Cermet NAX Series for Milling

NACHI

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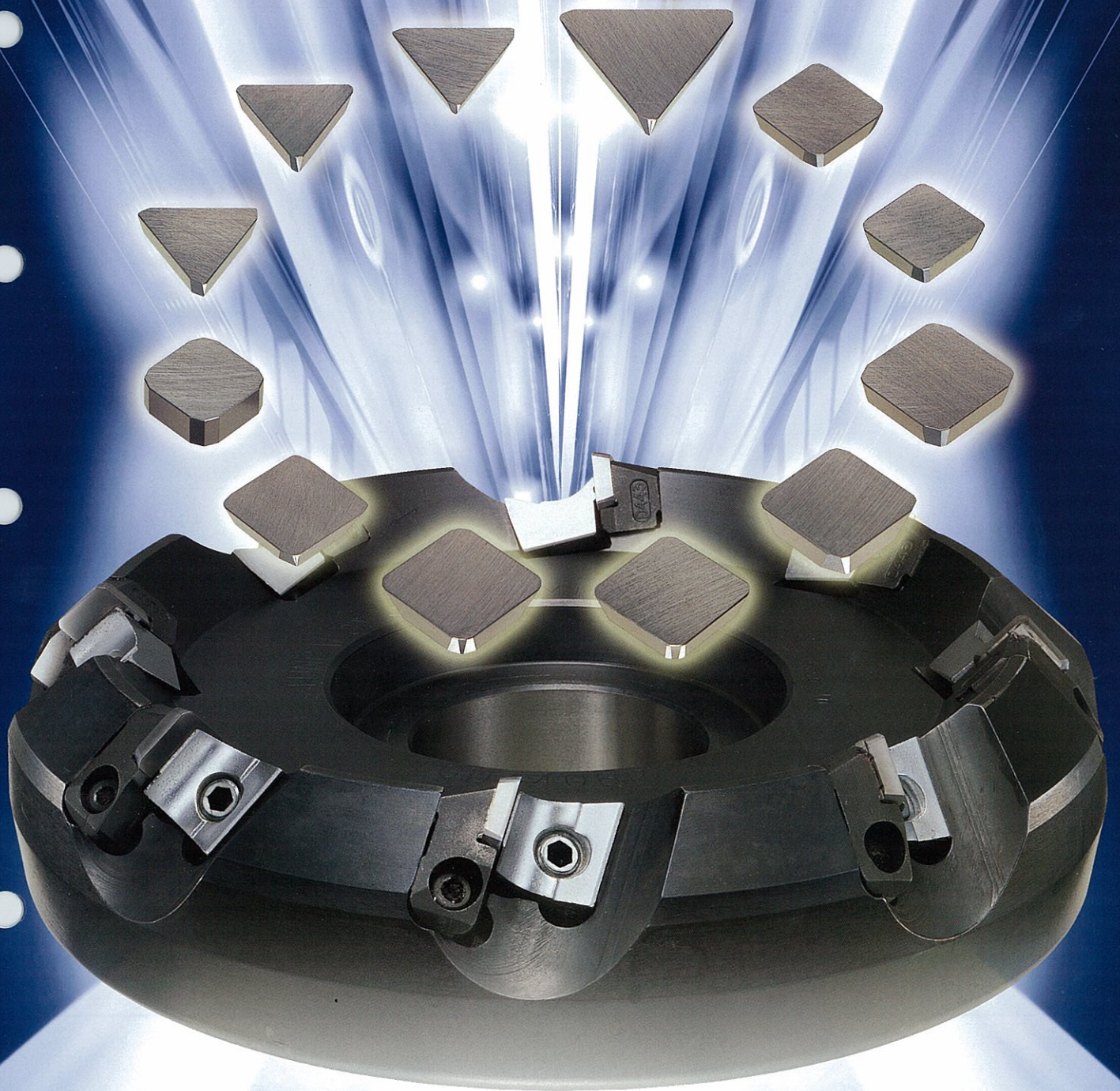
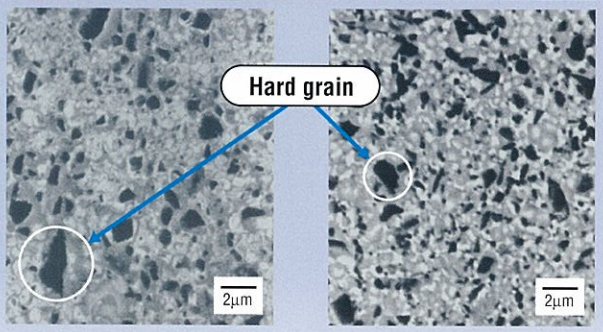


Cermet NAX Series for Milling

High-performance Cermet materials developed through harmonized technologies

The NAX series is developed as a series of Cermet material for cutting tools by Nachi's original sintering technology and traditional tool making expertise. Cermet has low affinity with steel to make a good cutting surface. There are five different grades of material for various applications. The NAX series Cermet supports a wide range of demands for turning work and milling work.

Electron microscope image of NAX LL, SS alloy structure



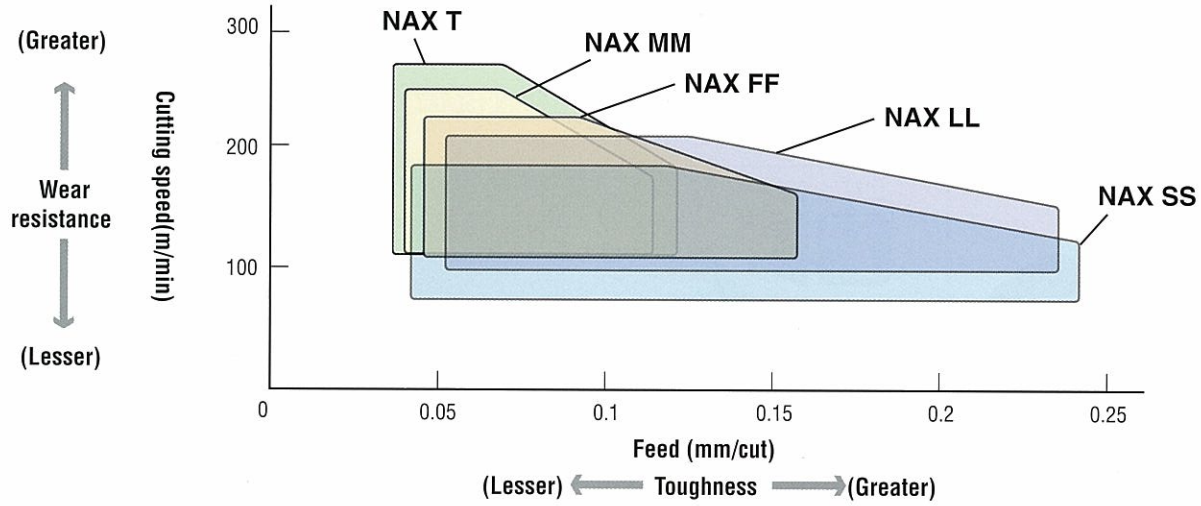
Grade for finish-turning: NAX T　　Grade for milling: NAX SS

NAX SS has a high nitrogen content, so it has tough and very fine hard grains in its microstructure. It shows high anti-chipping performance at milling work.

NAX Series Features

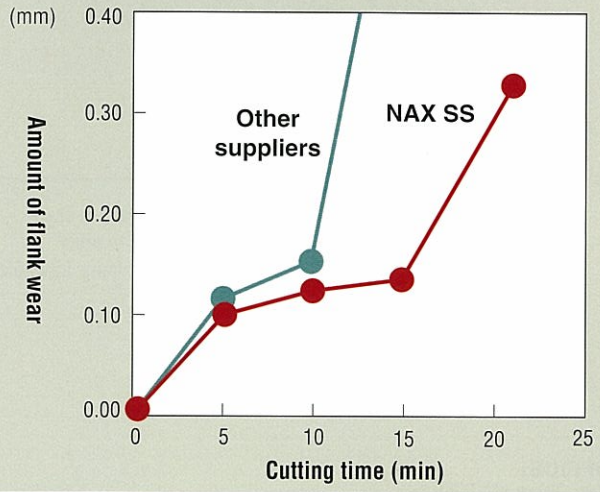
Cutting application	Cermet grade name	Physical and mechanical properties			Cutting characteristics	Characteristics and applications
		Specific gravity g/cm³	Hardness HRA	T.R.S. kgf/mm²		
Milling	NAX SS	7.15	91.5	200	Lough work ↔ Finishing work / Greater anti-chipping ↔ Greater wear resistance	Extremely effective for particularly heavy milling or intermittent turning work. The best grade for intermittent cutting. (Grade toughest for mlling work and intermittent turning)
General purpose	NAX LL	7.25	92.0	180		General purpose grade with a good balance of wear resistance and toughness for both turning and milling work. (Grade for both turning and milling work)
	NAX FF	6.80	92.0	170		Applies to various applications for finish and normal continuous cutting. Shows both high wear resistance and high heat crack resistance. (Grade for general purpose)
Finishing turning	NAX MM	6.70	92.5	160		Has good abrasion resistance at medium speed, normal cutting. An improved grade from old NAXM, with greater toughness. (Grade for finish and normal cutting)
	NAX T	7.25	92.5	150		Shows superior performance at high and medium speed, finish cutting. Has particularly good wear resistance. (Grade with high wear resistance for finish cutting)

Ranges of Targeted Cutting Applications



Cutting performance comparisons with simular grades

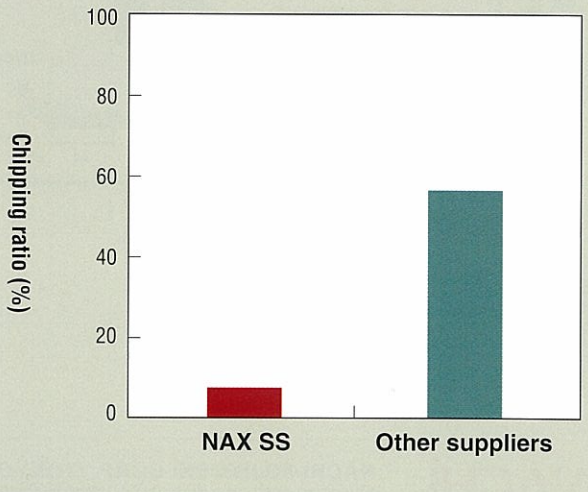
Wear resistance at milling of SCM435



[Test conditions]

- Work material: SCM435 annealed material
- Cutting speed: V = 200 m/min
- Feed: f = 0.35 mm/rev
- Insert shape: SNGN120408TN
- Depth of cut: d = 1.5 mm
- Dry process

Anti-chipping performance at milling of SCM435



[Test conditions]

- Work material: SCM435 annealed material grooved
- Cutting speed: V = 175 m/min
- Feed: f = 0.355 mm/rev
- Insert shape: SNGN120408TN
- Depth of cut: d = 1.5 mm
- Dry process

Targeted Cutting Conditions

Work material				Cutting conditions: cutting speed (m/min)		
Type of material		Corresponding JIS symbol	Brinell hardness HB	Feed (mm/cut) 0.4	0.3	0.1
Structural carbon steels	Annealed	SS400,S10C	~100	100	200	280
		S15C	130	90	150	200
		S35C	150	80	130	170
		S55C	170	70	120	160
Alloy steels	Annealed Tempered	SUJ	190~210	70	110	170
		SCM	225~325	70	110	160
		SNCM	325~450	60	100	150
Tool steels	Annealed Tempered	SK	260~300	75	100	150
		SKD	300~400	70	100	140

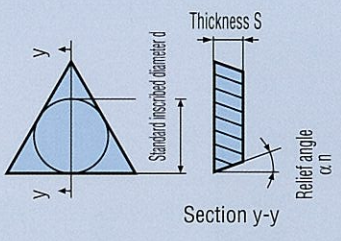
Comparison of Cermet Materials Grades by Manufacturer

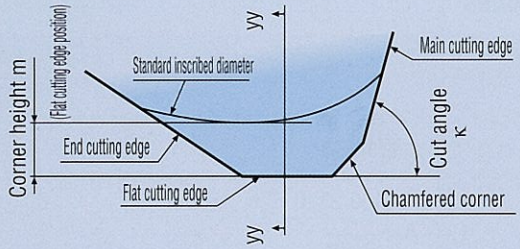
Grades for turning　Grades for milling

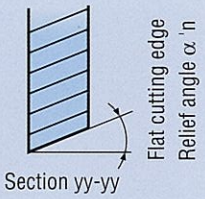
Area of application	← Continuous finishing cutting / Greater wear resistance				Intermittent high-feed cutting / Greater toughness →	
	P05	P10	P15	P20	P25	P30
Nachi-Fujikoshi	NAX T	NAX MM		NAX LL	NAX SS	
		NAX FF				
Sumitomo Electric	T110A		T1200A	T130A	T250A	
Tungaloy	NS520		NS530		NS540	
Mitsubishi Materials	NX2525			NX55 ⟶ NX335	NX4545	
Kyocera	N	TN30	TN60		TN100M	
Hitachi Tool	CH350		CH550		CH570	

Note: Information in this table was taken from the catalogs of the relevant manufacturers without their approval.

Terminology







Insert identification system

	Insert shape
S	Square
T	Equilateral triangle

(1) Shape

	Relief angle
N	0°
A	3°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°
G	30°
O	Others

(2) Relief angle

	Tolerance ((mm))		
	Corner height (m)	Inscribed diameter (d)	Thickness (s)
A	±0.005	±0.025	±0.025
C	±0.013		
E	±0.025		

(3) Accuracy

	Bore		Chip breaker
	Yes/no	Shape	
N	No	—	No
R			Single face
F			Double face
W	Yes	Partial cylindrical bore chamfer 40 to 60°	No
T			Single face
B		Partial cylindrical bore chamfer 70 to 90°	No
H			Single face

(4) Groove/bore

	Metric Series		Inch Series	Inscribed diameter dimensions (mm)
	Square	Triangular		
06	11		2	6.35
09	16		3	9.525
12	22		4	12.70
15	27		5	15.875
19	33		6	19.05

(5) Cutting length and inscribed diameter

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Metric series number	T	P	E	N	22	04	PD	T	R	S
Inch series number	T	P	E	N	4	3	Z	T	R	S

(6) Thickness

Metric Series	Inch Series	Thickness (mm)
03	2	3.18
T3	–	3.97
04	3	4.76
06	4	6.35

(7) Corner configuration

Corner radius			For flat cutting edges					
			Old number		New number			
			Cut angle		Cut angle		Flat cutting edge relief angle	
Metric Series	Inch Series	Radius (mm)		Angle		Angle		Angle
00	0	0	H	75°	A	45°	N	0°
02	Y	0.2	E	65°	D	60°	A	3°
04	1	0.4	G	65°	C	65°	B	5°
08	2	0.8	P	45°	E	75°	C	7°
12	3	1.2	Z	Others	F	85°	P	11°
16	4	1.6			G	87°	D	15°
20	5	2.0			P	90°	E	20°
					Z	Others	F	25°
							G	30°
							Z	Others

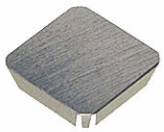
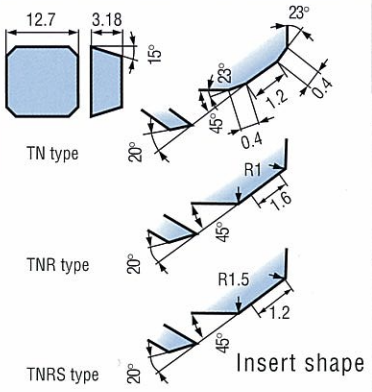
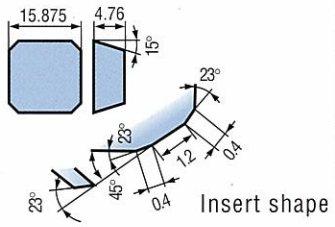
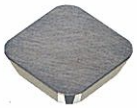
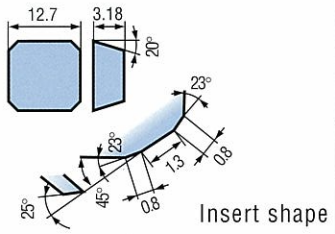
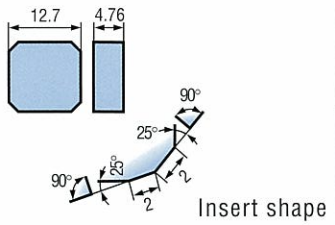
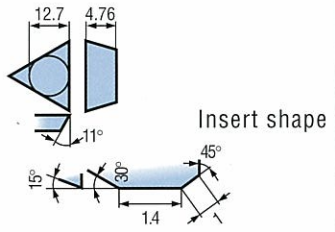
(8) Main cutting edge

	Cutting edge form
F	Sharp cutting edge
E	Round cutting edge
T	Angular cutting edge
S	Composite cutting edge

(9) Handedness

	Handedness
R	Right
L	Left
N	No

(10) Auxiliary

	Visual appearance	Shape	JIS number		Material type	
			Metric Series	Inch Series	NAX LL	NAX SS
Square Positive insert			SDEN 1203AE TN	SDEN 42P TN		
			SDEN 1203AE TNR	SDEN 42P TNR		
			SDEN 1203AE TNRS	SDEN 42P TNRS		
			SDCN 1504AZ TN	SDCN 53P TN		
			SDEN 1504AZ TN	SDEN 53P TN		
			SEEN 1203AF TN	SEEN 42P TN		
			SEEN 1203AF TNR	SEEN 42P TNR		
Square Negative insert			SNEN 1204CN TN	SNEN 43G TN		
			SNKN 1204CN TN	SNKN 43G TN		
Regular triangle Negative insert			TPCN 2204PD TR(TL)	TPCN 43Z TR(TL)		
			TPEN 2204PD TR(TL)	TPEN 43Z TR(TL)		

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NACHI-FUJIKOSHI CORP. (TOKYO HEAD OFFICE)
Shiodome Sumitomo Bldg., 1-9-2 Higashi-shinbashi, Minato-ku, Tokyo 105-0021
Phone:+81-(0)3-5568-5111 Fax:+81-(0)3-5568-5236 URL:http://www.nachi-fujikoshi.co.jp

NACHI AMERICA INC.
17500 Twenty-Three Mile Road, Macomb, Michigan, 48044, U.S.A.
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Bischofstrasse 99, 47809, Krefeld, GERMANY
Phone:+49-(0)2151-65046-0 Fax:+49-(0)2151-65046-90 URL:http://www.nachi.de

NACHI SINGAPORE PTE. LTD.
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Phone:+65-65587393 Fax:+65-65587371

U.K. BRANCH
Unit7, Junction Six Industrial Estate, Electric Avenue, Birmingham B6 7JJ, U.K.
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