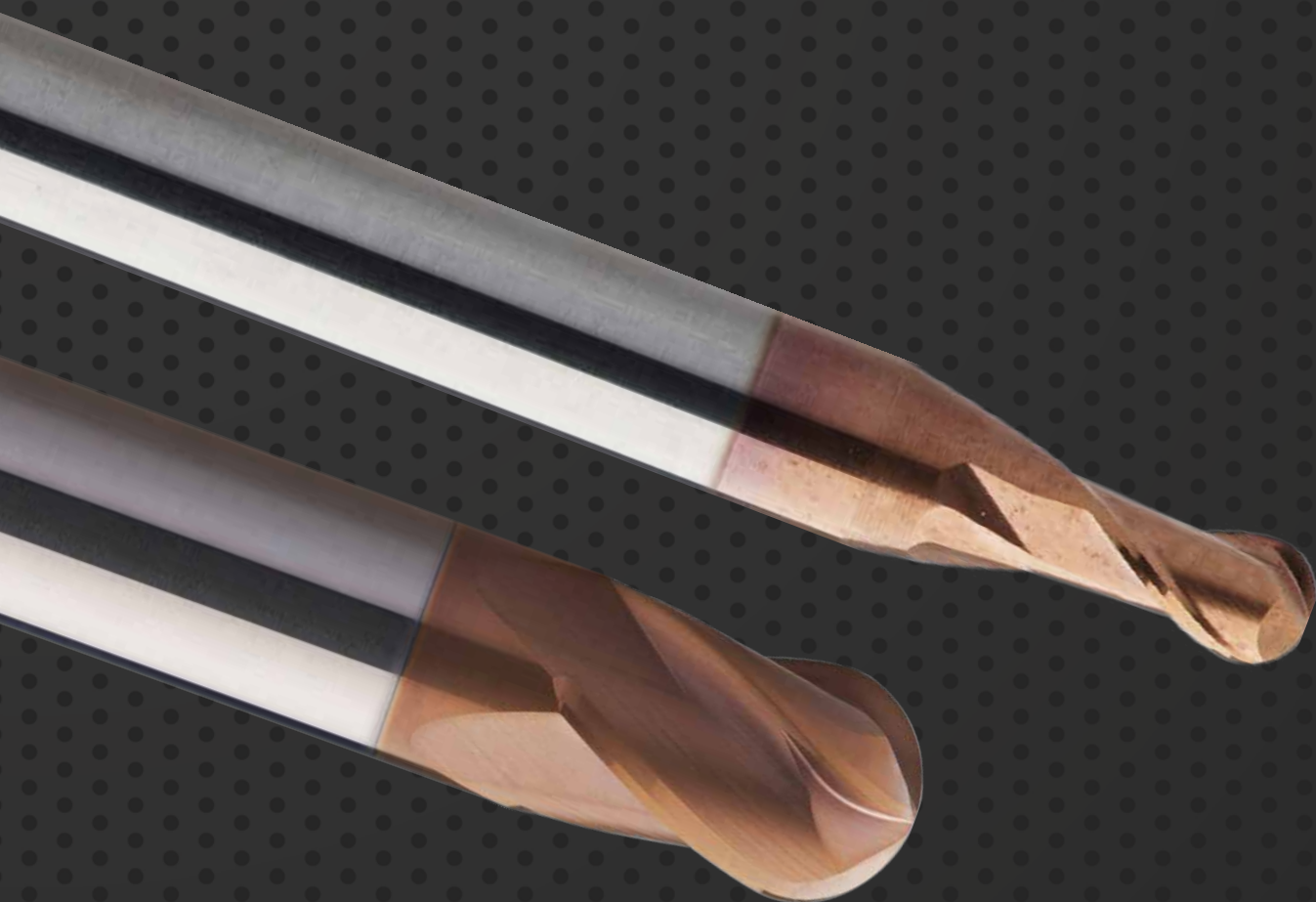




BALLNOSE

BN 60

For general machining

For material application between 53 HRC to 68 HRC

Index - BN 60, For 53 - 68 HRC

 Suitable for Material Groups
  Adapté pour les matériaux
  适用于材料
 Geeignet für die Materialgruppen
  Adatto per il materiale

H

EDP Number	Type	No. Z	Helix Angle	Coating	Performance	Page Number
A1L 	BN 60	4	30°	B0909	G	400
A71 	BN 60 Long	2	30°	B0909	G	401
A72 	BN 60 Long, Recess	2	30°	B0909	G	401
A73 	BN 60 Extra-Long	2	30°	B0909	G	402
A74 	BN 60 Extra-Long, Recess	2	30°	B0909	G	402
A75 	BN 60 Miniature	2	30°	B0909	G	403
A77 	BN 60 Taper Neck	2	30°	B0909	G	404

G - General P - Performance

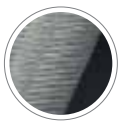
FEATURES & BENEFITS

BN 60



Top View

1 Eccentric Grinding



Optimum eccentric grinding in order to avoid rubbing, while maintaining maximum cutting tool strength.

2 Cutting Edge Preparation



- Enhances tool life
- Less material adhere on the cutting edge for stable machining
- Improves wear resistance and reduces excessive friction

3 Superior Coating to Reduce Friction

- Increases hardness and higher abrasive wear resistance
- Higher thermal resistance
- Smoother chips evacuation

4 Suitable for Material Group

H





1. Exzentrischer Schliff
Optimaler exzentrischer Schliff zur Reduzierung der Reibung unter Beibehaltung der maximalen Schneidenstabilität
2. Schneidkantenbehandlung
Verbessert die Werkzeuglebensdauer
Weniger Materialanhaftungen an der Schneide Für stabile Bearbeitung
3. Ausgezeichnete Beschichtung zur Verringerung der Reibung
Erhöht die Härte und und bietet bessere Verschleißfestigkeit
Höhere Temperaturbeständigkeit
Glatte Oberfläche für besseren Spänefluß
4. Positiver Spanwinkel
Geeignet für die Materialgruppen H



1. 偏心研磨
最佳偏心研磨,可避免摩擦,同时保持最大切削刀具强度。
2. 切削刃设置提高刀具寿命
提高刀具寿命。
较少的材料粘在切削刃上。
用于稳定加工。
3. 优异的涂层,减少摩擦
增加硬度,提高材料耐磨性。
更高的抗热性。
更顺畅的排屑。
4. 正前角
适用于材料 H。



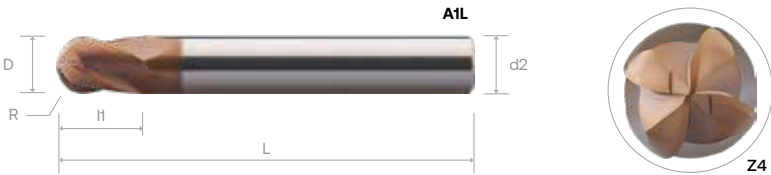
1. Levigatura orbitale
Levigatura orbitale ottimale per evitare sfregatura, garantendo la massima resistenza dello strumento di taglio.
2. Preparazione dell'angolo di taglio
Migliora la durata dello strumento
Meno materiale che aderisce sull'angolo di taglio
Per una lavorazione stabile
3. Rivestimento superiore per ridurre la frizione
Aumenta la durezza e una maggiore resistenza all'usura abrasiva
Resistenza termica superiore
Evacuazione dei trucioli più semplice
4. Angolo di taglio positivo
Adatto per il materiale H



1. Meulage excentrique
Meulage optimal diminuant le coefficient de friction tout en maintenant une bonne acuité de l'arête de coupe
2. Préparation des arêtes de coupes
Améliore la durée de vie de l'outil
Moins de matériau adhère à l'arête tranchante
Pour un usinage stable
3. Revêtement supérieur pour réduire la friction
Augmente la dureté et la résistance à l'abrasion
Résistance thermique supérieure
Évacuation des copeaux plus fluide
4. Angle de coupe positif
Adapté pour les matériaux H

BN 60 BALLNOSE CUTTERS, 4 FLUTES

-  VHM BN 60 Standard Radiusschafffräser, 4 Zähne
-  Frese sferiche BN 60 Standard, 4 taglienti
-  Fraises BN 60 Standard, à bout hémisphérique, 4 dents
-  整体硬质合金 BN 60 系列 球头 立铣刀 4 刃 - 标准长度



Order Number	Dimension (mm)						B0909
	D	R	I 1	I 2	L	d2 (h6)	
A1L 0300	3	1.5	5		40	3	°
A1L 0300 050 06			5		50	6	°
A1L 0400	4	2	8		50	4	°
A1L 0400 050 06			8		50	6	°
A1L 0500	5	2.5	9		50	5	°
A1L 0500 050 06			9		50	6	•
A1L 0600 050	6	3	10		50	6	•
A1L 0600 060			10		60	6	•
A1L 0800	8	4	12		64	8	°
A1L 1000	10	5	14		70	10	°
A1L 1200	12	6	16		75	12	•
A1L 1400	14	7	32		90	14	°
A1L 1600	16	8	32		90	16	°
A1L 1800	18	9	38		100	18	°
A1L 2000	20	10	38		100	20	°
A1L 2200	22	11	40		100	22	°
A1L 2500	25	12.5	40		100	25	°

- BN 30
- BN 45
- BN 60
- BN 60X
- DM70 - BN 70
- BN GR

Material Group | Material-Gruppe | Groupe Matiere | Gruppo Materiali | 材质主类

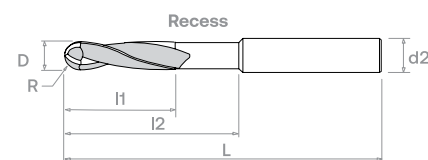
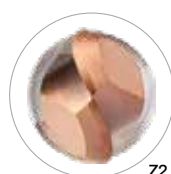
N01N02N03K01K02P01P02P03M01M02S01S02S03H01H02O01O02

405

Cutting Parameter

BN 60 LONG BALLNOSE CUTTERS / WITH RECESS, 2 FLUTES

- VHM BN 60 Radiusschaftfräser, lang, 2 Zähne
 Frese sferiche lunghe BN 60 lunghe, 2 taglienti
 Fraises BN 60 longues, à bout hémisphérique, 2 dents
 整体硬质合金BN60 系列 2刃长型球头铣刀



Order Number	Dimension (mm)						B0909	Order Number	Dimension (mm)						B0909
	D	R	I1	I2	L	d2 (h6)			D	R	I1	I2	L	d2 (h6)	
A71 0100 04	1	0.5	3		75	4	•	A72 0100 04	1	0.5	3	7	75	4	◦
A71 0100 075 06					75	6	•	A72 0100 075 06				7	75	6	•
A71 0150 04	1.5	0.75			75	4	•	A72 0150 04	1.5	0.75		10	75	4	•
A71 0150 075 06					75	6	•	A72 0150 075 06				10	75	6	•
A71 0200 04	2	1	4		75	4	•	A72 0200 04	2	1	4	14	75	4	•
A71 0200 075 06					75	6	•	A72 0200 075 06				14	75	6	•
A71 0250 04	2.5	1.25			75	4	•	A72 0250 04	2.5	1.25		18	75	4	◦
A71 0250 075 06					75	6	•	A72 0250 075 06				18	75	6	•
A71 0300	3	1.5	5		60	3	•	A72 0300	3	1.5	5	21	60	3	•
A71 0300 075 06					75	6	•	A72 0300 075 06				21	75	6	•
A71 0400	4	2	8		60	4	•	A72 0400	4	2	8	28	60	4	•
A71 0400 075 06					75	6	•	A72 0400 075 06				28	75	6	•
A71 0500	5	2.5	9		60	5	•	A72 0500	5	2.5	9	32	60	5	◦
A71 0500 075 06					75	6	•	A72 0500 075 06				32	75	6	•
A71 0600	6	3	10		75	6	•	A72 0600	6	3	10	40	75	6	•
A71 0800	8	4	12		75	8	•	A72 0800	8	4	12	40	75	8	•
A71 1000 075	10	5	14		75	10	•	A72 1000 075	10	5	14	40	75	10	•
A71 1000 100					100	10	•	A72 1000 100				60	100	10	•
A71 1200	12	6	16		100	12	•	A72 1200	12	6	16	60	100	12	•
A71 1400	14	7	32		125	14	•	A72 1400	14	7	32	80	125	14	◦
A71 1600	16	8			125	16	•	A72 1600	16	8		80	125	16	•
A71 1800	18	9	38		125	18	•	A72 1800	18	9	38	80	125	18	◦
A71 2000	20	10			125	20	•	A72 2000	20	10		80	125	20	•

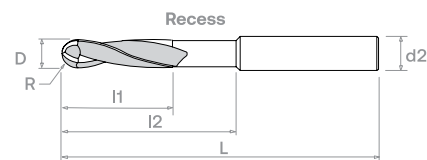
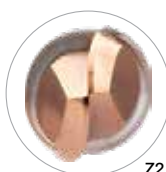
Material Group | Material-Gruppe | Groupe Matière | Gruppo Materiali | 材质主类

Cutting Parameter

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O01	O02	406
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BN 60 EXTRA-LONG BALLNOSE CUTTERS / WITH RECESS, 2 FLUTES

-  VHM BN 60 Radiusschaftfräser, extra-lang, 2 Zähne
 Frese sferiche extra-lunghe BN 60, 2 taglienti
 Fraises BN 60 extra-longues, à bout hémisphérique, 2 dents
 整体硬质合金BN60 系列 2刃加长型球头铣刀



Order Number	Dimension (mm)						B0909	Order Number	Dimension (mm)						B0909
	D	R	I1	I2	L	d2(h6)			D	R	I1	I2	L	d2(h6)	
A73 0100 04	1	0.5	3		100	4	◦	A74 0100 04	1	0.5	3	10	100	4	◦
A73 0100 100 06					100	6	•	A74 0100 100 06					10	100	6
A73 0150 04	1.5	0.75	3		100	4	◦	A74 0150 04	1.5	0.75	3	15	100	4	◦
A73 0150 100 06					100	6	◦	A74 0150 100 06					15	100	6
A73 0200 04	2	1	4		100	4	•	A74 0200 04	2	1	4	20	100	4	•
A73 0200 100 06					100	6	•	A74 0200 100 06					20	100	6
A73 0250 04	2.5	1.25	4		100	4	◦	A74 0250 04	2.5	1.25	4	25	100	4	◦
A73 0250 100 06					100	6	◦	A74 0250 100 06					25	100	6
A73 0300 04	3	1.5	5		100	4	◦	A74 0300 04	3	1.5	5	30	100	4	•
A73 0300 100 06					100	6	•	A74 0300 100 06					30	100	6
A73 0400	4	2	8		100	4	•	A74 0400	4	2	8	40	100	4	•
A73 0400 100 06					100	6	•	A74 0400 100 06					40	100	6
A73 0500	5	2.5	9		100	5	•	A74 0500	5	2.5	9	50	100	5	◦
A73 0500 100 06					100	6	◦	A74 0500 100 06					50	100	6
A73 0600 100	6	3	10		100	6	•	A74 0600 100	6	3	10	60	100	6	•
A73 0600 150					150	6	•	A74 0600 150					60	150	6
A73 0800 100	8	4	12		100	8	•	A74 0800 100	8	4	12	60	100	8	•
A73 0800 150					150	8	•	A74 0800 150					80	150	8
A73 1000 125	10	5	14		125	10	•	A74 1000 125	10	5	14	85	125	10	•
A73 1000 150					150	10	•	A74 1000 150					100	150	10
A73 1200 125	12	6	16		125	12	•	A74 1200 125	12	6	16	85	125	12	•
A73 1200 150					150	12	•	A74 1200 150					110	150	12
A73 1400 150	14	7	32		150	14	•	A74 1400 150	14	7	32	110	150	14	•
A73 1400 200					200	14	•	A74 1400 200					150	200	14
A73 1600 150	16	8	32		150	16	•	A74 1600 150	16	8	32	110	150	16	•
A73 1600 200					200	16	•	A74 1600 200					150	200	16
A73 1800 150	18	9	38		150	18	◦	A74 1800 150	18	9	38	110	150	18	◦
A73 1800 200					200	18	◦	A74 1800 200					150	200	18
A73 2000 150	20	10	38		150	20	◦	A74 2000 150	20	10	38	110	150	20	◦
A73 2000 200					200	20	◦	A74 2000 200					150	200	20

Material Group | Material-Gruppe | Groupe Matière | Gruppo Materiali | 材质主类

Cutting Parameter

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O01	O02
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BN 60 MINIATURE BALLNOSE CUTTERS, 2 FLUTES

- 

VHM BN 60 Radiuskleinstschaftfräser, 2 Zähne
- 

Micro-frese sferiche BN 60, 2 taglienti
- 

Micro-fraises BN 60 à bout hémisphérique, 2 dents
- 

整体硬质合金BN60系列微型球头立铣刀2刀-标准长度



Order Number	Dimension (mm)						B0909
	D	R	l1	l2	L	d2 (h6)	
A75 0020 03	0.2	0.1	0.4		40	3	°
A75 0020 04			0.4		40	4	°
A75 0030 03	0.3	0.15	0.6		40	3	°
A75 0030 04			0.6		40	4	°
A75 0040 03	0.4	0.2	0.8		40	3	°
A75 0040 04			0.8		40	4	°
A75 0050 03	0.5	0.25	1.2		40	3	°
A75 0050 04			1.2		40	4	°
A75 0060 03	0.6	0.3	1.4		40	3	°
A75 0060 04			1.4		40	4	°
A75 0070 03	0.7	0.35	1.6		40	3	°
A75 0070 04			1.6		40	4	°
A75 0080 03	0.8	0.4	1.8		40	3	°
A75 0080 04			1.8		40	4	°
A75 0090 03	0.9	0.45	2		40	3	°
A75 0090 04			2		40	4	°

D mm	Tol. µm
0.1 ~ 0.7	0 / -12
0.7 ~ 4.0	0 / -20

Material Group | Material-Gruppe | Groupe Matiere | Gruppo Materiali | 材质主类

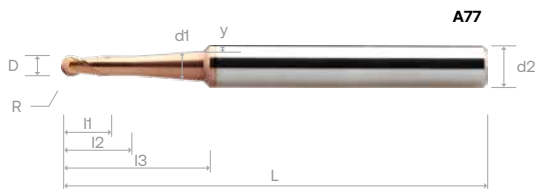
Cutting Parameter

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O01	O02	408
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○ ○

BN 60 TAPER NECK BALANOSE CUTTERS , 2 FLUTES

-  VHM BN 60 Standard Torusfräser, 2 Zähne
 Frese sferiche BN 60, collo conico, 2 taglienti
 Fraises 2 tailles BN 60 col conique, 2dents
 整体硬质合金BN 60 系列 锥颈 立铣刀 2 刃 - 标准长度



Order Number	Dimension (mm)								B0909
	D	R	I1	I2	I3	L	d2 (h6)	y	
A77 0100 020 06 080	1.0	0.5	1.5	4.0	20	60	6	8°	○
A77 0100 040 06 040				4.0	40	75	6	4°	●
A77 0150 020 06 070	1.5	0.8	2.3	7.5	20	60	6	7°	○
A77 0150 040 06 035				7.5	40	75	6	3.5°	○
A77 0200 020 06 067	2.0	1.0	3.0	8.0	20	60	6	6.7°	●
A77 0200 040 06 029				8.0	40	75	6	2.9°	●
A77 0200 040 06 010				8.0	40	75	6	1°	○
A77 0300 020 06 043	3.0	1.5	3.5	10.0	20	60	6	4.3°	●
A77 0300 040 06 022				12.0	40	75	6	2.2°	●
A77 0300 045 06 010				12.0	45	75	6	1°	●
A77 0400 020 06 029	4.0	2.0	4.0	12.0	20	60	6	2.9°	●
A77 0400 040 06 014				20.0	40	75	6	1.4°	○
A77 0400 060 06 010				20.0	60	100	6	1°	○
A77 0500 040 06 007	5.0	2.5	6.0	25.0	40	75	6	0.7°	○
A77 0600 020 06 000				20.0	20	60	6	-	●
A77 0600 040 06 000	6.0	3.0		40.0	40	75	6	-	○
A77 0600 060 08 010				25.0	60	100	8	1°	●
A77 0600 080 08 010				25.0	80	125	8	1°	○
A77 0800 025 08 000	8.0	4.0	7.0	25.0	25	64	8	-	○
A77 0800 060 08 000				60.0	60	100	8	-	●
A77 0800 075 10 008				30.0	75	125	10	0.8°	○
A77 0800 105 10 006				20.0	105	150	10	0.6°	○
A77 1000 030 10 000				30.0	30	75	10	-	○
A77 1000 075 10 000	10.0	5.0	8.0	75.0	75	125	10	-	○
A77 1000 070 12 008				30.0	70	125	12	0.8°	○
A77 1200 035 12 000	12.0	6.0	10.0	35.0	35	100	12	-	○
A77 1200 070 12 000				70.0	70	125	12	-	○
A77 1200 090 16 013				35.0	90	150	16	1.3°	○

Material Group | Material-Gruppe | Groupe Matiere | Gruppo Materiali | 材质主类

Cutting Parameter

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O01	O02
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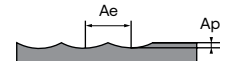
408

Note: These recommended cutting data indicators are just for reference. They should be adjusted according to the different cutting condition



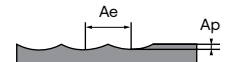
H

BN 60 Ballnose Cutters, 4 Flutes - A1L



Roughing	H			
Working Material	Hardened steel		Hardened steel	
Properties	45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.10 × D		0.08 × D	
Cutting Width, ae	0.30 × D		0.24 × D	
D	Vc	Fz	Vc	Fz
3	130	0.022	110	0.018
4		0.031		0.025
5		0.039		0.032
6		0.048		0.039
8		0.069		0.053
10		0.091		0.070
12		0.113		0.088
14		0.127		0.098
16		0.139		0.109
18		0.147		0.120
20		0.157		0.130
22		0.168		0.141
25		0.176		0.154

BN 60 Ballnose Cutters, 4 Flutes - A1L

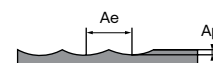


Finishing	H			
Working Material	Hardened steel		Hardened steel	
Properties	45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.05 × D		0.05 × D	
Cutting Width, ae	0.02 × D		0.02 × D	
D	Vc	Fz	Vc	Fz
3	150	0.018	135	0.015
4		0.025		0.020
5		0.031		0.026
6		0.038		0.031
8		0.055		0.043
10		0.073		0.056
12		0.091		0.071
14		0.102		0.078
16		0.111		0.087
18		0.118		0.096
20		0.125		0.104
22		0.134		0.113
25		0.141		0.123

Note: These recommended cutting data indicators are just for reference. They should be adjusted according to the different cutting condition

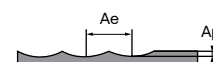


BN 60 Long Ballnose Cutters, 2 Flutes - A71, A72



Roughing	H			
Working Material	Hardened steel		Hardened steel	
Properties	45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.10 × D		0.08 × D	
Cutting Width, ae	0.30 × D		0.24 × D	
D	Vc	Fz	Vc	Fz
1	120	0.009	100	0.006
2		0.020		0.013
3		0.032		0.021
4		0.044		0.030
5		0.054		0.040
6		0.068		0.051
8		0.092		0.070
10		0.122		0.091
12		0.150		0.116
14		0.170		0.128
16		0.188		0.135
18		0.204		0.144
20		0.220		0.155

BN 60 Long Ballnose Cutters, 2 Flutes - A71, A72



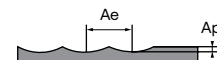
Finishing	H			
Working Material	Hardened steel		Hardened steel	
Properties	45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.05 × D		0.05 × D	
Cutting Width, ae	0.02 × D		0.02 × D	
D	Vc	Fz	Vc	Fz
1	140	0.006	120	0.004
2		0.013		0.009
3		0.020		0.015
4		0.030		0.022
5		0.040		0.030
6		0.051		0.038
8		0.072		0.055
10		0.095		0.071
12		0.118		0.090
14		0.132		0.100
16		0.148		0.109
18		0.162		0.116
20		0.172		0.121

Note: These recommended cutting data indicators are just for reference. They should be adjusted according to the different cutting condition



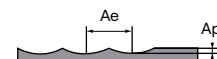
H

BN 60 Extra Long Ballnose Cutters, 2 Flutes - A73, A74



Roughing	H			
Working Material	Hardened steel		Hardened steel	
Properties	45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.10 × D		0.08 × D	
Cutting Width, ae	0.30 × D		0.24 × D	
D	Vc	Fz	Vc	Fz
1	100	0.008	80	0.005
2		0.018		0.012
3		0.029		0.019
4		0.040		0.027
5		0.049		0.036
6		0.061		0.046
8		0.083		0.063
10		0.110		0.082
12		0.135		0.104
14		0.153		0.115
16		0.169		0.122
18		0.184		0.130
20		0.198		0.140

BN 60 Extra Long Ballnose Cutters, 2 Flutes - A73, A74

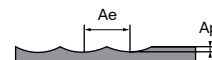


Finishing	H			
Working Material	Hardened steel		Hardened steel	
Properties	45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.05 × D		0.05 × D	
Cutting Width, ae	0.02 × D		0.02 × D	
D	Vc	Fz	Vc	Fz
1	120	0.005	100	0.004
2		0.012		0.008
3		0.018		0.014
4		0.027		0.020
5		0.036		0.027
6		0.046		0.034
8		0.065		0.050
10		0.086		0.064
12		0.106		0.081
14		0.119		0.090
16		0.133		0.098
18		0.146		0.104
20		0.155		0.109

Note: These recommended cutting data indicators are just for reference. They should be adjusted according to the different cutting condition

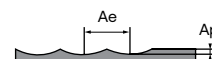


BN 60 Miniature Ballnose Cutters, 2 Flutes - A75



Profiling	H					
Working Material	Hardened steel			Hardened steel		
Properties	45 ≤ HRC < 52			52 ≤ HRC < 68		
D	Ap	N	Fz	Ap	N	Fz
0.2	0.013	50000	0.003		42000	0.003
0.3	0.014	50000	0.006	0.013	42000	0.004
0.4	0.014	50000	0.006	0.019	33600	0.005
0.5	0.023	50000	0.008	0.021	28000	0.008
0.6	0.041	50000	0.008	0.025	28000	0.010
0.7	0.065	47500	0.009	0.037	28000	0.012
0.8	0.078	43000	0.010	0.048	28000	0.014
0.9	0.088	41000	0.011	0.060	25200	0.018

BN 60 Taper Neck Ballnose Cutters, 2 Flutes - A77



Profiling	H						
Working Material	Hardened steel				Hardened steel		
Properties	45 ≤ HRC < 52				52 ≤ HRC < 68		
D	Effective Length	Ap	N	Fz	Ap	N	Fz
1.0	20	0.048	27000	0.016	0.042	25200	0.015
	40	0.028	24800	0.013	0.022	22300	0.010
1.5	20	0.052	18900	0.024	0.046	17200	0.023
	40	0.032	17300	0.020	0.026	15000	0.016
2.0	20	0.065	14600	0.031	0.059	13230	0.029
	40	0.039	13500	0.028	0.033	11760	0.027
3.0	20	0.078	10100	0.046	0.072	9000	0.044
	40	0.052	9600	0.040	0.046	8500	0.038
	45	0.042	9200	0.035	0.036	8400	0.032
4.0	20	0.085	8630	0.055	0.080	6900	0.058
	40	0.065	7760	0.050	0.060	6700	0.049
	60	0.060	6900	0.040	0.060	6440	0.038
5.0	40	0.075	6350	0.062	0.070	5400	0.062
6.0	20	0.100	5800	0.083	0.095	4700	0.087
	40	0.080	5300	0.075	0.075	4600	0.074
	60	0.070	4800	0.059	0.065	4400	0.058
	80	0.050	4000	0.050	0.045	3600	0.045
8.0	25	0.120	4360	0.112	0.110	3650	0.114
	60	0.080	3700	0.078	0.070	3400	0.077
	75	0.060	3200	0.065	0.050	2800	0.061
	105	0.040	2500	0.062	0.035	2000	0.058
10.0	30	0.130	3600	0.137	0.120	3000	0.140
	70	0.080	2700	0.112	0.070	2300	0.082
	75	0.070	2600	0.085	0.060	2200	0.082
12.0	35	0.140	3100	0.164	0.130	2600	0.164
	70	0.100	2400	0.132	0.090	2000	0.122
	90	0.070	1850	0.130	0.060	1500	0.105