



BALLNOSE

BN 60X

Designed to bring you premium features and benefits
For material application between 40 HRC to 60 HRC

Index - BN 60X, For 40 - 60 HRC

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

P
H

EDP Number	Type	No. Z	Helix Angle	Coating	Performance	Page Number
A4Q 	BN 60X	2	30°	B0909	P	413
A4R 	BN 60X	2	30°	B0909	P	413
A4S 	BN 60X Miniature Long Neck	2	30°	B0909	P	414

G - General P - Performance

FEATURES & BENEFITS

BN 60X



Top View

1 Radius Tolerance

BN60X Radius Tolerance

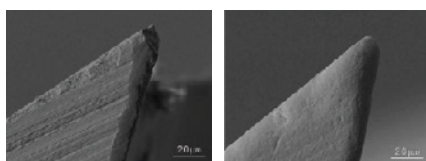
Diameter	Radius Tolerance
$\varnothing \leq 6$	+0.000 -0.012
$\varnothing > 6$	+0.000 -0.020

2 Enhanced Geometry Design

- Improves finishing application
- Enhances tool stability and rigidity

3 Unique Cutting Edge Treatment

- Reduces tool chipping
- Prolongs tool life



Before

After

4 Suitable to machine material from 40 to 68 HRC for

- Profiling application.
- Semi finishing application.
- Finishing application.

5 Suitable for Materials



End face view - Different grinding method



BN60X
Ballnose



HPMT Standard
Ballnose





1. Radiustoleranz
BN60X Radiustoleranz
2. Verbesserte Werkzeuggeometrie
Verbessert die Werkzeugstabilität und -steifigkeit
Verbessert die Schlichtfräsanwendung
3. Einzigartige Behandlung der Schneidkanten
Reduziert das Absplittern des Werkzeugs
Verlängert die Werkzeuglebensdauer
4. Geeignet Für Materialhärte von 40 bis 60 HRC an:
Profilfräsanwendung
Vorschlichtfräsanwendung
Schlichtfräsanwendung
5. Geeignet für die Materialgruppen P, H



1. 圆弧公差
BN60X。
2. 增强刀具几何设计
增强刀具稳定性和刚性。
提高精加工。
3. 特殊切削刃设置
减少刀具磨损。
提高刀具寿命。
4. 适用于 40 至 68 HRC 洛氏硬度加工材料
仿形铣削。
半加工。
精加工。
5. 适用于材料 P, H



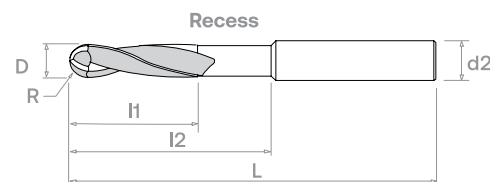
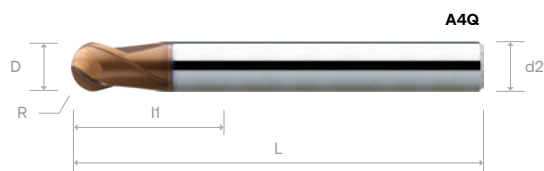
1. Tolleranza del raggio
Tolleranza raggio BN60X
2. Design geometrico migliorato
Migliora l'applicazione di finitura
Migliora la stabilità e la rigidità dell'utensile
3. Trattamento all'avanguardia unico nel suo genere
Riduce la scheggiatura degli utensili
Prolunga la vita dell'utensile
4. Adatto a lavorare materiai da 40 a 60 HRC per
Applicazione di profilatura
Applicazione di semifinitura
Applicazione di finitura
5. Adatto per materiali P, H



1. Tolerance du Rayon
BN60X Radius Tolerance
2. Conception de la Géométrie Améliorée
Améliore la rigidité et la stabilité de l'outil
Améliore l'application de finition
3. Préparation Unique de L'arête de Coupe
Réduit l'écaillage des outils
Prolonge la durée de vie de l'outil
4. Convient pour L'usinage des Matières de 40 À 60 HRC
Application de copiage
Application de semi finition
Application de finition
5. Adapté aux matériaux P, H

BN 60X BALLNOSE CUTTERS / WITH RECESS, 2 FLUTES

-  VHM BN 60X Standard Radiusschaftfräser, 2 Zähne
-  Frese sferiche BN 60X, 2 taglienti
-  Fraises BN 60X Standard, à bout hémisphérique, 2 dents
-  整体硬质合金 BN 60X 系列 2 刀球头铣刀



Order Number	Dimension (mm)						B0909
	D	R	I1	I2	L	d2 (h6)	
A4Q 0050	0.5	0.25	0.5		50	4	◦
A4Q 0060	0.6	0.3	0.6		50	4	•
A4Q 0080	0.8	0.4	0.8		50	4	•
A4Q 0100	1	0.5	1		50	4	•
A4Q 0150	1.5	0.75	1.5		50	4	•
A4Q 0200	2	1	2		50	4	•
A4Q 0250	2.5	1.25	2.5		50	4	•
A4Q 0300 050 04	3	1.5	3		50	4	◦
A4Q 0300 050 06					50	6	•
A4Q 0400 050 06	4	2	4		50	6	•
A4Q 0500 050 06	5	2.5	5		50	6	•
A4Q 0600 050	6	3	6		50	6	•
A4Q 0600 060					60	6	•
A4Q 0800	8	4	8		64	8	•
A4Q 1000	10	5	10		70	10	•
A4Q 1200	12	6	12		75	12	•
A4Q 1600	16	8	16		90	16	•
A4Q 1800	18	9	18		100	18	◦
A4Q 2000	20	10	20		100	20	◦

Order Number	Dimension (mm)						B0909	
	D	R	I1	I2	L	d2 (h6)		
A4R 0050	0.5	0.25	0.5		50	4		
A4R 0060	0.6	0.3	0.6		50	4		
A4R 0080	0.8	0.4	0.8		50	4		
A4R 0100	1	0.5	1	4	50	4	◦	
A4R 0150	1.5	0.75	1.5	6	50	4	◦	
A4R 0200	2	1	2	8	50	4	•	
A4R 0250	2.5	1.25	2.5	10	50	4	◦	
A4R 0300 050 04	3	1.5	3		14	50	4	◦
A4R 0300 050 06					14	50	6	•
A4R 0400 050 06	4	2	4	20	50	6	•	
A4R 0500 050 06	5	2.5	5	20	50	6	◦	
A4R 0600 050	6	3	6		20	50	6	◦
A4R 0600 060					30	60	6	•
A4R 0800	8	4	8	30	64	8	•	
A4R 1000	10	5	10	32	70	10	◦	
A4R 1200	12	6	12	38	75	12	◦	
A4R 1600	16	8	16	46	90	16	◦	
A4R 1800	18	9	18	53	100	18	◦	
A4R 2000	20	10	20	58	100	20	◦	

Diameter (mm)	Radius Tolerance
$R \leq 2.5$	± 0.005
$2.5 \leq R \leq 6$	± 0.010
$6 < R$	± 0.015

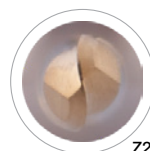
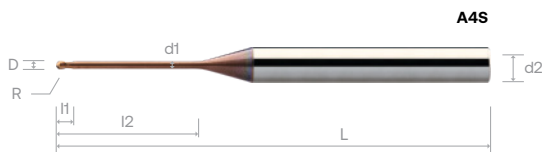
Material Group | Material-Gruppe | Groupe Matiere | Gruppo Materiali | 材质主类

Cutting Parameter

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O01	O02	415
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BN 60X MINIATURE BALLNOSE CUTTERS WITH LONG NECK, 2 FLUTES

- 🇩🇪 VHM BN 60 X Kleinstradiusfräser mit langem Hals, 2 Zähne
- 🇮🇹 Micro-frese sferiche BN 60X, con collo lungo, 2 taglienti
- 🇫🇷 Micro-fraises BN 60X à bout hémisphérique avec cou long, 2 dents
- 🇨🇳 整体硬质合金 BN 60X 系列 微小径2刃长颈球头铣刀



Order Number	Dimension (mm)							B0909	Order Number	Dimension (mm)							B0909
	D	R	I1	I2	L	d1	d2 (H6)			D	R	I1	I2	L	d1	d2 (H6)	
A4S 0020 050 0400	0.2	0.10	0.15	-	50	-	4	•	A4S 0150 050 0400	1.5	0.75	1.35	-	50	-	4	•
A4S 0020 050 0400 005				0.5	50	0.17	4	•	A4S 0150 050 0400 080				8	50	1.4	4	•
A4S 0020 050 0400 010				1	50	0.17	4	•	A4S 0150 050 0400 120				12	50	1.4	4	•
A4S 0020 050 0400 015	0.3	0.15	0.23	1.5	50	0.17	4	•	A4S 0150 050 0400 160	1.6	0.80	1.44	16	50	1.4	4	•
A4S 0030 050 0400				-	50	-	4	•	A4S 0150 060 0400				-	60	-	4	•
A4S 0030 050 0400 010				1	50	0.27	4	•	A4S 0150 060 0400 180				18	60	1.4	4	•
A4S 0030 050 0400 020	0.4	0.2	0.30	2	50	0.27	4	•	A4S 0160 050 0400	1.8	0.90	1.62	-	50	-	4	•
A4S 0030 050 0400 030				3	50	0.27	4	•	A4S 0160 050 0400 080				8	50	1.5	4	•
A4S 0040 050 0400				-	50	-	4	•	A4S 0160 050 0400 120				12	50	1.5	4	•
A4S 0040 050 0400 010	0.5	0.25	0.35	1	50	0.37	4	•	A4S 0160 050 0400 160	2	1	1.70	16	50	1.5	4	•
A4S 0040 050 0400 020				2	50	0.37	4	•	A4S 0160 060 0400				-	60	-	4	•
A4S 0040 050 0400 030				3	50	0.37	4	•	A4S 0160 060 0400 200				20	60	1.5	4	•
A4S 0040 050 0400 040	0.6	0.30	0.42	4	50	0.37	4	•	A4S 0180 050 0400	3	1.5	2.40	-	50	-	4	•
A4S 0040 050 0400 050				5	50	0.37	4	•	A4S 0180 050 0400 080				8	50	1.7	4	•
A4S 0050 050 0400				-	50	-	4	•	A4S 0180 050 0400 120				12	50	1.7	4	•
A4S 0050 050 0400 020	0.8	0.40	0.48	2	50	0.45	4	•	A4S 0180 050 0400 160	4	2	3.00	16	50	1.7	4	•
A4S 0050 050 0400 030				3	50	0.45	4	•	A4S 0180 060 0400				-	60	-	4	•
A4S 0050 050 0400 040				4	50	0.45	4	•	A4S 0180 060 0400 200				20	60	1.7	4	•
A4S 0050 050 0400 050	1.0	0.50	0.80	5	50	0.45	4	•	A4S 0200 050 0400	3	1.5	2.40	-	50	-	4	•
A4S 0050 050 0400 060				6	50	0.45	4	•	A4S 0200 050 0400 040				4	50	1.9	4	•
A4S 0050 050 0400 080				8	50	0.45	4	•	A4S 0200 050 0400 060				6	50	1.9	4	•
A4S 0060 050 0400	1.2	0.60	1.08	-	50	-	4	•	A4S 0200 050 0400 080	4	2	3.00	8	50	1.9	4	•
A4S 0060 050 0400 020				2	50	0.55	4	•	A4S 0200 050 0400 100				10	50	1.9	4	•
A4S 0060 050 0400 030				3	50	0.55	4	•	A4S 0200 050 0400 120				12	50	1.9	4	•
A4S 0060 050 0400 040	1.4	0.70	1.26	4	50	0.55	4	•	A4S 0200 050 0400 140	4	2	3.00	14	50	1.9	4	•
A4S 0060 050 0400 050				5	50	0.55	4	•	A4S 0200 050 0400 160				16	50	1.9	4	•
A4S 0060 050 0400 060				6	50	0.55	4	•	A4S 0200 060 0400				-	60	-	4	•
A4S 0060 050 0400 080	1.4	0.70	1.26	8	50	0.55	4	•	A4S 0200 060 0400 180	4	2	3.00	18	60	1.9	4	•
A4S 0080 050 0400				-	50	-	4	•	A4S 0200 060 0400 200				20	60	1.9	4	•
A4S 0080 050 0400 020				2	50	0.75	4	•	A4S 0200 060 0400 220				22	60	1.9	4	•
A4S 0080 050 0400 040	1.4	0.70	1.26	4	50	0.75	4	•	A4S 0200 075 0400	4	2	3.00	-	75	-	4	•
A4S 0080 050 0400 050				5	50	0.75	4	•	A4S 0200 075 0400 250				25	75	1.9	4	•
A4S 0080 050 0400 060				6	50	0.75	4	•	A4S 0200 075 0400 300				30	75	1.9	4	•
A4S 0080 050 0400 070	1.4	0.70	1.26	7	50	0.75	4	•	A4S 0300 050 0600	4	2	3.00	-	50	-	6	•
A4S 0080 050 0400 080				8	50	0.75	4	•	A4S 0300 050 0600 080				8	50	2.8	6	•
A4S 0080 050 0400 100				10	50	0.75	4	•	A4S 0300 050 0600 100				10	50	2.8	6	•
A4S 0100 050 0400	1.4	0.70	1.26	-	50	-	4	•	A4S 0300 060 0600	4	2	3.00	-	60	-	6	•
A4S 0100 050 0400 030				3	50	0.9	4	•	A4S 0300 060 0600 160				16	60	2.8	6	•
A4S 0100 050 0400 040				4	50	0.9	4	•	A4S 0300 060 0600 200				20	60	2.8	6	•
A4S 0100 050 0400 050	1.4	0.70	1.26	5	50	0.9	4	•	A4S 0300 075 0600	4	2	3.00	-	75	-	6	•
A4S 0100 050 0400 060				6	50	0.9	4	•	A4S 0300 075 0600 250				25	75	2.8	6	•
A4S 0100 050 0400 070				7	50	0.9	4	•	A4S 0300 075 0600 300				30	75	2.8	6	•
A4S 0100 050 0400 080	1.4	0.70	1.26	8	50	0.9	4	•	A4S 0300 075 0600 350	4	2	3.00	35	75	2.8	6	•
A4S 0100 050 0400 090				9	50	0.9	4	•	A4S 0400 050 0600				-	50	-	6	•
A4S 0100 050 0400 100				10	50	0.9	4	•	A4S 0400 050 0600 100				10	50	3.7	6	•
A4S 0100 050 0400 120	1.4	0.70	1.26	12	50	0.9	4	•	A4S 0400 060 0600	4	2	3.00	-	60	-	6	•
A4S 0100 050 0400 140				14	50	0.9	4	•	A4S 0400 060 0600 160				16	60	3.7	6	•
A4S 0100 050 0400 160				16	50	0.9	4	•	A4S 0400 060 0600 200				20	60	3.7	6	•
A4S 0100 060 0400	1.4	0.70	1.26	-	60	-	4	•	A4S 0400 075 0600	4	2	3.00	-	75	-	6	•
A4S 0100 060 0400 200				20	60	0.9	4	•	A4S 0400 075 0600 250				25	75	3.7	6	•
A4S 0120 050 0400				-	50	-	4	•	A4S 0400 075 0600 300				30	75	3.7	6	•
A4S 0120 050 0400 060	1.4	0.70	1.26	6	50	1.1	4	•	A4S 0400 075 0600 350	4	2	3.00	35	75	3.7	6	•
A4S 0120 050 0400 080				8	50	1.1	4	•	A4S 0400 100 0600				-	100	-	6	•
A4S 0120 050 0400 100				10	50	1.1	4	•	A4S 0400 100 0600 400				40	100	3.7	6	•
A4S 0120 050 0400 120	1.4	0.70	1.26	12	50	1.1	4	•	A4S 0400 100 0600 450	4	2	3.00	45	100	3.7	6	•
A4S 0140 050 0400				-	50	-	4	•	A4S 0400 100 0600 500				50	100	3.7	6	•
A4S 0140 050 0400 080				8	50	1.3	4	•									
A4S 0140 050 0400 120	1.4	0.70	1.26	12	50	1.3	4	•		1.4	0.70	1.26					
A4S 0140 050 0400 160				16	50	1.3	4	•									

Diameter	Radius Tolerance
Ø ≤ 3	+0.000 -0.012
Ø > 3	+0.000 -0.020

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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416 - 417

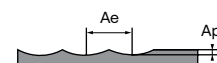
Recommended Cutting Data



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

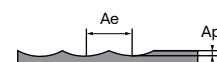


BN 60X Ballnose Cutters, 2 Flutes - A4Q, A4R



Roughing	P		H			
Working Material	Prehardened steel		Hardened steel		Hardened steel	
Properties	35 ≤ HRC < 45		45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.06 × D		0.05 × D		0.03 × D	
Cutting Width, ae	0.30 × D		0.25 × D		0.15 × D	
D	Vc	Fz	Vc	Fz	Vc	Fz
1	250	0.020	220	0.016	180	0.012
2		0.027		0.024		0.022
3		0.041		0.037		0.035
4		0.056		0.051		0.049
5		0.072		0.065		0.063
6		0.087		0.081		0.079
8		0.118		0.109		0.107
10		0.153		0.145		0.140
12		0.190		0.180		0.178
16		0.244		0.233		0.225
18		0.262		0.257		0.248
20		0.278		0.275		0.270

BN 60X Ballnose Cutters, 2 Flutes - A4Q, A4R



Finishing	P		H			
Working Material	Prehardened steel		Hardened steel		Hardened steel	
Properties	35 ≤ HRC < 45		45 ≤ HRC < 52		52 ≤ HRC < 68	
Cutting depth, ap	0.05 × D		0.05 × D		0.04 × D	
Cutting Width, ae	0.02 × D		0.02 × D		0.02 × D	
D	Vc	Fz	Vc	Fz	Vc	Fz
1	260	0.017	230	0.014	190	0.011
2		0.021		0.020		0.019
3		0.033		0.032		0.030
4		0.048		0.044		0.041
5		0.062		0.057		0.053
6		0.076		0.070		0.066
8		0.105		0.096		0.091
10		0.134		0.123		0.118
12		0.167		0.156		0.149
16		0.216		0.199		0.190
18		0.235		0.218		0.210
20		0.254		0.232		0.226

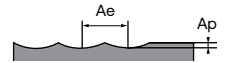
Recommended Cutting Data



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



BN 60X Miniature Long Neck Ballnose Cutters, 2 Flutes - A4S



Profiling		P			H					
Working Material		Prehardened steel			Hardened steel			Hardened steel		
Properties		35 ≤ HRC < 45			45 ≤ HRC < 52			52 ≤ HRC < 68		
D	Effective Length	Ap	N	Fz	Ap	N	Fz	Ap	N	Fz
0.2	0.5	0.016	50000	0.003		45500	0.003	0.012	42000	0.003
	1.0	0.011	50000	0.003	0.009	45500	0.003	0.008	42000	0.003
	1.5	0.006	45900	0.003	0.005	40500	0.003	0.005	37800	0.002
0.3	1.0	0.017	50000	0.005	0.014	45000	0.004	0.013	42000	0.004
	2.0	0.010	45900	0.004	0.008	40500	0.004	0.007	37800	0.004
	3.0	0.006	45900	0.004	0.005	40500	0.004	0.005	37800	0.004
0.4	1.0	0.032	50000	0.007	0.026	46800	0.007	0.024	43680	0.007
	2.0	0.022	50000	0.005	0.018	46800	0.005	0.017	43680	0.005
	3.0	0.013	36720	0.005	0.010	32400	0.005	0.010	36288	0.004
	4.0	0.008	36720	0.005	0.007	32400	0.005	0.006	36288	0.004
	5.0	0.006	32640	0.005	0.005	32400	0.005	0.005	26880	0.004
0.5	2.0	0.028	44200	0.016	0.023	39000	0.011	0.021	36400	0.009
	3.0	0.024	39780	0.008	0.020	35100	0.008	0.018	25200	0.008
	4.0	0.016	30600	0.008	0.013	32400	0.008	0.012	25200	0.008
	5.0	0.014	30600	0.008	0.012	32400	0.008	0.011	25200	0.008
	6.0	0.010	27200	0.008	0.008	24000	0.007	0.008	22400	0.007
	8.0	0.006	27200	0.008	0.005	24000	0.007	0.005	22400	0.007
0.6	2.0	0.050	50000	0.019	0.041	48000	0.018	0.038	44800	0.015
	3.0	0.033	50000	0.016	0.027	48000	0.014	0.025	44800	0.011
	4.0	0.021	48960	0.015	0.017	43200	0.013	0.016	40320	0.009
	5.0	0.016	39780	0.012	0.013	35100	0.011	0.012	32760	0.009
	6.0	0.012	39780	0.012	0.010	35100	0.011	0.009	32760	0.009
	8.0	0.012	27200	0.011	0.010	24000	0.010	0.009	22400	0.008
0.8	2.0	0.096	50000	0.024	0.078	48000	0.027	0.072	44800	0.021
	4.0	0.062	50000	0.024	0.051	48000	0.027	0.047	44800	0.021
	5.0	0.047	48960	0.022	0.038	43200	0.025	0.035	40320	0.019
	6.0	0.034	42840	0.020	0.027	37800	0.019	0.025	35280	0.018
	7.0	0.025	39100	0.017	0.020	34500	0.016	0.019	32200	0.016
	8.0	0.016	35360	0.015	0.013	31200	0.014	0.012	29120	0.013
	10.0	0.016	27200	0.013	0.013	24000	0.013	0.012	22400	0.012
	3.0	0.160	45900	0.033	0.130	43200	0.032	0.120	37800	0.030
1.0	4.0	0.112	45900	0.033	0.091	43200	0.032	0.084	37800	0.030
	5.0	0.072	39780	0.032	0.059	43200	0.029	0.054	32760	0.028
	6.0	0.048	38556	0.030	0.039	38880	0.029	0.036	29484	0.023
	7.0	0.048	33048	0.020	0.039	31590	0.021	0.036	27216	0.020
	8.0	0.048	33048	0.020	0.039	31590	0.021	0.036	27216	0.018
	9.0	0.036	33048	0.020	0.029	31590	0.021	0.027	27216	0.018
	10.0	0.030	33048	0.020	0.025	31590	0.021	0.023	27216	0.018
	12.0	0.020	24480	0.019	0.016	21600	0.018	0.015	20160	0.017
	14.0	0.016	24480	0.019	0.013	21600	0.018	0.012	20160	0.017
	16.0	0.012	24480	0.019	0.010	21600	0.018	0.009	20160	0.017
	20.0	0.008	18360	0.018	0.007	16200	0.016	0.006	15120	0.016
1.2	6.0	0.088	31824	0.032	0.072	30240	0.034	0.066	26208	0.020
	8.0	0.048	31824	0.032	0.039	30240	0.034	0.036	26208	0.020
	10.0	0.042	29376	0.022	0.034	27000	0.020	0.032	24192	0.018
	12.0	0.036	29376	0.022	0.029	25920	0.020	0.027	24192	0.018
1.4	8.0	0.088	27846	0.032	0.072	24570	0.031	0.066	22932	0.030
	12.0	0.042	25704	0.024	0.034	22680	0.023	0.032	21168	0.022
	16.0	0.028	19040	0.023	0.023	16800	0.022	0.021	15680	0.021
1.5	8.0	0.072	27846	0.033	0.059	24570	0.029	0.054	22932	0.027
	12.0	0.072	25704	0.027	0.059	22680	0.025	0.054	21168	0.027
	16.0	0.030	19040	0.025	0.025	16800	0.023	0.023	15680	0.021
	18.0	0.030	19040	0.025	0.025	16800	0.023	0.023	15680	0.021

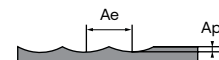
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BN 30
BN 45
BN 60
BN 60X
DM70 -
BN 70
BN GR

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



BN 60X Miniature Long Neck Ballnose Cutters, 2 Flutes - A4S



Profiling		P			H					
Working Material		Prehardened steel			Hardened steel			Hardened steel		
Properties		35 ≤ HRC < 45			45 ≤ HRC < 52			52 ≤ HRC < 68		
D	Effective Length	Ap	N	Fz	Ap	N	Fz	Ap	N	Fz
1.6	8.0	0.176	30940	0.040	0.143	27300	0.039	0.132	23660	0.034
	12.0	0.078	27846	0.039	0.064	24570	0.038	0.059	21294	0.030
	16.0	0.048	23868	0.028	0.039	21060	0.027	0.036	19656	0.025
	20.0	0.032	17680	0.026	0.026	15600	0.025	0.024	14560	0.024
1.8	8.0	0.208	28730	0.042	0.169	25350	0.040	0.156	23660	0.036
	12.0	0.084	23868	0.032	0.068	21060	0.030	0.063	19656	0.027
	16.0	0.054	23868	0.032	0.044	21060	0.030	0.041	19656	0.027
	20.0	0.036	17680	0.029	0.029	15600	0.025	0.027	14560	0.025
2.0	4.0	0.320	26775	0.067	0.260	23625	0.064	0.240	22050	0.060
	6.0	0.320	26775	0.060	0.260	23625	0.057	0.240	22050	0.054
	8.0	0.224	26775	0.060	0.182	23625	0.057	0.168	22050	0.054
	10.0	0.168	24990	0.054	0.137	22050	0.051	0.126	19110	0.039
	12.0	0.096	22491	0.054	0.078	19845	0.051	0.072	17199	0.038
	14.0	0.096	22491	0.047	0.078	18428	0.044	0.072	15876	0.032
	16.0	0.096	20885	0.032	0.078	18428	0.040	0.072	15876	0.029
	18.0	0.072	19278	0.032	0.059	18428	0.037	0.054	15876	0.029
	20.0	0.060	19278	0.032	0.049	18428	0.030	0.045	15876	0.029
	22.0	0.040	15173	0.030	0.033	13388	0.028	0.030	14994	0.027
	25.0	0.040	14280	0.030	0.033	12600	0.028	0.030	14112	0.026
	30.0	0.024	14280	0.030	0.020	12600	0.028	0.018	14112	0.026
3.0	8.0	0.480	20400	0.100	0.390	18000	0.085	0.360	16800	0.090
	10.0	0.336	20400	0.100	0.273	18000	0.085	0.252	16800	0.090
	16.0	0.252	19040	0.080	0.205	16800	0.068	0.189	14560	0.065
	20.0	0.144	15912	0.060	0.117	14040	0.056	0.108	12096	0.054
	25.0	0.096	15912	0.060	0.078	14040	0.056	0.072	12096	0.054
	30.0	0.096	14668	0.060	0.078	12960	0.055	0.072	12096	0.054
4.0	35.0	0.064	10880	0.057	0.052	9600	0.053	0.048	10752	0.050
	10.0	0.480	14663	0.134	0.390	12938	0.125	0.360	12075	0.119
	16.0	0.336	14663	0.134	0.273	12938	0.125	0.252	12075	0.119
	20.0	0.336	12708	0.108	0.273	11213	0.101	0.252	10465	0.100
	25.0	0.192	11437	0.098	0.156	10092	0.101	0.144	9419	0.086
	30.0	0.128	10558	0.081	0.104	9316	0.077	0.096	8694	0.072
	35.0	0.080	10558	0.081	0.065	9316	0.077	0.060	8694	0.072
	40.0	0.080	10558	0.081	0.065	9316	0.077	0.060	8694	0.072
	45.0	0.080	7820	0.076	0.065	6900	0.070	0.060	6440	0.067
	50.0	0.080	7820	0.076	0.065	6900	0.070	0.060	6440	0.067