-012-1525 >>

Workpiece material		SFM 99321	SFM 99323	Ø .590" f IPR	Ø .590" Pitch Inch	Ø .669" f IPR	Ø .669" Pitch Inch	Ø .787" f IPR	Ø .787" Pitch Inch	Ø.866" f IPR	Ø.866" Pitch Inch	Ø .984" f IPR	Ø .984" Pitch Inch
P	Carbon steel 0.25%C	**197**~295~426	**328**~525~722	.0020 **.0028** .0035	.0472 .0630 **.0787**	.0028 **.0039** .0051	.0512 .0701 **.0886**	.0035 **.0051** .0063	.0591 .0787 **.0984**	.0047 **.0063** .0079	.0630 .0858 **.1083**	.0051 **.0071** .0087	.0709 .0945 **.1181**
P	Carbon steel 0.45% C	**197**~295~394	**328**~492~656	.0020 **.0028** .0035	.0472 .0630 **.0787**	.0028 **.0039** .0051	.0512 .0701 **.0886**	.0035 **.0051** .0063	.0591 .0787 **.0984**	.0047 **.0063** .0079	.0630 .0858 **.1083**	.0051 **.0071** .0087	.0709 .0945 **.1181**
P	Carbon steel 0.60%C	**164**~230~361	**262**~426~590	.0020 **.0024** .0031	.0433 .0591 **.0709**	.0028 **.0035** .0043	.0472 .0634 **.0795**	.0031 **.0047** .0059	.0512 .0701 **.0886**	.0039 **.0055** .0071	.0551 .0764 **.0972**	.0047 **.0063** .0079	.0630 .0846 **.1063**
P	Low alloy steel	**131**~230~328	**262**~394~525	.0016 **.0020** .0028	.0394 .0512 **.0630**	.0024 **.0031** .0039	.0394 .0551 **.0709**	.0028 **.0039** .0051	.0472 .0630 **.0787**	.0035 **.0051** .0063	.0512 .0709 **.0866**	.0039 **.0055** .0067	.0551 .0748 **.0945**
P	High alloy steel	**131**~197~262	**197**~295~394	.0016 **.0020** .0028	.0394 .0512 **.0630**	.0024 **.0031** .0039	.0394 .0551 **.0709**	.0028 **.0039** .0051	.0472 .0630 **.0787**	.0035 **.0051** .0063	.0512 .0709 **.0866**	.0039 **.0055** .0067	.0551 .0748 **.0945**
M	Stainless steel	**131**~197~262	**197**~295~394	.0016 **.0020** .0028	.0394 .0512 **.0630**	.0024 **.0031** .0039	.0394 .0551 **.0709**	.0028 **.0039** .0051	.0472 .0630 **.0787**	.0035 **.0051** .0063	.0512 .0709 **.0866**	.0039 **.0055** .0067	.0551 .0748 **.0945**
K	Cast Iron	**131**~230~328	**262**~394~525	.0020 **.0028** .0035	.0472 .0630 **.0787**	.0028 **.0039** .0051	.0512 .0701 **.0886**	.0035 **.0051** .0063	.0512 .0748 **.0984**	.0047 **.0063** .0079	.0630 .0858 **.1083**	.0051 **.0071** .0087	.0709 .0945 **.1181**
N	Al	**262**~426~590	**394**~689~984	.0020 **.0028** .0035	.0709 .0945 **.1181**	.0028 **.0039** .0051	.0787 .1059 **.1327**	.0035 **.0051** .0063	.0866 .1173 **.1476**	.0047 **.0063** .0079	.0945 .1283 **.1622**	.0051 **.0071** .0087	.1063 .1417 **.1772**
N	Cu	**197**~344~492	**328**~558~787	.0020 **.0028** .0035	.0551 .0748 **.0945**	.0028 **.0039** .0051	.0630 .0846 **.1063**	.0035 **.0051** .0063	.0709 .0945 **.1181**	.0047 **.0063** .0079	.0787 .1043 **.1299**	.0051 **.0071** .0087	.0827 .1122 **.1417**
S	Ni- Alloy	**33** ~66~ 98	**49** ~92~ 131	.0008 **.0010** .0012	.0394 .0512 **.0630**	.0012 **.0016** .0020	.0394 .0551 **.0709**	.0012 **.0018** .0024	.0472 .0630 **.0787**	.0016 **.0024** .0031	.0512 .0709 **.0866**	.0016 **.0024** .0031	.0551 .0748 **.0945**
S	Titanium	**98**~131~164	**131**~197~262	.0008 **.0010** .0012	.0394 .0512 **.0630**	.0012 **.0016** .0020	.0394 .0551 **.0709**	.0012 **.0018** .0024	.0472 .0630 **.0787**	.0016 **.0024** .0031	.0512 .0709 **.0866**	.0016 **.0024** .0031	.0551 .0748 **.0945**
H	Hardened	**131**~197~262	**197**~295~394	.0012 **.0016** .0020	.0197 .0256 **.0315**	.0020 **.0024** .0031	.0236 .0315 **.0394**	.0028 **.0039** .0047	.0276 .0374 **.0472**	.0031 **.0043** .0059	.0315 .0433 **.0551**	.0035 **.0047** .0063	.0394 .0512 **.0630**

Cutting Data

- Boldface number is recommended for start.
- Pitch is possible to increase 20% while cutting conditions are all fine.

99321-016-2030 / 99323-016-2030 >>

Workpiece material		SFM 99321	SFM 99323	Ø .787" f IPR	Ø .787" Pitch Inch	Ø .866" f IPR	Ø .866" Pitch Inch	Ø .984" f IPR	Ø .984" Pitch Inch	Ø1.063" f IPR	Ø1.063" Pitch Inch	Ø1.181" f IPR	Ø1.181" Pitch Inch
P	Carbon steel 0.25%C	**197**~295~426	**328**~525~722	.0024 **.0031** .0039	.0709 .0945 **.1181**	.0035 **.0047** .0059	.0748 .1008 **.1280**	.0047 **.0063** .0079	.0827 .1102 **.1378**	.0055 **.0075** .0094	.0866 .1165 **.1476**	.0059 **.0083** .0102	.0945 .1260 **.1575**
P	Carbon steel 0.45% C	**197**~295~394	**328**~492~656	.0024 **.0031** .0039	.0709 .0945 **.1181**	.0035 **.0047** .0059	.0748 .1008 **.1280**	.0047 **.0063** .0079	.0827 .1102 **.1378**	.0055 **.0075** .0094	.0866 .1165 **.1476**	.0059 **.0083** .0102	.0945 .1260 **.1575**
P	Carbon steel 0.60%C	**164**~230~361	**262**~426~590	.0020 **.0028** .0035	.0630 .0846 **.1063**	.0031 **.0043** .0051	.0669 .0906 **.1142**	.0039 **.0055** .0071	.0748 .1004 **.1260**	.0051 **.0071** .0087	.0787 .1063 **.1339**	.0051 **.0071** .0091	.0827 .1122 **.1417**
P	Low alloy steel	**131**~230~328	**262**~394~525	.0020 **.0024** .0031	.0551 .0748 **.0945**	.0028 **.0039** .0047	.0591 .0807 **.1024**	.0035 **.0051** .0063	.0630 .0866 **.1102**	.0043 **.0059** .0075	.0709 .0945 **.1181**	.0047 **.0063** .0079	.0748 .1004 **.1260**
P	High alloy steel	**131**~197~262	**197**~295~394	.0020 **.0024** .0031	.0551 .0748 **.0945**	.0028 **.0039** .0047	.0591 .0807 **.1024**	.0035 **.0051** .0063	.0630 .0866 **.1102**	.0043 **.0059** .0075	.0709 .0945 **.1181**	.0047 **.0063** .0079	.0748 .1004 **.1260**
M	Stainless steel	**131**~197~262	**197**~295~394	.0020 **.0024** .0031	.0551 .0748 **.0945**	.0028 **.0039** .0047	.0591 .0807 **.1024**	.0035 **.0051** .0063	.0630 .0866 **.1102**	.0043 **.0059** .0075	.0709 .0945 **.1181**	.0047 **.0063** .0079	.0748 .1004 **.1260**
K	Cast Iron	**131**~230~328	**262**~394~525	.0024 **.0031** .0039	.0709 .0945 **.1181**	.0035 **.0047** .0059	.0748 .1016 **.1280**	.0047 **.0063** .0079	.0827 .1102 **.1378**	.0055 **.0075** .0094	.0866 .1173 **.1476**	.0059 **.0083** .0102	.0945 .1260 **.1575**
N	Al	**262**~426~590	**394**~689~984	.0024 **.0031** .0039	.1063 .1417 **.1772**	.0035 **.0047** .0059	.1102 .1512 **.1917**	.0047 **.0063** .0079	.1220 .1594 **.1969**	.0055 **.0075** .0094	.1299 .1752 **.2205**	.0059 **.0083** .0102	.1417 .1890 **.2362**
N	Cu	**197**~344~492	**328**~558~787	.0024 **.0031** .0039	.0827 .1122 **.1417**	.0035 **.0047** .0059	.0906 .1220 **.1535**	.0047 **.0063** .0079	.0984 .1319 **.1654**	.0055 **.0075** .0094	.1063 .1417 **.1772**	.0059 **.0083** .0102	.1102 .1496 **.1890**
S	Ni- Alloy	**33** ~66~ 98	**49** ~92~ 131	.0008 **.0012** .0016	.0551 .0748 **.0945**	.0012 **.0020** .0024	.0591 .0807 **.1024**	.0016 **.0024** .0031	.0630 .0866 **.1102**	.0016 **.0028** .0035	.0709 .0945 **.1181**	.0020 **.0031** .0039	.0748 .1004 **.1260**
S	Titanium	**98**~131~164	**131**~197~262	0.0008 **0.0012** 0.0016	.0551 .0748 **.0945**	.0012 **.0020** .0024	.0591 .0807 **.1024**	.0016 **.0024** .0031	.0630 .0866 **.1102**	.0016 **.0028** .0035	.0709 .0945 **.1181**	.0020 **.0031** .0039	.0748 .1004 **.1260**
H	Hardened	**131**~197~262	**197**~295~394	.0020 **.0024** .0031	.0551 .0748 **.0945**	.0028 **.0039** .0047	.0591 .0807 **.1024**	.0035 **.0051** .0063	.0630 .0866 **.1102**	.0043 **.0059** .0075	.0709 .0945 **.1181**	.0047 **.0063** .0079	.0748 .1004 **.1260**

99321-020-2540 / 99323-020-2540 >>

Workpiece material		SFM 99321	SFM 99323	Ø .984" f IPR	Ø .984" Pitch Inch	Ø1.102" f IPR	Ø1.102" Pitch Inch	Ø1.260" f IPR	Ø1.260" Pitch Inch	Ø1.417" f IPR	Ø1.417" Pitch Inch	Ø1.575" f IPR	Ø1.575" Pitch Inch
P	Carbon steel 0.25%C	**197**~295~426	**328**~525~722	.0028 **.0039** .0047	.0709 .0945 **.1181**	.0039 **.0055** .0067	.0827 .1102 **.1378**	.0055 **.0075** .0091	.0945 .1260 **.1575**	.0067 **.0091** .0110	.1063 .1417 **.1772**	.0071 **.0094** .0118	.1181 .1575 **.1969**
P	Carbon steel 0.45% C	**197**~295~394	**328**~492~656	.0028 **.0039** .0047	.0709 .0945 **.1181**	.0039 **.0055** .0067	.0827 .1102 **.1378**	.0055 **.0075** .0091	.0945 .1260 **.1575**	.0067 **.0091** .0110	.1063 .1417 **.1772**	.0071 **.0094** .0118	.1181 .1575 **.1969**
P	Carbon steel 0.60%C	**164**~230~361	**262**~426~590	.0024 **.0031** .0039	.0630 .0846 **.1063**	.0035 **.0051** .0063	.0748 .1004 **.1260**	.0047 **.0063** .0079	.0866 .1142 **.1417**	.0059 **.0079** .0098	.0945 .1260 **.1575**	.0063 **.0087** .0106	.1063 .1417 **.1772**
P	Low alloy steel	**131**~230~328	**262**~394~525	.0020 **.0028** .0035	.0551 .0748 **.0945**	.0031 **.0043** .0055	.0669 .0886 **.1102**	.0039 **.0055** .0071	.0748 .1004 **.1260**	.0051 **.0071** .0087	.0866 .1142 **.1417**	.0055 **.0075** .0094	.0945 .1260 **.1575**
P	High alloy steel	**131**~197~262	**197**~295~394	.0020 **.0028** .0035	.0551 .0748 **.0945**	.0031 **.0043** .0055	.0669 .0886 **.1102**	.0039 **.0055** .0071	.0748 .1004 **.1260**	.0051 **.0071** .0087	.0866 .1142 **.1417**	.0055 **.0075** .0094	.0945 .1260 **.1575**
M	Stainless steel	**131**~197~262	**197**~295~394	.0020 **.0028** .0035	.0551 .0748 **.0945**	.0031 **.0043** .0055	.0669 .0886 **.1102**	.0039 **.0055** .0071	.0748 .1004 **.1260**	.0051 **.0071** .0087	.0866 .1142 **.1417**	.0055 **.0075** .0094	.0945 .1260 **.1575**
K	Cast Iron	**131**~230~328	**262**~394~525	.0028 **.0039** .0047	.0709 .0945 **.1181**	.0039 **.0055** .0067	.0827 .1102 **.1378**	.0055 **.0075** .0091	.0945 .1260 **.1575**	.0067 **.0091** .0110	.1063 .1417 **.1772**	.0071 **.0094** .0118	.1181 .1575 **.1969**
N	Al	**262**~426~590	**394**~689~984	.0028 **.0039** .0047	.1063 .1417 **.1772**	.0039 **.0055** .0067	.1220 .1634 **.2047**	.0055 **.0075** .0091	.1417 .1890 **.2362**	.0067 **.0091** .0110	.1575 .2106 **.2638**	.0071 **.0094** .0118	.1772 .2362 **.2953**
N	Cu	**197**~344~492	**328**~558~787	.0028 **.0039** .0047	.0827 .1122 **.1417**	.0039 **.0055** .0067	.0984 .1319 **.1654**	.0055 **.0075** .0091	.1142 .1516 **.1890**	.0067 **.0091** .0110	.1260 .1693 **.2126**	.0071 **.0094** .0118	.1417 .1890 **.2362**
S	Ni- Alloy	**33** ~66~ 98	**49** ~92~ 131	.0008 **.0016** .0020	.0551 .0748 **.0945**	.0012 **.0020** .0028	.0669 .0886 **.1102**	.0016 **.0028** .0035	.0748 .1004 **.1260**	.0020 **.0031** .0039	.0866 .1142 **.1417**	.0024 **.0035** .0047	.0945 .1260 **.1575**
S	Titanium	**98**~131~164	**131**~197~262	.0008 **.0016** .0020	.0551 .0748 **.0945**	.0012 **.0020** .0028	.0669 .0886 **.1102**	.0016 **.0028** .0035	.0748 .1004 **.1260**	.0020 **.0031** .0039	.0866 .1142 **.1417**	.0024 **.0035** .0047	.0945 .1260 **.1575**
H	Hardened	**131**~197~262	**197**~295~394	.0020 **.0028** .0035	.0551 .0748 **.0945**	.0031 **.0043** .0055	.0669 .0886 **.1102**	.0039 **.0055** .0071	.0748 .1004 **.1260**	.0051 **.0071** .0087	.0866 .1142 **.1417**	.0055 **.0075** .0094	.0945 .1260 **.1575**

Cutting Data

- Boldface number is recommended for start.
- Pitch is possible to increase 20% while cutting conditions are all fine.

99321-025-3050 / 99323-025-3050 >>

Workpiece material		SFM 99321	SFM 99323	Ø1.181" f IPR	Ø1.181" Pitch Inch	Ø1.378" f IPR	Ø1.378" Pitch Inch	Ø1.575" f IPR	Ø1.575" Pitch Inch	Ø1.772" f IPR	Ø1.772" Pitch Inch	Ø1.969" f IPR	Ø1.969" Pitch Inch
P	Carbon steel 0.25%C	**197**~295~426	**328**~525~722	.0031 **.0043** .0051	.0945 .1260 **.1575**	.0047 **.0063** .0079	.1063 .1417 **.1772**	.0067 **.0091** .0110	.1181 .1575 **.1969**	.0075 **.0102** .0126	.1299 .1732 **.2165**	.0079 **.0106** .0134	.1417 .1890 **.2362**
P	Carbon steel 0.45% C	**197**~295~394	**328**~492~656	.0031 **.0043** .0051	.0945 .1260 **.1575**	.0047 **.0063** .0079	.1063 .1417 **.1772**	.0067 **.0091** .0110	.1181 .1575 **.1969**	.0075 **.0102** .0126	.1299 .1732 **.2165**	.0079 **.0106** .0134	.1417 .1890 **.2362**
P	Carbon steel 0.60%C	**164**~230~361	**262**~426~590	.0028 **.0039** .0047	.0866 .1142 **.1417**	.0039 **.0055** .0071	.0945 .1260 **.1575**	.0059 **.0079** .0098	.1063 .1417 **.1772**	.0067 **.0091** .0110	.1181 .1575 **.1969**	.0071 **.0094** .0118	.1260 .1693 **.2126**
P	Low alloy steel	**131**~230~328	**262**~394~525	.0024 **.0031** .0039	.0748 .1004 **.1260**	.0035 **.0051** .0063	.0866 .1142 **.1417**	.0051 **.0071** .0087	.0945 .1260 **.1575**	.0059 **.0079** .0098	.1024 .1378 **.1732**	.0063 **.0087** .0106	.1142 .1516 **.1890**
P	High alloy steel	**131**~197~262	**197**~295~394	.0024 **.0031** .0039	.0748 .1004 **.1260**	.0035 **.0051** .0063	.0866 .1142 **.1417**	.0051 **.0071** .0087	.0945 .1260 **.1575**	.0059 **.0079** .0098	.1024 .1378 **.1732**	.0063 **.0087** .0106	.1142 .1516 **.1890**
M	Stainless steel	**131**~197~262	**197**~295~394	.0024 **.0031** .0039	.0748 .1004 **.1260**	.0035 **.0051** .0063	.0866 .1142 **.1417**	.0051 **.0071** .0087	.0945 .1260 **.1575**	.0059 **.0079** .0098	.1024 .1378 **.1732**	.0063 **.0087** .0106	.1142 .1516 **.1890**
K	Cast Iron	**131**~230~328	**262**~394~525	.0031 **.0043** .0051	.0945 .1260 **.1575**	.0047 **.0063** .0079	.1063 .1417 **.1772**	.0067 **.0091** .0110	.1181 .1575 **.1969**	.0075 **.0102** .0126	.1299 .1732 **.2165**	.0079 **.0106** .0134	.1417 .1890 **.2362**
N	Al	**262**~426~590	**394**~689~984	.0031 **.0043** .0051	.1417 .1890 **.2362**	.0047 **.0063** .0079	.1575 .2106 **.2638**	.0067 **.0091** .0110	.1772 .2362 **.2953**	.0075 **.0102** .0126	.1929 .2579 **.3228**	.0079 **.0106** .0134	.2126 .2835 **.3543**
N	Cu	**197**~344~492	**328**~558~787	.0031 **.0043** .0051	.1142 .1516 **.1890**	.0047 **.0063** .0079	.1260 .1693 **.2126**	.0067 **.0091** .0110	.1417 .1890 **.2362**	.0075 **.0102** .0126	.1575 .2087 **.2598**	.0079 **.0106** .0134	.1693 .2264 **.2835**
S	Ni- Alloy	**33** ~66~ 98	**49** ~92~ 131	.0008 **.0016** .0020	.0748 .1004 **.1260**	.0016 **.0024** .0031	.0866 .1142 **.1417**	.0024 **.0035** .0047	.0945 .1260 **.1575**	.0024 **.0035** .0047	.1024 .1378 **.1732**	.0028 **.0043** .0055	.1142 .1516 **.1890**
S	Titanium	**98**~131~164	**131**~197~262	.0008 **.0016** .0020	.0748 .1004 **.1260**	.0016 **.0024** .0031	.0866 .1142 **.1417**	.0024 **.0035** .0047	.0945 .1260 **.1575**	.0024 **.0035** .0047	.1024 .1378 **.1732**	.0028 **.0043** .0055	.1142 .1516 **.1890**
H	Hardened	**131**~197~262	**197**~295~394	.0024 **.0031** .0039	.0748 .1004 **.1260**	.0035 **.0051** .0063	.0866 .1142 **.1417**	.0051 **.0071** .0087	.0945 .1260 **.1575**	.0059 **.0079** .0098	.1024 .1378 **.1732**	.0063 **.0087** .0106	.1142 .1516 **.1890**

99321-025-4265 >>

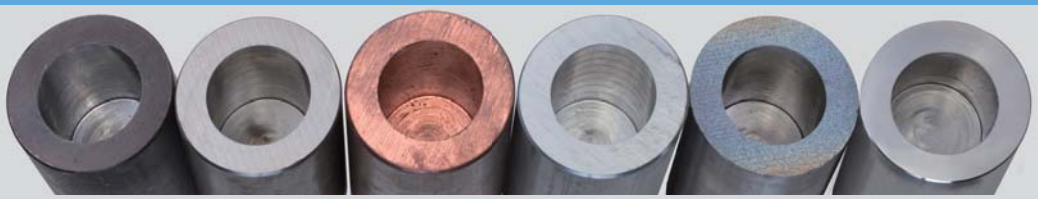
Workpiece material		SFM 99323	Ø1.654" f IPR	Ø1.654" Pitch Inch	Ø1.969" f IPR	Ø1.969" Pitch Inch	Ø2.165" f IPR	Ø2.165" Pitch Inch	Ø2.362" f IPR	Ø2.362" Pitch Inch	Ø2.559" f IPR	Ø2.559" Pitch Inch
P	Carbon steel 0.25%C	**328** ~ 525 ~ 722	.0047 **.0063** .0079	.1181 .1575 **.1969**	.0059 **.0079** .0094	.1220 .1634 **.2047**	.0071 **.0094** .0118	.1299 .1732 **.2165**	.0075 **.0102** .0126	.1339 .1791 **.2244**	.0079 **.0106** .0134	.1417 .1890 **.2362**
P	Carbon steel 0.45% C	**328** ~ 492 ~ 656	.0047 **.0063** .0079	.1181 .1575 **.1969**	.0059 **.0079** .0094	.1220 .1634 **.2047**	.0071 **.0094** .0118	.1299 .1732 **.2165**	.0075 **.0102** .0126	.1339 .1791 **.2244**	.0079 **.0106** .0134	.1417 .1890 **.2362**
P	Carbon steel 0.60%C	**262** ~ 426 ~ 590	.0043 **.0059** .0071	.1063 .1417 **.1772**	.0051 **.0071** .0087	.1102 .1476 **.1850**	.0063 **.0087** .0106	.1181 .1575 **.1969**	.0067 **.0091** .0114	.1181 .1594 **.2008**	.0071 **.0094** .0118	.1260 .1693 **.2126**
P	Low alloy steel	**262** ~ 394 ~ 525	.0039 **.0051** .0063	.0945 .1260 **.1575**	.0043 **.0059** .0075	.0984 .1319 **.1654**	.0055 **.0075** .0094	.1024 .1378 **.1732**	.0059 **.0079** .0098	.1102 .1457 **.1811**	.0063 **.0087** .0106	.1142 .1516 **.1890**
P	High alloy steel	**197** ~ 295 ~ 394	.0039 **.0051** .0063	.0945 .1260 **.1575**	.0043 **.0059** .0075	.0984 .1319 **.1654**	.0055 **.0075** .0094	.1024 .1378 **.1732**	.0059 **.0079** .0098	.1102 .1457 **.1811**	.0063 **.0087** .0106	.1142 .1516 **.1890**
M	Stainless steel	**197** ~ 295 ~ 394	.0039 **.0051** .0063	.0945 .1260 **.1575**	.0043 **.0059** .0075	.0984 .1319 **.1654**	.0055 **.0075** .0094	.1024 .1378 **.1732**	.0059 **.0079** .0098	.1102 .1457 **.1811**	.0063 **.0087** .0106	.1142 .1516 **.1890**
K	Cast Iron	**262** ~ 394 ~ 525	.0047 **.0063** .0079	.1181 .1575 **.1969**	.0059 **.0079** .0094	.1220 .1634 **.2047**	.0071 **.0094** .0118	.1299 .1732 **.2165**	.0075 **.0102** .0126	.1339 .1791 **.2244**	.0079 **.0106** .0134	.1417 .1890 **.2362**
N	Al	**394** ~ 689 ~ 984	.0047 **.0063** .0079	.1772 .2362 **.2953**	.0059 **.0079** .0094	.1850 .2461 **.3071**	.0071 **.0094** .0118	.1929 .2579 **.3228**	.0075 **.0102** .0126	.2047 .2717 **.3386**	.0079 **.0106** .0134	.2126 .2835 **.3543**
N	Cu	**328** ~ 558 ~ 787	.0047 **.0063** .0079	.1417 .1890 **.2362**	.0059 **.0079** .0094	.1496 .1988 **.2480**	.0071 **.0094** .0118	.1575 .2087 **.2598**	.0075 **.0102** .0126	.1614 .2165 **.2717**	.0079 **.0106** .0134	.1693 .2264 **.2835**
S	Ni- Alloy	**49** ~ 92 ~ 131	.0016 **.0024** .0031	.0945 .1260 **.1575**	.0020 **.0031** .0039	.0984 .1319 **.1654**	.0024 **.0035** .0047	.1024 .1378 **.1732**	.0024 **.0039** .0051	.1102 .1457 **.1811**	.0028 **.0043** .0055	.1142 .1516 **.1890**
S	Titanium	**131** ~ 197 ~ 262	.0016 **.0024** .0031	.0945 .1260 **.1575**	.0020 **.0031** .0039	.0984 .1319 **.1654**	.0024 **.0035** .0047	.1024 .1378 **.1732**	.0024 **.0039** .0051	.1102 .1457 **.1811**	.0028 **.0043** .0055	.1142 .1516 **.1890**
H	Hardened	**197** ~ 295 ~ 394	.0039 **.0051** .0063	.0945 .1260 **.1575**	.0043 **.0059** .0075	.0984 .1319 **.1654**	.0055 **.0075** .0094	.1024 .1378 **.1732**	.0059 **.0079** .0098	.1102 .1457 **.1811**	.0063 **.0087** .0106	.1142 .1516 **.1890**

Application Example

Special insert geometry is able to cut different materials>>

- Serrated cutting edge makes the chips short and small, and easier to evacuate.
- Recommended for almost all material types, good for drilling material that generates long, soft chips.

Example 1



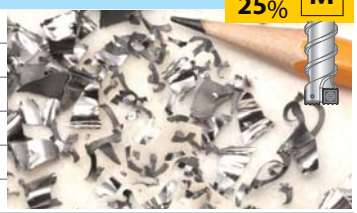
Hole size: Ø 0.984"x 1.969"L / Tool: 99321-016-2030

Material: SAE8620 — Load 28% P

Vc	=	262.4	SFM
S	=	1500	r.p.m.
f	=	.0059	IPR
F	=	8.850	IPM
P	=	.236	Inch
T	=	63	sec.

Material: SUS304 (Stainless steel 304) — Load 25% M

Vc	=	262.4	SFM
S	=	1500	r.p.m.
f	=	.0031	IPR
F	=	4.65	IPM
P	=	.236	Inch
T	=	118	sec.

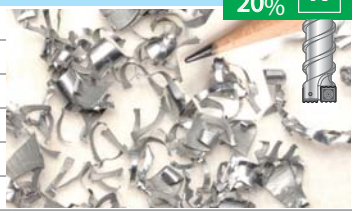


Material: C1100 — Load 25% N

Vc	=	393.6	SFM
S	=	2250	r.p.m.
f	=	.0039	IPR
F	=	8.775	IPM
P	=	.236	Inch
T	=	63	sec.

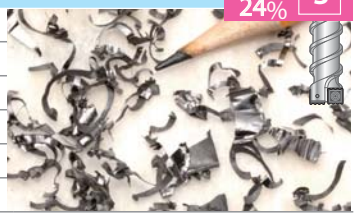
Material: AL6061T6 — Load 20% N

Vc	=	590.4	SFM
S	=	3370	r.p.m.
f	=	.0079	IPR
F	=	26.623	IPM
P	=	.236	Inch
T	=	21	sec.



Material: TiAl6V4 — Load 24% S

Vc	=	262.4	SFM
S	=	1500	r.p.m.
f	=	.0031	IPR
F	=	4.65	IPM
P	=	.236	Inch
T	=	118	sec.



Material: Inconel 718 (Drill with internal coolant) — Load 24% S

Vc	=	131.2	SFM
S	=	750	r.p.m.
f	=	.0118	IPR
F	=	8.85	IPM
P	=	.079	Inch
T	=	100	sec.

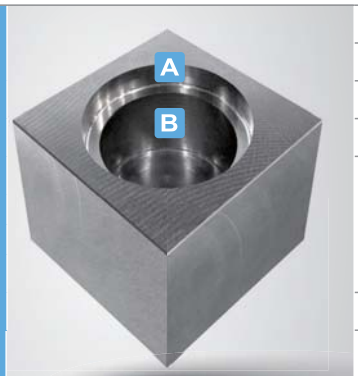
Suggested insert grades for best result >>

Example 2

Diameter (inch)		.984"		
Depth (mm)		1.969"		
Tool (Dc=17mm)		99321-016-2030 (external coolant)		
Material		P Carbon Steel	M Stainless Steel	H Tool Steel
	DIN	C45E	X5CrNi18-10	X40CrMoV5 1
	SAE	1045	304	H13
	JIS	S45C	SUS304	SKD61 (HRC50°)
Insert Grade		N9MX070204-**NC5072**	N9MX070204-**NC5072**	N9MX070204-**NC2032**
No. of Edges		2	2	2
Vc = (SFM)		394	131	262
S = (r.p.m.)		2250	750	1500
f = (IPR)		.0079"	.0051	.0040"
F = (IPM)		17.78	3.83	6.0
Pitch = (Inch)		.236"	.118"	.118"
Machine Load = % (BT40, VMC)		35%	20%	20%
Tool Life (hole)		150	108	18
Chip Removal Volume (cm^3)		3682	2651	441.78

To produce step hole Ø2.106" & Ø1.772" by one tool >>

Example 3

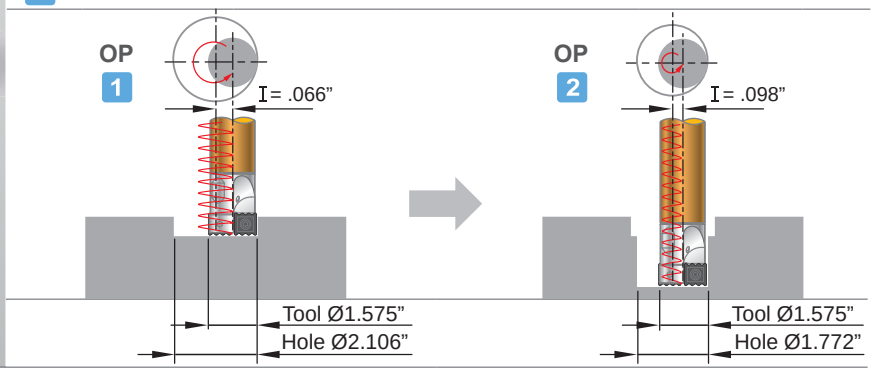


Application

- Hydraulic port for plug-in valve cylinders, counterbore for bolt, and more!

Material	S50C (JIS). High carbon steel
Tool	99323-LS32-HD40 (Non-standard size)
Insert	N9MX12T308-NC2032
Machine	BT40, 22.5 Kw
Coolant	Internal

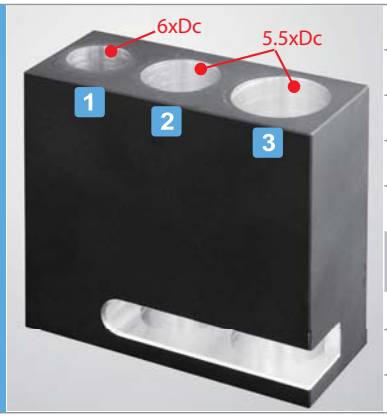
Hole	Dc Inch	D Inch	L Inch	Vc SFM	S r.p.m	f IPR	F IPM	I Inch	P Inch	T sec.
A	Ø1.575	Ø2.106	.394	984	2400	.0059	14.16	.266	.197	14
B		Ø1.772	1.260	984	2400	.0059	14.16	.098	.079	42



Just one ‘‘NC Helix Drill’’ can machine different diameters and hole depths.

Just one tool to drill different diameters and hole depth, possible up to 6xDc >>

Example 4



Material	AL6061T6
Tool	99323-016-2030
Insert	N9MX070204-NC5072
Machine	HAAS VM-3, BT40, 22.5KW
Coolant	Internal coolant

Fig.	Dc Inch	D Inch	L Inch	Vc SFM	S r.p.m	f IPR	F IPM	P Inch
1	Ø .669	Ø .787	3.937	394	2250	.0040	9	.118
2		Ø .984	3.740	328	1900	.0070	13	.177
3		Ø 1.181	3.740	197	1200	0.010	12	.236

Low spindle power is not a problem! BT30 machine, Ø1.181" hole diameter, 3.3xDc drill depth >>

Example 5

Maximum drilling capacity of the 5.5 kw spindle is Ø0.63”

Material	S50C (JIS), High carbon steel
Tool	99321-020-2540 / BC20-HD22-2540
Insert	N9MX100306-NC2032
Machine	BT30, 5.5 Kw
Coolant	External coolant

Dc Inch	D Inch	L Inch	Vc SFM	S r.p.m	f IPR	F IPM	I Inch	P Inch	T sec.
Ø .866	Ø1.181	2.756	656	* 2893	.0079	22.85	.157	.110	62

* 3000 r.p.m. is used.

Drilling diameter, increase flexibility and occupy few tools in CNC machine.

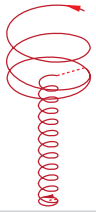
One tool performs multiple patterns >>

Example 6

Material	AL6061T6
Tool	99323-016-2030 M08-HD17-2030
Insert	N9MX070204-NC5072
Machine	HAAS VM-3, BT40, 22.5KW
Coolant	Internal

Fig.	Dc Inch	Vc SFM	S r.p.m	f IPR	F IPM	P Inch	T sec.
1	Ø .669	656	3800	.0060	22.8	.157	67
2		656	3800	.0060	22.8	.157	95
3		656	3800	.0060	22.8	.157	80

Tool Path 1



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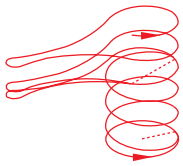

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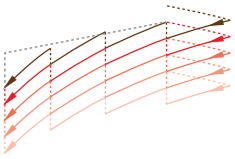


```
%
G40 G80 G69
G28 G91 Z0
G28 G91 X0 Y0
G00 G90
G126
G00 G90 X0. Y0.
G52 X18. Y-20.
G00 G90 X0. Y0.
T5
M06
#1= 6.5 (X1)
#11= -6.5 (X1=-I)
#6= 1.5 (X2)
#7= -1.5 (X2=-I)
#2= 0. (Y)
#3= 2.0 (Z1-1)
#13= -2.0 (Z1-2)
#16= -10.0 (Z1-1)
#17= -12.0 (Z1-2)
#4= 190.0 (F1-1)
#5= 570.0 (F1-2)
#14= 190.0 (F1-1)
#15= 380.0 (F1-2)
#8= 3 (L1=Deepth/P#9)
#9= 4.0 (P1=Z#3-DOWN Pitch)
#18= 7 (L2=Deepth/P#9)
#19= 2.0 (P2=Z#16-DOWN Pitch)
M88
G00 G90 X#1 Y#2
S3800 M03
G43 H05 Z30. (M08)
Z10.
Z5.
G01 Z#3 F#4
M97 P1000 L#8
G03 I#11 F#4
G01 X#6 Y#2 (Holes 2)
M97 P2000 L#18
G03 I#7 F#14
G01 X0. Y0.
G00 G90 Z10. M05
G00 G90 Z20. M89
G00 G90 Z30. M09
G28 G91 Z0. M05
M00
G28 G91 Y0.
M30
N1000
G03 I#11 Z#13 F#5
#13= #13 - #9
M99
N2000
G03 I#7 Z#17 F#15
#17= #17 - #19
M99

%
```

```
%
G40 G80 G69
G28 G91 Z0
G28 G91 X0 Y0
G00 G90
G126
G00 G90 X0. Y0.
G52 X0. Y0.
G00 G90 X0. Y0.
T5
M06
#12= 1.0 (Z-UP)
#13= 0.0 (Z1)
#14= -1.512 (Z2)
#15= -2.608 (Z3)
#16= -2.904 (Z4)
#17= -4.0 (Z5-1) (Z2-1)
#4= 190.0 (F1)
#5= 570.0 (F2)
#7= -6.5 (X2=-I)
#18= -12.0 (Z2-2)
#19= 4.0 (P2=Z#17-DOWN PITCH)
G00 G90 X25. Y-51.
M88
S3800 M03
G43 H05 Z30. (M08)
Z10.
G01 Z#12 F#4
M97 P1000 L2
G01 X35.757 Y-55.924 F#4
G03 X35.757 Y-46.076 R-6.5
G02 X15.537 Y-49.599 R20.
G03 X15.537 Y-52.401 R-1.5
G02 X35.757 Y-55.924 R20.
G01 X46.5 Y-51.
M97 P2000 L3
G03 I#7 F#4
G01 X40. Y-51.
G00 G90 Z10. M05
G00 G90 Z20. M89
G00 G90 Z30. M09
G28 G91 Z0. M05
M00
G28 G91 Y0.
M30

N1000
G01 X35.757 Y-55.924 Z#13 F#4
G03 X35.757 Y-46.076 R-6.5 Z#14
F#5
G02 X15.537 Y-49.599 R20. Z#15
G03 X15.537 Y-52.401 R-1.5
Z#16
G02 X35.757 Y-55.924 R20. Z#17

#13= #13 - 4.0
#14= #14 - 4.0
#15= #15 - 4.0
#16= #16 - 4.0
#17= #17 - 4.0
M99

N2000
G03 I#7 Z#18 F#5
#18= #18 - #19
M99

%
```

```
%
G40 G80 G69
G28 G91 Z0
G28 G91 X0 Y0
G00 G90
G126
G00 G90 X0. Y0.
G52 X0. Y0.
G00 G90 X0. Y0.
T5
M06
#1= 4.0 (Z up)
#2= 0.0 (Z1)
#3= -4.0 (Z2)
#4= 210.0 (F1)
#5= 420.0 (F2)
#6= 4.0 (Z#13-Pitch)
G00 G90 X92.56 Y-14.507
M88
S2800 M03
G43 H05 Z30. (M08)
Z10.
Z5.
M97 P1000 L5 (Z-Pitch)
G00 G90 Z30. M05
M09
M89
G28 G91 Z0. M05
M00
G28 G91 Y0.
M30

N1000

G00 G90 X92.56 Y-14.507
G01 Z#1 F#4
G02 X108.5 Y-20.416 Z#2 R72. F#5
G03 X92.56 Y-14.507 Z#3 R72. F#5
G01 Z#2
G03 X75.679 Y-12.5 Z#3 R72. F#5
G01 Z#2
G03 X58.798 Y-14.507 Z#3 R72. F#5
G01 Z#2
G03 X42.858 Y-20.416 Z#3 R72. F#5
G01 Z#2
G00 G90 Z5.
#1= #1 - #6 (Z up)
#2= #2 - #6 (Z1.)
#3= #3 - #6 (Z2.)
M99

%
```

HIGH SPEED BORING BARS

High Efficiency/Easy Adjustment

Easy Handling

- Dimensions are easy to read. They are indicated on the tools and are easily adjustable on a tool presetter or in machining center.
- No backlash.
- Change the boring bar and set the boring dimension on the tool presetter in just one minute.

Interchangeable Boring Bars from Diameters of 5 mm to 50 mm

- This simple boring tool has minimal components.
- In minutes, the boring bar may be changed and the boring dimension set on the tool presetter.

Low Cost For Machining Small Holes

- The cost of this product is low compared to other micro adjustable boring heads.

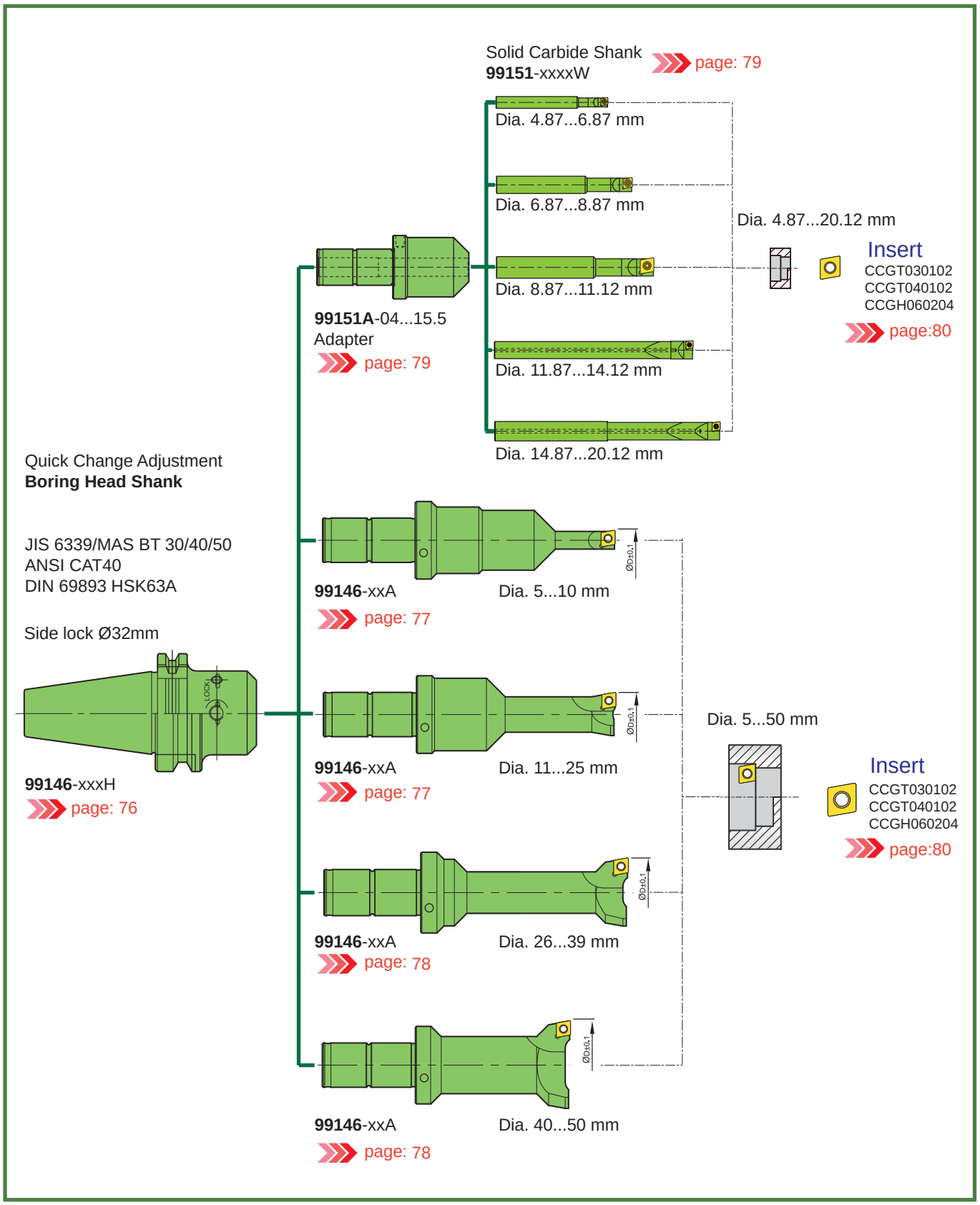
High Speed

- Boring bar design ensures accurate high speed boring. Grade balance is G6.3 10000 r.p.m., all sizes are guaranteed.
- Surface speeds of carbide inserts up to 700 m/min.
- Combination bore / chamfer / facing tools can be ordered on request.

Procedures For Assembly

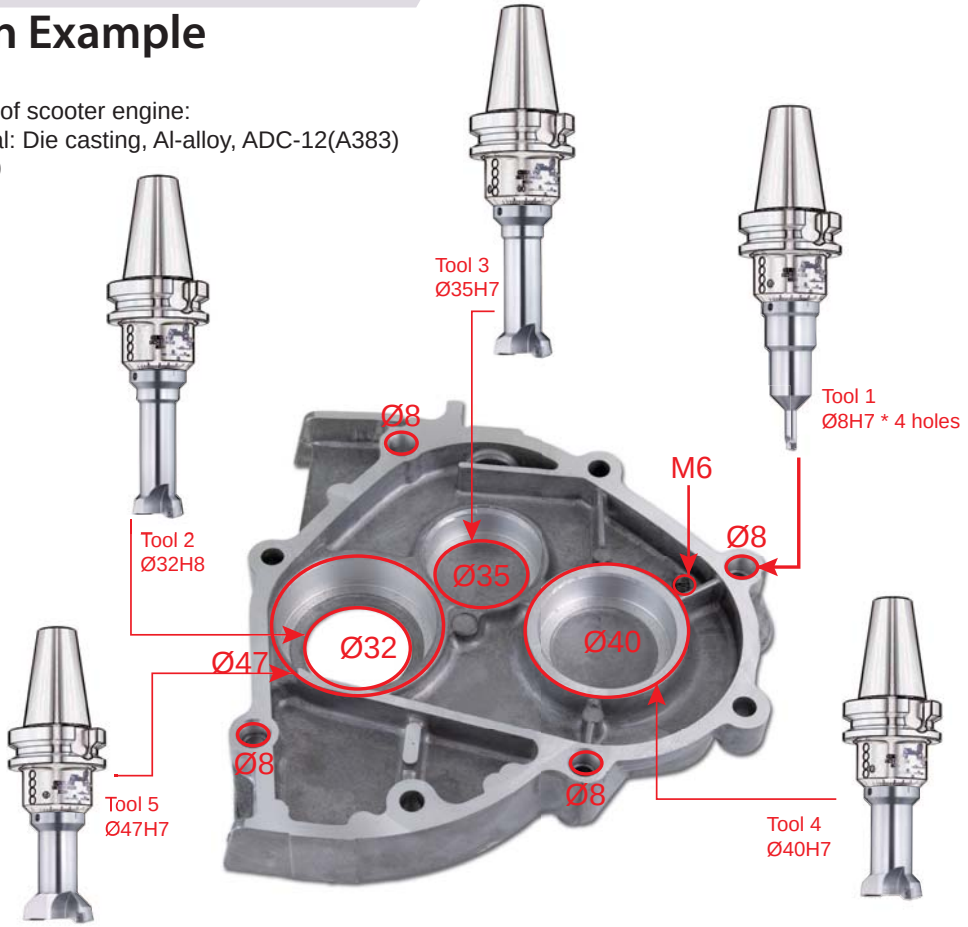
1. Use 4 mm allen-key to loosen locking screw M8, take care not to remove the screw.
2. Use 3 mm allen-key to loosen pre-load screw M6, take care not to remove the screw.
3. Remove the original boring bar and insert the new boring bar.
4. Tighten the M6 pre-load screw using the torque screwdriver with hex head key.
   (Recomended torque = 0.9~1.0 Nm)
5. Ensure the boring head and boring bar fit together securely.
6. Measure the boring diameter of the boring bar using tool presetter and adjust it to the required diameter.
7. Tighten the M8 locking screw using the torque screwdriver with hex head key (Recomended torque = 8~9Nm)

Program of Boring Bar System



Application Example

- Machining a cover of scooter engine:
  Work piece material: Die casting, Al-alloy, ADC-12(A383)
  Spindle Size: BT40

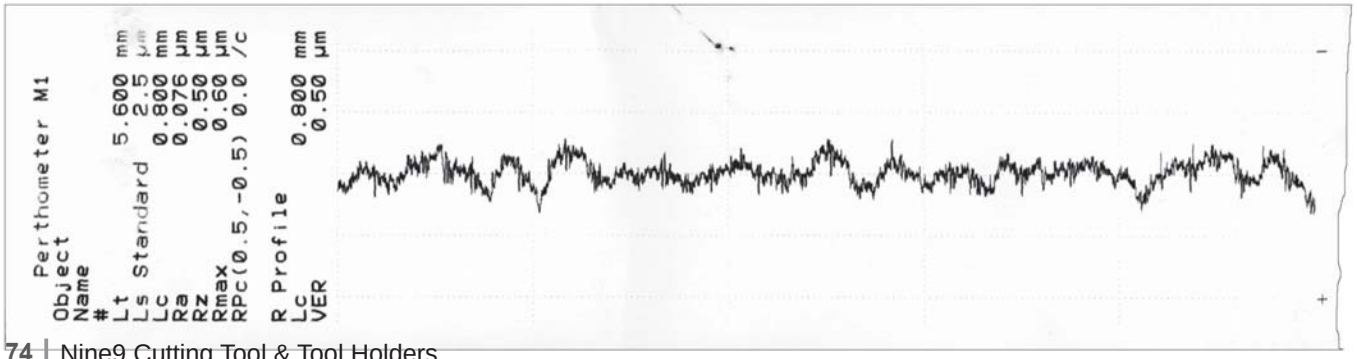


TOOL LIST by Nine9 Boring Bar 99146-series :

No.	Boring Bar	Grade of insert	Dia. mm	Depth	r.p.m.	F = mm/min.	Machining time
1	C20-146-0824	CCGT040102 NC30	Ø8H7	8 mm	8000	400	1.2 sec.
2	C20-3200-70L	CCGT060202HP NC9031	Ø32H8	8 mm	2985	209	2.3 sec.
3	C20-3500-70L		Ø35H7	12 mm	2730	191	3.8 sec.
4	C20-4000-70L		Ø40H7	15 mm	2400	168	5.4 sec.
5	C20-4700-70L		Ø47H7	15 mm	2030	142	6.4 sec.

Working Example

Material	Vc m/min.	f mm/rev.	Roughness			Tool holder	Insert
			Ra	Rz	Rmax		
Al alloy, 6061	150	0.2	0.076μm	0.50μm	0.6μm	99146-BT40-26A	CCGH0602U NC9036



Procedures For Adjustment

Featuring Improved:

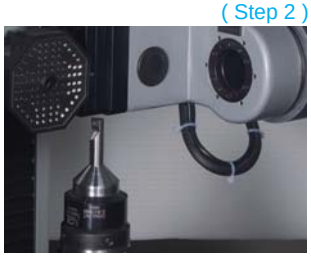
- **Cycle time**
- **Position Accuracy**
- **Roughness**
- **True Roundness**

On Tool Presetter

1. Loosen M8 locking screw.
2. Set the boring bar at the neutral position. (Step 1)
3. Measure the boring diameter using the tool presetter and compare with the required diameter. (Step 2)
4. If boring diameter is too big or too small, please put an allen-key into the adjusting driving hole. Turn to " + " to increase and turn to " - " to reduce boring diameter. (Step 3 and 4)
5. Tighten M8 locking screw.

(Step 1)

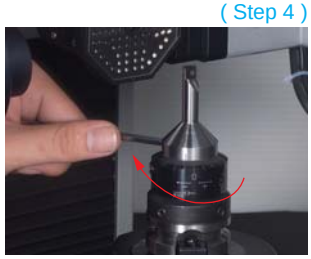
(Step 2)



(Step 3)

To Increase Diameter

(Step 4)



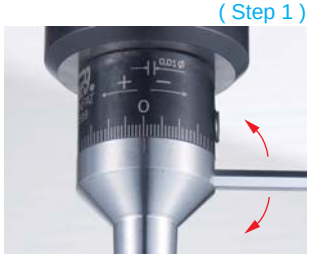
To Reduce Diameter

On Milling Machine And Machining Centers

1. Set the boring bar at the neutral position. (Step 1)
2. Tighten M8 locking screw.
3. Test cut on work piece, about 3-5mm deepth on the machine.
4. Measuring boring diameter of workpiece and compare with required diameter.
5. If boring diameter is too big or too small, loosen M8 locking screw, please put an allen-key into the adjusting driving hole. Turn to " + " to increase and turn to " - " to reduce boring diameter. (Step 2 and 3)
6. Tighten M8 locking screw. (Step 4)

Video is also available on youtube

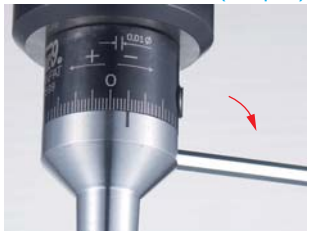
(Step 1)



(Step 2)

To Increase Diameter

(Step 3)



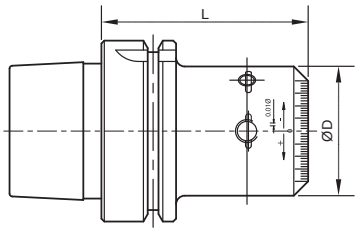
(Step 4)

To Reduce Diameter

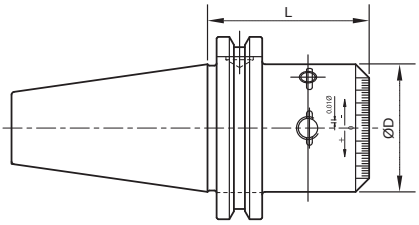
Boring Head Shank

- Adjustable range: +0.12 /-0.13 mm.
- Each adjustment division is 0.01 mm.
- Balance grade : G6.3 10000 r.p.m.

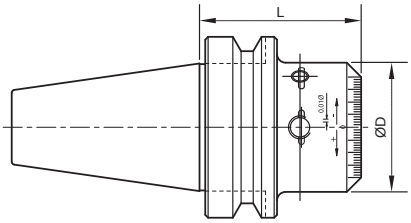
HSK63



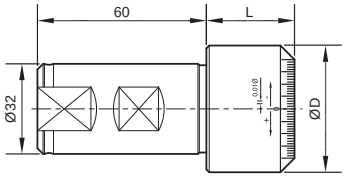
CAT40



BT



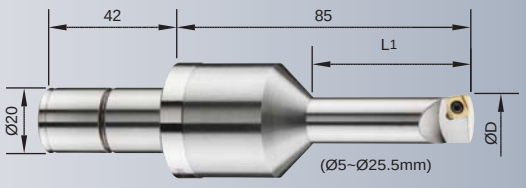
SB32



Part No.	ØD	L
SB32-146-31	45	31.3
BT30-146-51	45	51.3
BT40-146-56	45	56.3
BT50-146-77	45	77.3
CAT40-146-56	45	56.3
HSK63A-146-72	45	72.0

Boring Bar Ø5 ~ Ø25mm

- Alloy Steel Shank
- Boring Depth : L1, 2~3xD



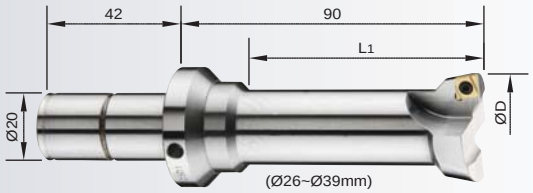
* H type with internal coolant can be ordered on request from Dia. 10mm.
Ordering example: C20-0800-16LH.

Part No.	ØD	L1	Insert
C20-0500-10L	4.87~5.12	10.00	CC...030102 NS-16030, NK-T6
C20-0600-12L	5.87~6.12	12.00	
C20-0700-14L	6.87~7.12	14.00	CC...040102 NS-20036, NK-T6
C20-0800-16L	7.87~8.12	16.00	
C20-0900-18L	8.87~9.12	18.00	CC...060204 Screw: NS-25045 Key: NK-T7
C20-1000-25L	9.87~10.12	25.00	
C20-1025-25L	10.12~10.37	25.00	
C20-1050-26L	10.37~10.62	26.25	
C20-1075-26L	10.62~10.87	26.25	
C20-1100-27L	10.87~11.12	27.50	
C20-1125-27L	11.12~11.37	27.50	
C20-1150-28L	11.37~11.62	28.75	
C20-1175-28L	11.62~11.87	28.75	
C20-1200-30L	11.87~12.12	30.00	
C20-1225-30L	12.12~12.37	30.00	
C20-1250-31L	12.37~12.62	31.25	
C20-1275-31L	12.62~12.87	31.25	
C20-1300-32L	12.87~13.12	32.50	
C20-1325-32L	13.12~13.37	32.50	
C20-1350-33L	13.37~13.62	33.75	
C20-1375-33L	13.62~13.87	33.75	
C20-1400-35L	13.87~14.12	35.00	
C20-1425-35L	14.12~14.37	35.00	
C20-1450-36L	14.37~14.62	36.25	
C20-1475-36L	14.62~14.87	36.25	
C20-1500-37L	14.87~15.12	37.50	
C20-1525-37L	15.12~15.37	37.50	
C20-1550-38L	15.37~15.62	38.75	
C20-1575-38L	15.62~15.87	38.75	
C20-1600-40L	15.87~16.12	40.00	CC...060204 Screw: NS-25060 Key: NK-T7
C20-1625-40L	16.12~16.37	40.00	
C20-1650-41L	16.37~16.62	41.25	
C20-1675-41L	16.62~16.87	41.25	
C20-1700-42L	16.87~17.12	42.50	

Part No.	ØD	L1	Insert
C20-1725-42L	17.12~17.37	42.50	CC...060204 Screw: NS-25060 Key: NK-T7
C20-1750-43L	17.37~17.62	43.75	
C20-1775-43L	17.62~17.87	43.75	
C20-1800-45L	17.87~18.12	45.00	
C20-1825-45L	18.12~18.37	45.00	
C20-1850-46L	18.37~18.62	46.25	
C20-1875-46L	18.62~18.87	46.25	
C20-1900-47L	18.87~19.12	47.50	
C20-1925-47L	19.12~19.37	47.50	
C20-1950-48L	19.37~19.62	48.75	
C20-1975-48L	19.62~19.87	48.75	
C20-2000-50L	19.87~20.12	50.00	
C20-2025-50L	20.12~20.37	50.00	
C20-2050-50L	20.37~20.62	50.00	
C20-2075-50L	20.62~20.87	50.00	
C20-2100-50L	20.87~21.12	50.00	
C20-2125-50L	21.12~21.37	50.00	
C20-2150-50L	21.37~21.62	50.00	
C20-2175-50L	21.62~21.87	50.00	
C20-2200-50L	21.87~22.12	50.00	
C20-2225-50L	22.12~22.37	50.00	
C20-2250-50L	22.37~22.62	50.00	
C20-2275-50L	22.62~22.87	50.00	
C20-2300-50L	22.87~23.12	50.00	
C20-2325-50L	23.12~23.37	50.00	
C20-2350-50L	23.37~23.62	50.00	
C20-2375-50L	23.62~23.87	50.00	
C20-2400-50L	23.87~24.12	50.00	
C20-2425-50L	24.12~24.37	50.00	
C20-2450-50L	24.37~24.62	50.00	
C20-2475-50L	24.62~24.87	50.00	
C20-2500-50L	24.87~25.12	50.00	
C20-2525-50L	25.12~25.37	50.00	
C20-2550-50L	25.37~25.62	50.00	

Boring Bar Ø26~Ø39mm

- Alloy Steel Shank
- Boring Depth : L1, 2~3xD

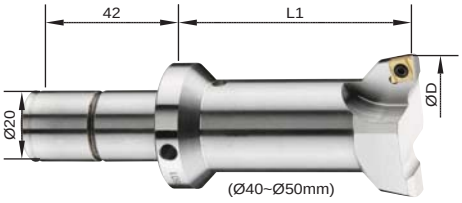


* H type with internal coolant can be ordered on request.
Ordering example: C20-3600-70LH.

Part No.	ØD	L1	Insert
C20-2600-50L	25.87~26.12	50.00	CC...060204 Screw: NS-25060 Key: NK-T7
C20-2700-50L	26.87~27.12	50.00	
C20-2800-50L	27.87~28.12	50.00	
C20-2900-50L	28.87~29.12	50.00	
C20-3000-50L	29.87~30.12	50.00	
C20-3100-70L	30.87~31.12	70.00	
C20-3200-70L	31.87~32.12	70.00	
C20-3300-70L	32.87~33.12	70.00	
C20-3400-70L	33.87~34.12	70.00	
C20-3500-70L	34.87~35.12	70.00	
C20-3600-70L	35.87~36.12	70.00	
C20-3700-70L	36.87~37.12	70.00	
C20-3800-70L	37.87~38.12	70.00	
C20-3900-70L	38.87~39.12	70.00	

Boring Bar Ø40~Ø50mm

- Alloy Steel Shank
- Boring Depth : L1, 2~3xD



* H type with internal coolant can be ordered on request.
Ordering example: C20-4700-70LH.

Part No.	ØD	L1	Insert
C20-4000-70L	39.87-40.12	70.00	CC...060204 Screw: NS-25060 Key: NK-T7
C20-4100-70L	40.87-41.12	70.00	
C20-4200-70L	41.87-42.12	70.00	
C20-4300-70L	42.87-43.12	70.00	
C20-4400-70L	43.87-44.12	70.00	
C20-4500-70L	44.87-45.12	70.00	
C20-4600-70L	45.87-46.12	70.00	
C20-4700-70L	46.87-47.12	70.00	
C20-4800-70L	47.87-48.12	70.00	
C20-4900-70L	48.87-49.12	70.00	
C20-5000-70L	49.87-50.12	70.00	

99151 Deep hole boring 4~6XD

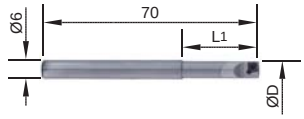
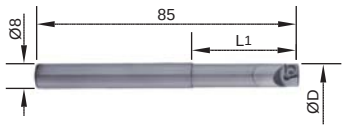
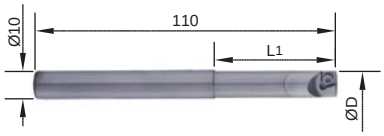
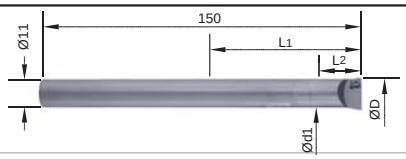
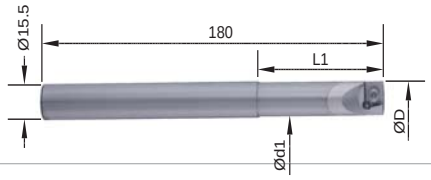
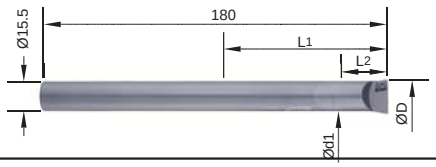
Adapter

- Economical solution of small dia. boring bar.

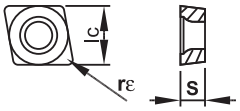
Part No.	ØD	L
C20-ID04	4	49
C20-ID06	6	52
C20-ID08	8	49
C20-ID10	10	42
C20-ID11	11	21.5
C20-ID15.5	15.5	21.5

Boring Bar Ø4.87~Ø20.12

- Solid Carbide Shank
- Boring Depth : L1, 4~6xD

Part No.	ØD	Ød	Ød1	L1	L2	L	Insert	Fig.
C06-0500-20L	4.87~5.12	6	-	20.00	-	70	CC...030102 Screw: NS-16030 Key:NK-T6	
C06-0525-20L	5.12~5.37	6	-	20.00	-	70		
C06-0550-22L	5.37~5.62	6	-	22.00	-	70		
C06-0575-22L	5.62~5.87	6	-	22.00	-	70		
C06-0600-24L	5.87~6.12	6	-	24.00	-	70		
C06-0625-24L	6.12~6.37	6	-	24.00	-	70		
C06-0650-26L	6.37~6.62	6	-	26.00	-	70		
C06-0675-26L	6.62~6.87	6	-	26.00	-	70		
C08-0700-28L	6.87~7.12	8	-	28.00	-	85	CC...040102 Screw: NS-20036 Key:NK-T6	
C08-0725-28L	7.12~7.37	8	-	28.00	-	85		
C08-0750-30L	7.37~7.62	8	-	30.00	-	85		
C08-0775-30L	7.62~7.87	8	-	30.00	-	85		
C08-0800-32L	7.87~8.12	8	-	32.00	-	85		
C08-0825-32L	8.12~8.37	8	-	32.00	-	85		
C08-0850-34L	8.37~8.62	8	-	34.00	-	85		
C08-0875-34L	8.62~8.87	8	-	34.00	-	85		
C10-0900-36L	8.87~9.12	10	-	36.00	-	110	CC...060204 Screw: NS-25045 Key:NK-T7	
C10-0925-36L	9.12~9.37	10	-	36.00	-	110		
C10-0950-38L	9.37~9.62	10	-	38.00	-	110		
C10-0975-38L	9.62~9.87	10	-	38.00	-	110		
C10-1000-40L	9.87~10.12	10	-	40.00	-	110		
C10-1025-40L	10.12~10.37	10	-	40.00	-	110		
C10-1050-42L	10.37~10.62	10	-	42.00	-	110		
C10-1075-42L	10.62~10.87	10	-	42.00	-	110		
C10-1100-44L	10.87~11.12	10	-	44.00	-	110		
C11-1200-150L	11.87~12.12	11	11	70.00	20	150	CC...060204 Screw: NS-25045 Key:NK-T7	
C11-1300-150L	12.87~13.12	11	-	70.00	-	150		
C11-1400-150L	13.87~14.12	11	-	70.00	-	150		
C15.5-1500-180L	14.87~15.12	15.5	14	90.00	90	180		
C15.5-1600-180L	15.87~16.12	15.5	15	90.00	90	180	CC...060204 Screw: NS-25060 Key:NK-T7	
C15.5-1700-180L	16.87~17.12	15.5	-	100.00	-	180		
C15.5-1800-180L	17.87~18.12	15.5	-	100.00	-	180		
C15.5-1900-180L	18.87~19.12	15.5	-	100.00	-	180		
C15.5-2000-180L	19.87~20.12	15.5	-	100.00	-	180		

Precisely Ground Inserts

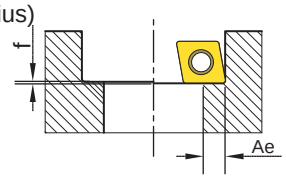
Inserts		Description	CCGT 030102	CCGT 040102	CCGW 040102	CCGH 0602U	CCFT 060204	CCFW 060204	CCFT 060204HP	CCMW 060204
NC30		K20F, TiAlN coated, universal grade for casting iron, carbon steel, alloy steel, stainless steel.	•	•						
DM		PCD brazed, a polished and honed cutting edge for fine surface finished and longer tool life.			•					•
NC2032		K20F, AlTiN coated, for high speed cutting of casting iron.						•		
NC2033		K20F, TiAlN coated, good for carbon steel, alloy steel, stainless steel.					•			
NC9031		K20F, TiN coated, good for Al, Al-alloy, Copper and non ferrous metal.							•	
NC9036		K20F, DLC coated, long tool life. Good for Al, Al-alloy, Copper and non ferrous metal.	•	•			•			
U-NC9036		K20F, DLC coated. It's a super finishing insert with large corner radius for high feed rate for cutting Al, Al-alloy and non-ferrous metal.				•				
Dimension		lc	3.5	4.3	4.3	6.35	6.35	6.35	6.35	6.35
		S	1.4	1.8	1.8	2.38	2.38	2.38	2.38	2.38
		rε	0.2	0.2	0.2	-	0.4	0.4	0.4	0.4

Cutting Data

• Note: Super fine finishing insert U-NC9036 and DM with special specified cutting width 0.006inch. (Radius)

Formulas of spindle speed and feed rate :

(see table below)



inch r.p.m.= $\frac{\text{SFM x 3.82}}{\text{D}}$ IPM= r.p.m. x IPR

Material	Cutting conditions or surface finishes	Grade of insert		Ae Max inch	SFM	IPR (inch/rev.)
Carbon Steel	Regular cutting	NC2033		.020	394 ~ 656	.002 ~ .004
	Interrupted cutting	NC30		.012	328 ~ 459	.002 ~ .003
Alloy Steel	Regular cutting	NC2033		.020	328 ~ 459	.002 ~ .004
	Interrupted cutting	NC30		.012	262 ~ 394	.002 ~ .003
Stainless Steel	Regular cutting	NC2033		.020	262 ~ 394	.002 ~ .004
	Interrupted cutting	NC30		.012	230 ~ 328	.002 ~ .004
Cast Iron	Regular cutting	NC2032	NC30	.020	262 ~ 394	.002 ~ .004
Brass, Bronze and Al-alloy Si >6%	Regular cutting	NC9036	NC9031	.020	492 ~ 984	.002 ~ .004
	Super mirror finish	U-NC9036		.006	492 ~ 984	.006 ~ .010
Al, Al-alloy, non-ferrous metal	Regular cutting	NC9036	NC9031	.020	492 ~ 984	.002 ~ .004
	Super finished	DM		.012	1640 ~ 6560	.002 ~ .004
	Super mirror finish	U-NC9036		.006	492 ~ 984	.006 ~ .010
Hardened Steel< 50 HRC	Regular cutting	NC30		.012	262 ~ 394	.002 ~ .003

Notes

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