



Inserts for Seco's standard milling cutters, see pages 470 - 519.

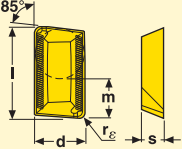
PCD inserts for Seco's standard milling cutters, see pages 520 - 523.

Inserts in grade PCBN, see pages 524 - 528.

Thread milling inserts, see pages 529 - 531.

Remaining stock standard inserts, see pages 532 - 543.

ABER26



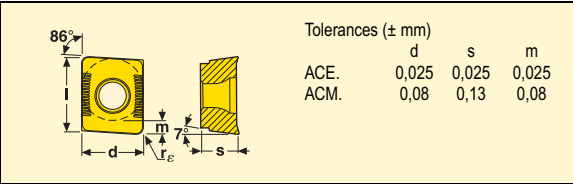
Tolerances (± mm)
ABER d s m
 0,025 0,025 0,025

Size	Dimensions in mm		
	~ l	d	s
2606	26,4	14	6,35

Inserts	Part No.	r _c	Cutting rake	Grades																	
				Coated												Uncoated					
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX	H15	H25
 	ABER 2606ZFFR-M15	1,6	17°	■			■						■	■							
	ABER 2606ZZFR-M15	1,6	17°											■							
 																					

■ Stock standard
Subject to change refer to current price and stock-list

AC..15



Size	Dimensions in mm		
	~ l	d	s
1506	15	12,7	6,35

Inserts	Part No.	r _ε	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
 	ACET 150612TR-ME10	1,2	22°																
	150612TR-M11	1,2	14°	■			■	■							■	■			
	150612TR-M14	1,2	15°	■				■							■	■		■	
	150612TR-MD15	1,2	15°				■		■						■	■			
 	ACET 150612TL-M11	1,2	14°	■				■								■			
	150612TL-M14	1,2	15°													■			
 	ACET 150630TR-M14	3,0	15°									■							
	150630TR-MD15	3,0	15°				■												
	150631TR-M11	3,1	14°													■			
	ACET 150631TL-M11	3,1	14°													■			
	ACET 150660TR-M14	6,0	15°									■				■			
	ACMT 150612TR-M14	1,2	15°					■				■				■			

■ Stock standard
Subject to change refer to current price and stock-list
When using inserts with corner radius > 3 mm, the cutter body must be modified.

Technical drawing of a tapered roller bearing showing dimensions and a table of tolerances.

Dimensions shown in the drawing:

- 85° (Bearing angle)
- d (Bore diameter)
- m (Internal diameter)
- r_6 (Internal fillet radius)
- 11° (Internal taper angle)
- s (Bearing width)

Tolerances ($\pm$ mm)

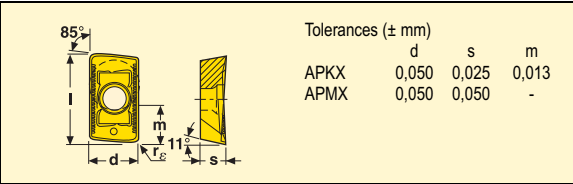
	d	s	m
APEX	0,025	0,025	0,025
APFT	0,013	0,025	0,007
APKT	0,050	0,025	0,013

Size	Dimensions in mm		
	~ l	d	s
1604	17	9,525	4,76

[illegible]

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AP.16



Size	Dimensions in mm		
	~ l	d	s
1604	17	9,525	5,67

Inserts	Part No.	r _e	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
ME11/ME12  M14 	APKX 1604PDR-ME12	0,8	24°	■				■				■	■			■	■		
	160416R-ME12	1,6	24°									■				■			
	APMX 160408TR-ME11	0,8	24°				■						■			■			
	160404TR-M14	0,4	24°					■											
	160408TR-M14	0,8	24°	■			■	■				■	■			■			
	160416TR-M14	1,6	24°					■					■			■			
	APMX 160404TL-M14	0,4	24°					■											
	160408TL-M14	0,8	24°					■											
	APKX 160430R-ME12	3,0	24°									■	■				■		
	160440R-ME12	4,0	24°													■			

■ Stock standard
Subject to change refer to current price and stock-list
When using inserts with corner radius > 3 mm, the cutter body must be modified.

Tolerances ($\pm$ mm)

	l	s	m
C...06/08/09	0,05	0,13	0,08
CCMX12	0,08	0,13	0,13

Size	Dimensions in mm	
	l	s
0601	6,35	1,89
0602	6,35	2,38
0603	6,35	3,5
08T3	8,03	4,4
0803	7,94	3,18
09T3	9,525	3,97
1204	12,7	4,76

[illegible]

■ **Stock standard**
Subject to change refer to current price and stock-list

Tolerances ($\pm$ mm)			
	l	s	m
HPMN	0,08	0,13	0,13
HPMR	0,08	0,13	0,13

Size	Dimensions in mm	
	l	s
1206	12,5	6,35

[illegible]

475

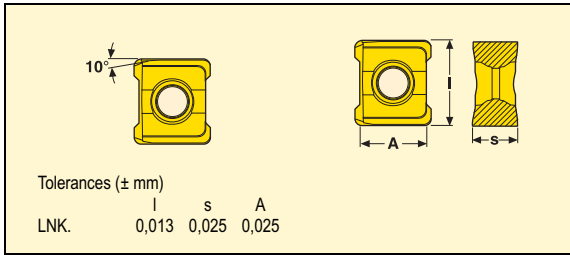
Tolerances ($\pm$ mm)			
	l	s	A
LNK.	0,013	0,025	0,025

Size	Dimensions in mm		
	l	s	A
0504	10	4,7	5,8

[illegible]

When using inserts with radius >2.4 mm, the cutter body must be modified.

LNKT/LNKW06/08



Size	Dimensions in mm		
	l	s	A
0605	10	5	7,8
0805	10	5	7,8

Inserts	Part No.	r_c	Cutting rake	Grades													
				Coated										Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M
LNKT.06	LNKT 060504PPN-E05	0,4	23°														
	060508PPN-E05	0,8	23°														
	060516PPN-E05	1,6	23°														
	060531PPN-E05	3,1	23°														
	060540PPR-E05*	4,0	23°														
	060540PPL-E05*	4,0	23°														
	LNKT 060504PPTN-M06	0,4	15°														
	060508PPTN-M06	0,8	15°														
	060516PPTN-M06	1,6	15°														
	060531PPTN-M06	3,1	15°														
	060540PPTR-M06*	4,0	15°														
	060540PPTL-M06*	4,0	15°														
	LNKW 060504PPN-MD08	0,4	0°														
	060508PPN-MD08	0,8	0°														
LNKT.08	LNKT 080504PPN-E05	0,4	23°														
	080508PPN-E05	0,8	23°														
	080516PPN-E05	1,6	23°														
	080520PPN-E05*	2,0	23°														
	080524PPN-E05*	2,4	23°														
	080531PPN-E05	3,1	23°														
	080540PPR-E05*	4,0	23°														
	080540PPL-E05*	4,0	23°														
	LNKT 080504PPTN-M06	0,4	15°														
	080508PPTN-M06	0,8	15°														
	080516PPTN-M06	1,6	15°														
	080520PPTN-M06*	2,0	15°														
	080524PPTN-M06*	2,4	15°														
	080531PPTN-M06	3,1	15°														
	080540PPTR-M06*	4,0	15°														
	080540PPTL-M06*	4,0	15°														
	LNKW 080504PPN-MD08	0,4	0°														
	080508PPN-MD08	0,8	0°														

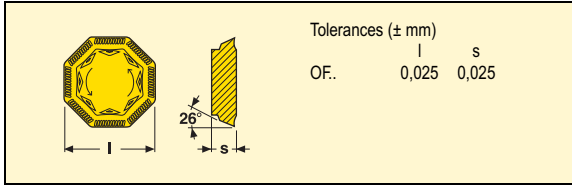
■ Stock standard

Subject to change refer to current price and stock-list

**When using inserts with radius >2,4 mm, the cutter body must be modified.

*Also used for slot width 10-12 mm.

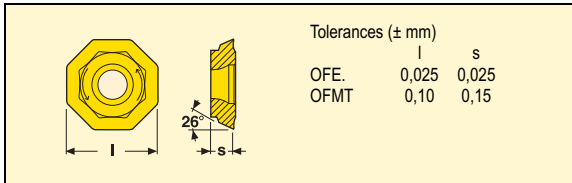
OFER/OFEN/OFMR07



Size	Dimensions in mm	
	l	s
OFER07	17,94	4,56
OFEN07	18,02	4,76
OFEN07ZZT	18,07	4,74
OFMR07	18,02	4,86

Inserts	Part No.	Cutting rake	Grades															
			Coated												Uncoated			
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
E07/M10/M16	OFER 070405N-E07	20°																
	070405N-M10	0°																
	OFEN 070405TN-D18	0°																
ME10/ME15	OFER 070405TN-M16	0°																
	070405TN-ME10	18°																
	070405TN-ME15	18°																
ZZR/ZZTR	OFMR 070405TR-M15	6°																
	070405TR-ME13	15°																
	OFEN 0704ZZR-M10	0°																
	0704ZZTR-M16	0°																

OFET/OFEW/OFMT07

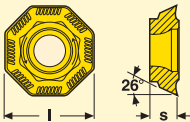


Size	Dimensions in mm	
	l	s
OFET07	17,94	4,56
OFEW07	17,94	4,76
OFMT07	17,97	4,86

Inserts	Part No.	Cutting rake	Grades															
			Coated												Uncoated			
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
OFET/OFMT	OFET 070405TN-ME10	18°																
	070405TN-ME15	18°																
	070405TN-M16	0°																
OFEW	OFET 070405TN-ME10	18°																
	070405TN-ME15	18°																
	070405TN-M16	0°																
OFMT	OFET 070405TN-ME10	18°																
	070405TN-ME15	18°																
	070405TN-M16	0°																
OFMT	OFET 070405TN-ME10	18°																
	070405TN-ME15	18°																
	070405TN-M16	0°																

■ Stock standard
Subject to change refer to current price and stock-list

OFEX/OFMT05



Tolerances (± mm)

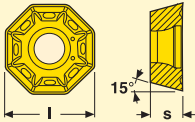
	l	s
OFEX	0,025	0,025
OFMT	0,08	0,05

Size	Dimensions in mm	
	l	s
05T3	12,7	3,77
0504	13,3	4,76

Inserts	Part No.	Cutting rake	Grades															
			Coated												Uncoated			
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
E06	OFEX 05T305FR-E06	18°											■					■
	05T305N-E04	20°											■					■
	05T305N-M05	0°						■										
	05T305TN-M08	0°	■		■		■					■				■		
ME07/ME12	OFEX 05T305TN-ME07	18°					■				■	■				■		
	OFEX 05T305TN-D09					■												
M05	OFMT 050405TR-ME12	18°					■					■				■		
	050405TR-M14	0°	■				■					■				■		
M08/D09/M14																		

■ Stock standard
Subject to change refer to current price and stock-list

ODMT05



Tolerances (± mm)

	l	s
ODMT	0,08	0,05

Size	Dimensions in mm	
	l	s
0504	12,7	4,76

Inserts	Part No.	r _ε	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
MD20	ODMT 050408TN-MD20	0,8	14°			■	■	■	■								■		
	ODMT 050504TN-MD20	0,4	14°						■										
																			

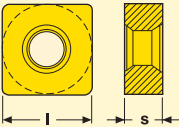
■ Stock standard
Subject to change refer to current price and stock-list

Size	Dimensions in mm	
	l	s
ON..09	22	5,8

[illegible]

481

R230.19



Tolerances (± mm)

	l	s
R230.19	0,013	0,010

Size	Dimensions in mm	
	l	s
1205	12,70	5,4

Inserts	Part No.	Cutting rake	Grades																	
			Coated														Uncoated			
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F30M	F40M	S60M	HX	H15
E05/M07																				
 	R230.19 -1205-E05	20°																		
	-1205-M07	0°																	■	
															■					

R235.15



Size	Dimensions in mm	
	~ l	
032	43,0	
050	54,7	
080	54,7	

Inserts	Part No.	Cutting rake	Grades																	
			Coated												Uncoated					
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F30M	F40M	S60M	HX	H15
E05 	R235.15 -032-E05	8°														■				
	-050-E05	8°														■		■		
	-080-E05	8°														■		■		

■ Stock standard
Subject to change refer to current price and stock-list

Tolerances (mm)

R335.15-..	a_e	$0 - +0,15$
	b	$0 - +0,05$

Size	Dimensions in mm		
	~ l	a _e	b
13110/13130	13,50/13,50	1,40/1,60	1,13/1,33
13160	13,50	2,20	1,63
13185	13,50	2,20	1,88
13215	13,50	3,10	2,18
13265	13,50	3,10	2,68

[illegible]

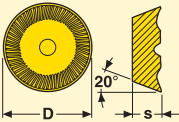
Tolerances (mm)

R335.15-..	a_e	0 – +0,15
	b	0 – +0,05

Size	Dimensions in mm		
	~ l	a _e	b
18315	18,0	3,55	3,20
18350	18,0	3,85	3,55
18400	18,0	4,55	4,05
18415	18,0	4,55	4,20
18500	18,0	5,50	5,05
18515	18,0	5,50	5,20

[illegible]

REHR1605



Tolerances (± mm)

	D	s
REHR	0,013	0,25

Size	Dimensions in mm	
	D	s
1605	16,0	5,56

Inserts	Part No.	Cutting rake	Grades															
			Coated												Uncoated			
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
ME12 	REHR 1605M0T-ME12	20°																
	1605M0T-M14	14°	■								■	■						■
	1605M0T-MD15	6°				■												
M14/MD15 																		

■ Stock standard
Subject to change refer to current price and stock-list

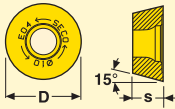
Tolerances ($\pm$ mm)		
	D	s
RDHW	0,013	0,025
RDHT	0,013	0,025

	Dimensions in mm	
Size	D	s
0501	5	1,51
0702	7	2,38

[illegible]

485

RD.06/08/10



Tolerances (± mm)

	D	s
RDHT	0,013	0,025
RDHW	0,013	0,025
RDKW	0,05	0,025

Size	Dimensions in mm	
	D	s
06T1	6,0	2,18
0803	8,0	3,18
10T3	10,0	3,97

Inserts	Part No.	Cutting rake	Grades															
			Coated												Uncoated			
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
E02/E03/E04 	RDHT 06T1M0-E02	18°																
	0803M0-E03	20°																
	10T3M0-E04	20°																
	10T3M0T-M05	16°																
	10T3M0T-M07	11°																
M05/M07 	RDHW 06T1M0-MD02	0°																
	0803M0-MD03	0°																
	10T3M0-MD04	0°																
	10T3M0T-MD06	0°																
MD02/MD03/MD04/ MD05/MD06 	RDKW 0803M0T-MD05	0°																
	10T3M0T-MD06	0°																

■ Stock standard
Subject to change refer to current price and stock-list

Technical drawing of a Rotor Positioning Housing (RPH) showing front and side views. The front view is a circular cross-section with a central hole and a flange. The side view shows the housing's profile with a central bore. Dimensions are indicated: D for the outer diameter, 11 for the bore diameter, and s for the housing thickness. A table of tolerances ($\pm$ mm) is provided:

	D	s
RPH.	0,013	0,025
RPKW	0,08	0,025

Size	Dimensions in mm	
	D	s
1204	12,0	4,76

■ **Stock standard**
Subject to change refer to current price and stock-list

Technical drawing of a flange. The front view shows a circular flange with a central hole and a serrated outer edge. The diameter is labeled 'D'. The side view shows the flange's profile with a thickness labeled 's' and a height labeled '11'.

	Tolerances ($\pm$ mm)	
	D	s
RPHT	0,013	0,25
RPX	0,013	0,25
RPHW	0,013	0,25

	Dimensions in mm	
Size	D	s
1605	16,0	5,56
2006	20,0	6,35

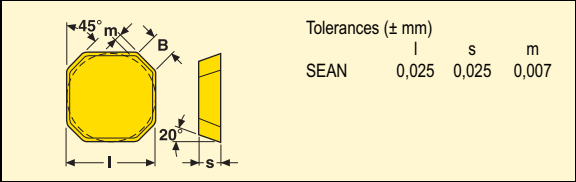
■ **Stock standard**
Subject to change refer to current price and stock-list

		Tolerances (± mm)		
		l	s	m
SCE.		0,025	0,025	0,025
SCM.		0,08	0,13	0,13

[illegible]

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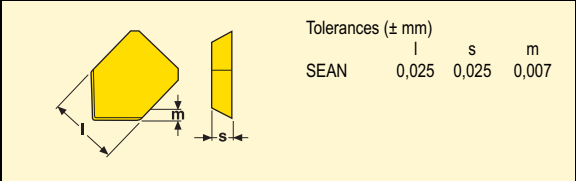
SEAN..



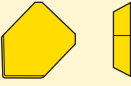
Size	Dimensions in mm	
	I	s
1203	12,7	3,18
1303	13,44	3,36
1604	16,8	4,79

Inserts	Part No.	B	Cutting rake	Grades																
				Coated												Uncoated				
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F30M	F40M	S60M	HX
	SEAN 1203AFN-E12	1,6	0°																	
	1203AFTN-M14	1,6	0°									■	■					■		
	SEAN 1303AFN-E12	3,5	0°																■	
	1303AFTN-M14	3,5	0°										■							
	1303AFTN-M15	3,5	0°	■																
	SEAN 1604AFN-E15	4,1	0°																■	
	1604AFTN-M18	4,1	0°										■							
	1604AFTN-M19	4,1	0°	■																

SEAN..ZZ..



Size	Dimensions in mm	
	I	s
1203	12,7	3,18
1504	15,875	4,76

Inserts	Part No.	Cutting rake	Grades																
			Coated												Uncoated				
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S10M	HX	H15
	SEAN 1203ZZN-E12	0°																	
	1203ZZTN-M14	0°																	
	1203ZZTN-M15	0°	■																
	1203ZZTN-MD15	0°				■													
	SEAN 1504ZZTN-M18	0°	■																

■ Stock standard
Subject to change refer to current price and stock-list

Tolerances (± mm)			
	l	s	m
SEKN12	0,08	0,025	0,013
-M14	0,08	0,025	0,03
SEKN15	0,10	0,025	0,013
-M18	0,05	0,025	0,05

	Dimensions in mm	
Size	l	s
1203	12,70	3,18
1204	12,70	4,76
1504	15,875	4,76

■ **Stock standard**
Subject to change refer to current price and stock-list

SEKR

	Tolerances (± mm)		
		l	s
	SEKR12/13	0,08	0,025
	SEKR15	0,10	0,025
	SEKR16	0,10	0,025

Size	Dimensions in mm	
	l	s
1203	12,7	3,18
1303	13,44	3,36
1504	15,875	4,76
1604	16,8	4,79

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
E07 ME10/ME16 	SEKR 1203AFN-E07	1,6	18°									■					■	■	
	SEKR 1203AFTN-ME10	1,5	20°									■	■				■	■	
	1203AFTN-ME13	1,5	24°				■	■				■	■				■	■	
	SEKR 1303AFTN-ME13	3,5	24°														■	■	
	SEKR 1504AFTN-ME12	1,5	20°										■						
	1504AFTN-ME16	1,5	20°									■	■						
	SEKR 1604AFTN-ME16	4,1	20°									■							

SEKR..ZZ

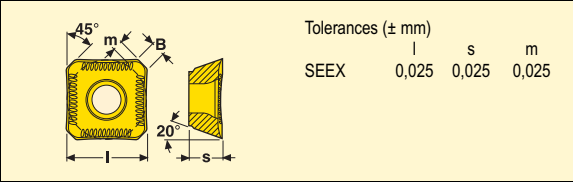
	Tolerances (± mm)		
		l	s
	SEKR..ZZ	0,08	0,025

Size	Dimensions in mm	
	l	s
1203	12,7	3,18

Inserts	Part No.	Cutting rake	Grades																
			Coated												Uncoated				
			MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX	H15
 	SEKR 1203ZZN-E07	18°															■		

■ Stock standard
Subject to change refer to current price and stock-list

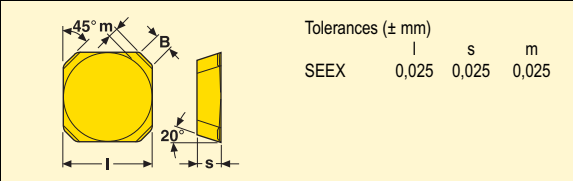
SEEX09



Size	Dimensions in mm	
	l	s
09T3	9,525	3,97

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
 	SEEX 09T3AFN-E04	1,5	25°																
	09T3AFN-M05	1,5	0°																
	09T3AFTN-ME07	1,5	22°																
	09T3AFTN-M08	1,5	0°																
	09T3AFTN-D09	1,5	0°																
 																			

SEEX1203

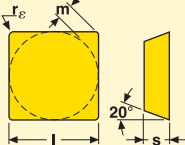


Size	Dimensions in mm	
	l	s
1203	12,77	3,18

Inserts	Part No.	r _ε	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
	SEEX 1203AFTN-M13	1,6	0°																
	1203AFTN-MD14	1,6	0°	■						■			■						■

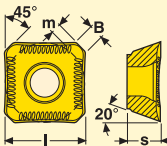
■ Stock standard
Subject to change refer to current price and stock-list

SENN12

	Tolerances (± mm)		
	SENN	0,08	0,025 0,13
Dimensions in mm			
Size	l	s	
1203	12,7	3,18	

Inserts	Part No.	rε	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
	SENN 120308-E10	0,8	0°																
	120308T-M12	0,8	0°																

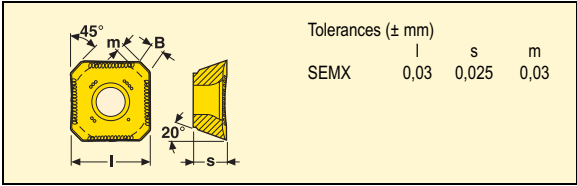
SEMX09

	Tolerances (± mm)		
	SEMX	0,05	0,13 0,08
Dimensions in mm			
Size	l	s	
09T3	9,525	3,97	

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
	SEMX 09T3AFTN-ME06	1,5	25°																
	09T3AFTN-M08	1,5	0°																
																			

■ Stock standard
Subject to change refer to current price and stock-list

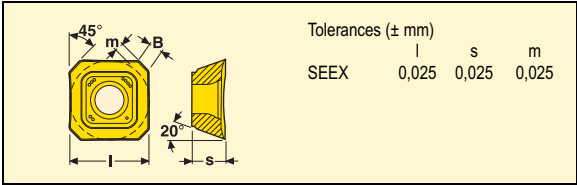
SEM12



Size	Dimensions in mm	
	l	s
1204	12,7	4,76

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
ME12/M15	SEMX 1204AFTN-ME12	1,57	18°																
	1204AFTN-M15	1,57	7°	■	■	■	■	■					■				■		
	SEMX 1204AFTN-MD19	1,57	0°	■			■		■				■						
MD19																			

SEEX1204

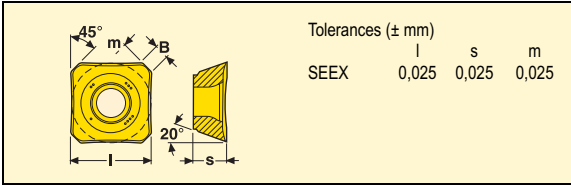


Size	Dimensions in mm	
	l	s
1204	12,7	4,76

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
E08/MD18	SEEX 1204AFN-E08	1,57	25°																
	1204AFN-M10	1,57	7°					■	■				■				■		
	SEEX 1204AFTN-ME11	1,57	18°					■					■				■		
ME11/M10/M14	SEEX 1204AFTN-M14	1,57	7°	■	■	■	■	■					■				■		
	SEEX 1204AFTN-MD18	1,57	0°	■			■		■				■				■		
ZZTN	SEEX 1204ZZTN-M14	-	0°	■			■	■					■				■		

* Only to be used together with SEEX1204.. inserts.

SEEX15

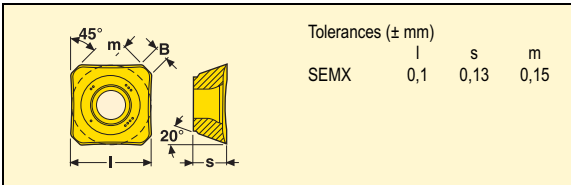


Size	Dimensions in mm	
	l	s
1505	15,875	5,56

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
E10	SEEX 1505AFN-E10	1,8	25°														■		
	SEEX 1505AFN-M12	1,8	5°					■					■				■		
M17/M12	SEEX 1505AFTN-M17	1,8	5°	■	■	■	■	■					■				■		
	SEEX 1505ZZTN-M17	—	5°	■				■					■				■		
ZZTN																			

*Only to be used with SEEX1505..inserts

SEM15



Size	Dimensions in mm	
	l	s
1505	15,875	5,56

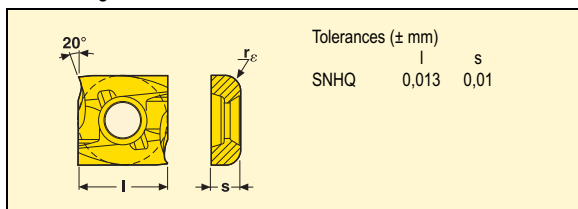
Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
ME15	SEM15 1505AFTN-ME15	1,8	21°										■				■		
	SEM15 1505AFTN-M18	1,8	5°	■	■	■	■	■					■				■		
M18/MD20	SEM15 1505AFTN-MD20	1,8	0°	■			■		■				■						

■ Stock standard
Subject to change refer to current price and stock-list

Size	Dimensions in mm		
	l	s	m
1504	15,875	4,76	

■ **Stock standard**
Subject to change refer to current price and stock-list

SNHQ 2 edges



Size	Dimensions in mm	
	L	S
1203	12,7	3,25
1204	12,7	4,02
12045	12,7	4,57
1205	12,7	5,47
1207	12,7	7,08

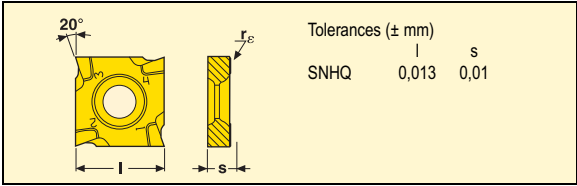
Inserts	Part No.	r _c	Cut- ting rate	Grades																	
				Coated												Uncoated					
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F30M	F40M	S60M	HX	H15
 	SNHQ 120320EL2-M07	2,0	20°														■				
	120324EL2-M07	2,4	20°															■			
	120330EL2-M07	3,0	20°															■			
	SNHQ 120320ER2-M07	2,0	20°															■			
	120324ER2-M07	2,4	20°															■			
	120330ER2-M07	3,0	20°															■			
	SNHQ 120424EL2-M07	2,4	20°															■			
	120431EL2-M07	3,1	20°															■			
	120435EL2-M07	3,5	20°															■			
	SNHQ 120424ER2-M07	2,4	20°															■			
	120431ER2-M07	3,1	20°															■			
	120435ER2-M07	3,5	20°															■			
	SNHQ 1204524EL2-M07	2,4	20°															■			
	1204531EL2-M07	3,1	20°															■			
	1204540EL2-M07	4,0	20°															■			
	SNHQ 1204524ER2-M07	2,4	20°															■			
	1204531ER2-M07	3,1	20°															■			
	1204540ER2-M07	4,0	20°															■			
	SNHQ 120524EL2-M07	2,4	20°															■			
	120531EL2-M07	3,1	20°															■			
	120540EL2-M07	4,0	20°															■			
	120550EL2-M07	5,0	20°															■			
	SNHQ 120524ER2-M07	2,4	20°															■			
	120531ER2-M07	3,1	20°															■			
	120540ER2-M07	4,0	20°															■			
	120550ER2-M07	5,0	20°															■			
	SNHQ 120724EL2-M07	2,4	20°															■			
	120731EL2-M07	3,1	20°															■			
	120740EL2-M07	4,0	20°															■			
	120750EL2-M07	5,0	20°															■			
	120760EL2-M07	6,0	20°															■			
	SNHQ 120724ER2-M07	2,4	20°															■			
	120731ER2-M07	3,1	20°															■			
	120740ER2-M07	4,0	20°															■			
	120750ER2-M07	5,0	20°															■			
	120760ER2-M07	6,0	20°															■			

■ Stock standard

Subject to change refer to current price and stock-list

When using inserts with corner radius > 4,0 mm, the cutter must be modified

SNHQ 4 edges



Size	Dimensions in mm	
	l	s
1102	11,0	2,32
1103	11,0	2,72
1203	12,7	3,25
1204	12,7	4,02

Inserts	Part No.	r_e	Cut- ting rake	Grades																		
				Coated												Uncoated						
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F30M	F40M	S60M	HX	H15	H25
	SNHQ 110202TL4-M07	0,2	20°															■				
	110204TL4-M07	0,4	20°														■	■				
	110208TL4-M07	0,8	20°														■	■				
	110212TL4-M07	1,2	20°														■	■				
	110216TL4-M07	1,6	20°														■	■				
	SNHQ 110202TR4-M07	0,2	20°															■				
	110204TR4-M07	0,4	20°														■	■				
	110208TR4-M07	0,8	20°														■	■				
	110212TR4-M07	1,2	20°														■	■				
	110216TR4-M07	1,6	20°														■	■				
	SNHQ 110302TL4-M07	0,2	20°															■				
	110304TL4-M07	0,4	20°														■	■				
	110308TL4-M07	0,8	20°														■	■				
	110312TL4-M07	1,2	20°														■	■				
	110316TL4-M07	1,6	20°														■	■				
	SNHQ 110302TR4-M07	0,2	20°															■				
	110304TR4-M07	0,4	20°														■	■				
	110308TR4-M07	0,8	20°														■	■				
	110312TR4-M07	1,2	20°														■	■				
	110316TR4-M07	1,6	20°														■	■				
	SNHQ 120302TL4-M07	0,2	20°															■				
	120304TL4-M07	0,4	20°														■	■				
	120308TL4-M07	0,8	20°														■	■				
	120312TL4-M07	1,2	20°														■	■				
	120316TL4-M07	1,6	20°														■	■				
	120320TL4-M07	2,0	20°														■	■				
	SNHQ 120302TR4-M07	0,2	20°															■				
	120304TR4-M07	0,4	20°														■	■				
	120308TR4-M07	0,8	20°														■	■				
	120312TR4-M07	1,2	20°														■	■				
	120316TR4-M07	1,6	20°														■	■				
	120320TR4-M07	2,0	20°														■	■				
	SNHQ 120402TL4-M07	0,2	20°															■				
	120404TL4-M07	0,4	20°														■	■				
	120408TL4-M07	0,8	20°														■	■				
	120412TL4-M07	1,2	20°														■	■				
	120416TL4-M07	1,6	20°														■	■				
	120420TL4-M07	2,0	20°														■	■				
	SNHQ 120402TR4-M07	0,2	20°															■				
	120404TR4-M07	0,4	20°														■	■				
	120408TR4-M07	0,8	20°														■	■				
	120412TR4-M07	1,2	20°														■	■				
	120416TR4-M07	1,6	20°														■	■				
	120420TR4-M07	2,0	20°														■	■				

■ Stock standard
Subject to change refer to current price and stock-list

Technical drawing of a square pin. The front view shows a square with a chamfered corner at 20°. The side view shows a rectangular profile with a radius r_c and a width s . The length is labeled l .

Tolerances ($\pm$ mm)		
	l	s
SNHQ	0,013	0,01

	Dimensions in mm	
Size	l	s
12045	12,7	4,57
1205	12,7	5,47
1207	12,7	7,08

[illegible]

Subject to change refer to current price and stock-list

Tolerances ($\pm$ mm)

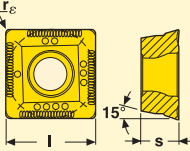
	l	s
SNHQ	0,013	0,01

Size	Dimensions in mm	
	l	s
1102	11,0	2,32
1103	11,0	2,72
1203	12,7	3,25
1204	12,7	4,02
12045	12,7	4,57
1205	12,7	5,47
1207	12,7	7,08

[illegible]

■ **Stock standard**
Subject to change refer to current price and stock-list

SONX



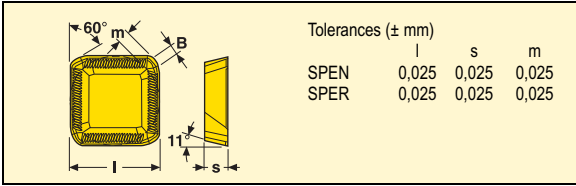
Tolerances (± mm)
SONX l s
 0,03 0,025

Size	Dimensions in mm	
	l	s
09T3	9,55	3,97
1205	12,7	5,17
1505	15,8	5,56

Inserts	Part No.	r _ε	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
ME06/ME08/ME10 	SONX 09T304TR-ME06	0,4	22°														■		
	09T304TR-M10	0,4	19°	■			■	■					■				■		
	09T308TR-M10	0,8	19°	■	■		■	■				■					■		
M10/M12/M14 	SONX 120508TR-ME08	0,8	24°														■		
	120508TR-M12	0,8	16°	■	■		■	■					■				■		
	SONX 150508TR-ME10	0,8	19°														■		
	150508TR-M14	0,8	22°	■	■		■	■					■				■		
	150516TR-M14	1,6	22°	■				■									■		

■ Stock standard
Subject to change refer to current price and stock-list

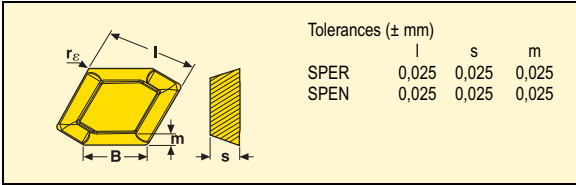
SPE.



Size	Dimensions in mm	
	l	s
1906	19,05	6,35
2807	28,575	7,94

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
SPER																			
		SPER 1906ZETR-M17	1,0	17°										■					
		SPEN 1906ZETR-D25	1,0	0°				■	■										
SPEN			SPEN 1906ZETR-MD20	1,0	0°	■				■			■	■					
			1906ZETL-MD20	1,0	0°					■									
			SPEN 2807ZETR-D35	1,5	0°				■										
			2807ZETR-MD35	1,5	0°	■													

SPE.-ZZ

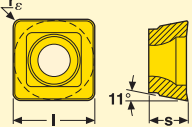


Size	Dimensions in mm		
	l	s	B
1906	20,00	6,35	12
2807	28,575	7,94	8,5

Inserts	Part No.	r _e	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
 M17/D25/MD20 	SPER 1906ZZTR-M17	1,6	17°					■											
	1906ZZTL-M17	1,6	17°					■											
	SPEN 1906ZZTR-D25	1,0	0°				■	■											
	1906ZZTR-MD20	1,0	0°	■				■											
	2807ZZTR-D35	2,1	0°				■												

■ Stock standard
Subject to change refer to current price and stock-list

SPMT10



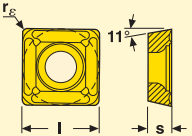
Tolerances (± mm)

	l	s
SPMT	0,05	0,13

Size	Dimensions in mm	
	l	s
1004	10,0	4,76

Inserts	Part No.	r _e	Cutting rake	Grades															
				Coated								Uncoated							
				T150M	T200M	T25M	T250M	T350M	F15M	F17M	F20M	F25M	F30M	F40M	S10M	S25M	S60M	HX	H15
	SPMT 100408T-M08	0,8	10°									■		■					

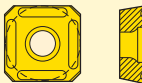
SPMX



Tolerances (± mm)

	l	s
SPMX06/07/09	0,05	0,13
SPMX12	0,08	0,13
SPMX15	0,10	0,13

Size	Dimensions in mm		
	l	s	B
0602AP.	6,35	2,38	0,7
060204	6,35	2,38	-
0703AP.	7,94	3,18	0,9
070304	7,94	3,18	-
0903AP.	9,525	3,18	1,0
090304	9,525	3,18	-
12T3AP	12,7	3,97	1,4
12T308	12,7	3,97	-
1504AP.	15,875	4,76	1,7

Inserts	Part No.	r _e	Cutting rake	Grades															
				Coated								Uncoated							
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
AP-75 	SPMX 0602AP-75	-	5°									■					■	■	
	0703AP-75	-	5°																
	0903AP-75	-	5°																
	12T3AP-75	-	5°									■	■					■	■
	1504AP-75	-	5°																
	1904AP-75	-	5°																
	SPMX 060204-75	0,4	5°									■					■		
	070304-75	0,4	5°									■					■		
	090304-75	0,4	5°									■					■		
	12T308-75	0,8	5°														■		
04-75/08-75 																			

■ Stock standard
Subject to change refer to current price and stock-list

Tolerances ($\pm$ mm)		
	s	m
VPGX	0,13	0,025

Size	Dimensions in mm	
	~ l	s
2206	14	6,35

[illegible]

Tolerances ($\pm$ mm)		
	s	m
VPGX	0,13	0,025

Size	Dimensions in mm	
	~ l	s
2206	14	6,35

[illegible]

505

Tolerances ($\pm$ mm)

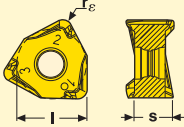
	d	s	m
XCMX05	0,05	0,13	0,08
XCMX12	0,08	0,13	0,13

Size	Dimensions in mm		
	~ l	d	s
05	6,35	5,65	2,38
12	12,7	9,525	4,76

[illegible]

■ **Stock standard**
Subject to change refer to current price and stock-list

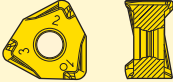
XNEX



Tolerances (± mm)

	l	s
XNEX	0,025	0,025

Size	Dimensions in mm	
	l	s
0806	12,48	6,37 - 6,47

Inserts	Part No.	r _ε	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
ME09/M13/MD15 	XNEX 080608TR-ME09	0,8	27°	■	■	■	■	■	■				■				■		
	080608TR-M13	0,8	22°	■	■	■	■	■	■				■				■		
	080608TR-MD15	0,8	17°	■	■	■	■	■	■				■				■		
	XNEX 080616TR-ME09	1,6	27°	■	■	■	■	■	■				■				■		
	080616TR-M13	1,6	22°	■	■	■	■	■	■				■				■		
	080616TR-MD15	1,6	17°	■	■	■	■	■	■				■				■		

■ Stock standard
Subject to change refer to current price and stock-list

Technical drawing of a tapered roller bearing. The drawing shows a cross-section of the bearing with the following dimensions and tolerances:

- Inner diameter: d
- Outer diameter: s
- Width: 7
- Angle: 80°
- Internal fit: f_8
- External fit: s_8

Tolerances ($\pm$ mm)

	d	s
XOEX	0,025	0,025
XOMX	0,03	0,05

Size	Dimensions in mm		
	l	d	s
OXEY 0602	6,94	4,09	2,45
XOMX 0602	6,91-6,94	4,09	2,45

[illegible]

508

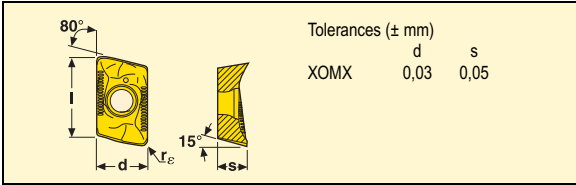
XOEX09



Size	Dimensions in mm		
	~ l	d	s
0903	10,8	6,35	3,65

Inserts	Part No.	r _c	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
 	XOEX 090304FR-E05	0,4	31°																
	090308FR-E05	0,8	31°																
	090316FR-E05	1,6	31°																
	090320FR-E05	2,0	31°																
	090331FR-E05	3,1	31°																

XOMX09



Size	Dimensions in mm		
	l	d	s
0903	9,9-10,8	6,35	3,21-3,65

Inserts	Part No.	r _c	Cutting rake	Grades																
				Coated												Uncoated				
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX	H15
 	XOMX 090304TR-ME06	0,4	24°	■				■	■					■	■					
	090308TR-ME06	0,8	24°	■	■			■	■			■	■			■	■			
	090312TR-ME06	1,2	24°																	
	090316TR-ME06	1,6	24°	■					■											
 	090320TR-ME06	2,0	24°						■					■			■			
	090324TR-ME06	2,4	24°							■					■					
	090331TR-ME06	3,1	24°						■	■			■	■			■			
	XOMX 090308TL-ME06	0,8	24°														■			
	XOMX 090308TR-M08	0,8	16°	■	■			■	■						■			■		
	090312TR-M08	1,2	16°												■			■		
	090316TR-M08	1,6	16°													■		■		
	090320TR-M08	2,0	16°														■		■	
	090324TR-M08	2,4	16°														■		■	
	090331TR-M08	3,1	16°															■		

■ Stock standard
Subject to change refer to current price and stock-list
When using inserts with corner radius > 2,4 mm, the cutter body must be modified.

	Tolerances ($\pm$ mm)	
	d	s
XOEX	0,025	0,025
XOMX	0,03	0,05

	Dimensions in mm		
Size	l	d	s
OXOE1204	11,73-12,16	8,18	5,06
XOMX1204	11,41-12,16	8,18	3,93-4,15

Inserts	Part No.	r _ε	Cutting rake	Grades																	
				Coated												Uncoated					
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX	H15	H25
 	XOEX 120404FR-E06	0,4	27°											■			■		■		
	120408FR-E06	0,8	27°											■			■		■		
	120416FR-E06	1,6	27°											■			■				
	120420FR-E06	2,0	27°											■			■				
	120431FR-E06	3,1	27°											■			■				
 	XOEX 120402R-M07	0,2	20°														■				
	120404R-M07	0,4	20°					■					■				■				
	120408R-M07	0,8	20°					■			■						■				
	120416R-M07	1,6	20°								■						■				
	120424R-M07	2,4	20°										■				■				
	120431R-M07	3,1	20°								■		■				■				
	120440R-M07	4,0	20°									■					■				
	120450R-M07*	5,0	20°														■				
	120463R-M07*	6,3	20°														■				
	XOEX 120408ZZR-M07*	0,8	20°						■								■				
	 	XOMX 120404TR-ME08	0,4	25°	■				■					■				■			
		120408TR-ME08	0,8	25°	■	■			■					■				■			
120412TR-ME08		1,2	25°					■					■				■				
120416TR-ME08		1,6	25°					■					■				■				
120420TR-ME08		2,0	25°					■					■				■				
120424TR-ME08		2,4	25°					■					■				■				
120431TR-ME08		3,1	25°					■					■				■				
120440TR-ME08		4,0	25°					■					■				■				
 	XOMX 120408TR-M12	0,8	13°	■	■		■	■	■				■				■				
	120416TR-M12	1,6	13°						■				■				■				
 	XOMX 120404TR-MD13	0,4	15°	■			■						■				■				
	120408TR-MD13	0,8	15°	■	■		■		■				■				■				
	120412TR-MD13	1,2	15°				■		■				■				■				
	120416TR-MD13	1,6	15°	■			■		■				■				■				
	XOMX 120408TR-D14	0,8	1°	■			■	■	■												
 	120431TR-D14	3,1	1°						■												

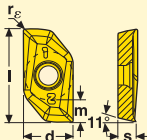
* Inserts with only one cutting edge.

Tolerances (± mm)		
	d	s
XOEX	0,025	0,025
XOMX	0,03	0,05

Size	Dimensions in mm		
	l	d	s
1806	~ 17,5	11,2	6,35

■ **Stock standard**
Subject to change refer to current price and stock-list
 When using inserts with corner radius > 4,0 mm, the cutter body must be modified.

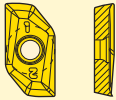
XPKX12



Tolerances (± mm)

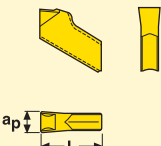
	l	s	m
XPKX	0,050	0,020	0,020

Size	Dimensions in mm		
	l	d	s
12T3	~ 18,8	10,07	3,98

Inserts	Part No.	r _e	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
E08 	XPKX 12T304PDER-E08	0,4	23°																
	XPKX 12T320PDER-E08	2,0	23°																
	XPKX 12T324PDER-E08	2,4	23°																
	XPKX 12T331PDER-E08	3,1	23°																
	XPKX 12T340PDER-E08	4,0	23°																

■ Stock standard
Subject to change refer to current price and stock-list

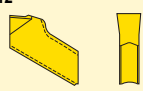
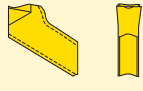
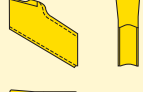
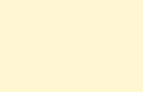
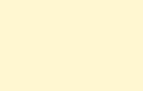
150.10



Tolerances (± mm)

150.10-2.25/2.5	a_p 0,05
150.10-3/4	0,08

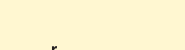
Size	Dimensions in mm	
	~ L	a_p
2N	9	2,24
2.5N	9	2,52
3N	9	3,11
4N	9	4,09

Inserts	Part No.	Cutting rake	Grades																				
			Coated														Uncoated						
			MK1500	MK2000	MK3000	MP2500	MH1000	T150M	T200M	T25M	T250M	T350M	F15M	F20M	F25M	F30M	F40M	CP 600	S60M	HX	H15	H25	
	150.10 -2.5N-12	30°								■	■		■					■					
	-3N-12	30°								■	■		■					■					
	-4N-12	30°								■	■		■					■					
	150.10 -2.25N-14	21°											■					■					
	-2.5N-14	21°									■		■					■					
	-3N-14	21°								■	■		■					■					
	-4N-14	21°								■	■		■					■					
	150.10 -2.25N-16	26°									■		■					■		■			
	-2.5N-16	26°									■		■					■		■			
	-3N-16	26°								■	■		■					■		■			
	-4N-16	26°								■	■		■					■		■			
																							

■ Stock standard
Subject to change refer to current price and stock-list

Tolerances ($\pm$ mm)

d	R	s
218.19..	0,01	0,01 0,013-0,07

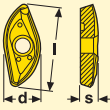


	Dimensions in mm		
Size	d	s	R
-080.	5,50	2,38	8
-100.	7,06	2,78	10
-125.	8,90	3,97	12,5
-150.	10,60	4,76	15
-160.	11,18	4,76	16
-200.	12,70	5,50	20
-250.	16,54	6,35	25

Inserts	Part No.	R	r _c	Cutting rake	Grades																		
					Coated												Uncoated						
					MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX	H15	H25	
		218.19 -080-E04	8	0,4	20°																		■
		-100-E06	10	0,8	20°																		■
		-125-T3-E06	12,5	0,8	20°																		■
		-160-04-E07	16	1,2	20°																		■
		-200-05-E09	20	0,6	20°								■										
		218.19 -100T-ME05	10	0,8	20°								■										
		-125T-T3-ME07	12,5	0,8	20°													■					
		-160T-04-ME08	16	1,2	20°													■					
		-200T-05-ME10	20	0,6	20°													■					
		-250T-06-ME12	25	1,2	20°								■										
		218.19 -080T-M04	8	0,4	10°					■					■			■	■				
		-100T-M06	10	0,8	10°					■		■		■				■	■				
		-125T-T3-M07	12,5	0,8	10°					■		■		■				■	■				
		-125T-T3-M12	12,5	0,8	10°					■		■		■				■					
		-150T-04-M08	15	1,2	10°							■	■										
		-160T-04-M08	16	1,2	10°					■	■	■		■				■	■				
		-160T-04-M15	16	1,2	10°					■		■		■				■					
		-200T-05-M10	20	0,6	10°							■						■	■	■			
		-250T-06-M12	25	1,2	10°								■					■		■			
		218.19 -080T-MD04	8	0,4	0°		■	■		■		■			■			■					
		-100T-MD08	10	0,8	0°		■	■	■		■	■			■			■					
		-125T-T3-MD08	12,5	0,8	0°						■												
		-125T-T3-MD10	12,5	0,8	0°		■	■	■														

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218.20



Tolerances (± mm)

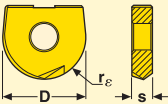
	s	d
218.20-...	0,02	0,03

Size	Dimensions in mm		
	l	s	d
-080.	15,64	3,21	6,88
-100.	19,55	4,05	8,59
-125.	24,43	5,05	10,74
-150.	28,70	5,99	11,91
-160.	30,61	6,40	12,70
-200.	38,26	7,94	15,86
-250.	47,83	10,00	19,82

Inserts	Part No.	r _c	Cutting rake	Grades															
				Coated								Uncoated							
				T150M	T200M	T25M	T250M	T350M	F15M	F17M	F20M	F25M	F30M	F40M	S10M	S25M	S60M	HX	H15
	218.20 -080ER-ME04	—	12°				■						■						
	-100ER-ME05	—	12°				■						■						
	-125ER-ME07	—	12°				■						■						
	-150ER-ME07	—	12°										■						
	-160ER-ME08	—	12°				■						■						
	-200ER-ME10	—	12°				■						■						
	-250ER-ME12	—	12°				■						■						
	218.20 -080ER-M04	—	0°									■	■						
	-100ER-M05	—	0°									■	■						
	-125ER-M07	—	0°									■	■						
	-150ER-M08	—	0°									■	■						
	-160ER-M08	—	0°									■	■						
	-200ER-M10	—	0°									■	■						
	-250TR-M14	—	0°										■						
	-250TR-M14C	—	0°											■					

■ Stock standard
Subject to change refer to current price and stock-list

219.19



Tolerances (mm)

	D
219.19-...	+0/ -0,02
	s
219.19-...	+0,005/ -0,010

Size	Dimensions in mm	
	D	s
080	8,0	2,0
100	10,0	2,5
120	12,0	2,5
160	16,0	3,0
200	20,0	3,0
250	25,0	4,0
320	32,0	5,0

Inserts	Part No.	Cutting rake	Grades																			
			Coated										Uncoated									
			T150M	T200M	T25M	T250M	T350M	F15M	F17M	F20M	F25M	F30M	F40M	S10M	S25M	S60M	HX	H15	H25			
 	219.19 -080-MD03	0°							■													
	-100-MD04	0°							■													
	-120-MD05	0°							■													
	-160-MD07	0°							■													
	-200-MD08	0°							■													
	-250-MD09	0°							■													
	-320-MD10	0°							■													
	219.19 -080P-M02	0°							■													
	-100P-M03	0°							■													
	-120P-M04	0°							■													
	-160P-M05	0°							■													
	-200P-M06	0°							■													
	-250P-M07	0°							■													
	-320P-M08	0°							■													

■ Stock standard
Subject to change refer to current price and stock-list

335.18

	Tolerances (± mm)			
		l	s	A
	335.18-10	0,013	0,025	0,013
	335.18-13	0,025	0,025	0,013
	335.18-16	0,025	0,025	0,013

Size	Dimensions in mm		
	l	s	A
-1005	10	5,4	10
-1305	12,7	5,4	10
-1606	16	6,4	12
-1005ZZ	10	5,4	10

Inserts	Part No.	B	Cutting rake	Grades															
				Coated												Uncoated			
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX
 	335.18	-1005-E07	0,5	20°															
		-1305-E08	0,5	20°															
		-1606-E09	0,5	20°															
 	335.18	-1005T-M10	0,5	10°	■	■		■	■				■				■		■
		-100508-M10	0,5	08°															
		-1305T-M11	0,5	10°	■	■		■	■				■				■		■
		-130508-M11	0,5	08°															
		-1606T-M12	0,5	10°				■	■								■		
 		-160608-M12	0,5	08°															
	335.18	-1005ZZ-MD10	-	0°															■

■ Stock standard
Subject to change refer to current price and stock-list

Tolerances ($\pm$ mm)

	l	s
335.19...	0,013	0,010



Size	Dimensions in mm	
	l	s
-1205.	12,7	5,4

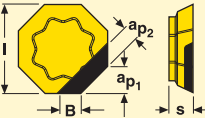
[illegible]

■ Stock standard
Subject to change refer to current price and stock-list

[illegible]

519

OFEN



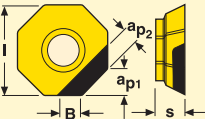
Tolerances (± mm)

	$\frac{1}{2}$	s
OFEN	0,025	0,025

Size	Dimensions in mm				
	l	s	B	ap ₁	ap ₂
07	17,95	4,76	1,7	3,5	—

Inserts	Part No.	Cutting rake	Grades					
			PCD20					
	OFEN 070405FN-M09	0°	■					

OFEX



Tolerances (± mm)

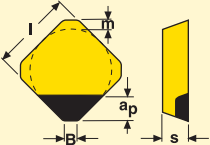
	$\frac{1}{2}$	s
OFEX	0,025	0,025

Size	Dimensions in mm				
	l	s	B	ap ₁	ap ₂
05	12,79	3,97	1,5	2,6	—

Inserts	Part No.	Cutting rake	Grades					
			PCD20					
	OFEX 05T305FN-M05	0°	■					

■ Stock standard
Subject to change refer to current price and stock-list

SEHN



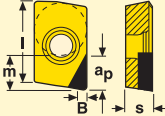
Tolerances (± mm)

	l	s	m
SEHN	0,013	0,025	0,013

Size	Dimensions in mm			
	l	s	B	ap
12	12,7	3,18	1,6	1,6

Inserts	Part No.	Cutting rake	Grades				
			PCD20	PCD30M			
	SEHN 1203AFFN-E08	0°	■	■			

APHT



Tolerances (± mm)

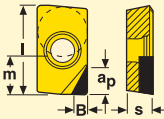
	l	s	m
APHT	0,013	0,025	0,013

Size	Dimensions in mm			
	l	s	B	ap
16	17	4,86	1,6	2,6

Inserts	Part No.	Cutting rake	Grades				
			PCD20				
	APHT 160408FR-M08	15°	■				

■ Stock standard
Subject to change refer to current price and stock-list

XCHX



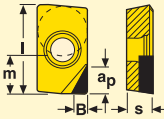
Tolerances (± mm)

	l	s	m
XCHX	0,013	0,025	0,013

Size	Dimensions in mm			
	l	s	B	a _p
13	14	4,37	0,8	3,2

Inserts	Part No.	Cutting rake	Grades				
			PCD20				
	XCHX 13T304FR-M06	15°	■				

XOEX



Tolerances (± mm)

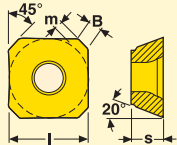
	l	s	m
XOEX06	0,03	0,13	0,025
XOEX09	0,05	0,25	0,25
XOEX12	0,05	0,25	0,25

Size	Dimensions in mm			
	l	s	B	a _p
06..FR	6,94	2,45	1,5	2,5
09..FR	10,75	3,65	1,45	4
09..ZZ	10,75	3,65	2	3,5
12..FR	13,88	5,03	1,5	4
12..FR-L2	13,7			

Inserts	Part No.	Cutting rake	Grades				
			PCD20	PCD05	PCD30		
	XOEX 060204FR	8°		■			
	XOEX 090304FR	8°	■		■		
	09030FR-ZZ	8°		■			
	XOEX 120404FR	15°	■		■		
	120404FR-L2	14°		■			

■ Stock standard
Subject to change refer to current price and stock-list

SEEX09



Tolerances (± mm)

	l	s	m
SEEX	0,025	0,025	0,025

Size	Dimensions in mm			
	l	s	B	a _p
09T3	9,525	3,97	1,5	1,6

Inserts	Part No.	Cutting rake	Grades				
			PCD20	PCD05			
 	SEEX 09T3AFFN-L1	0°	■	■			

■ Stock standard
Subject to change refer to current price and stock-list

RN.N06/09

	Tolerances (± mm)		
	D	s	
	RNMN06	0,05	0,13
	RNGN06	0,025	0,13
	RNMN09	0,05	0,13
	RNGN09	0,025	0,13

Size	Dimensions in mm	
	D	s
RNMN06	6,350	3,18
RNGN06	6,350	3,18
RNMN09	9,525	3,18
RNGN09	9,525	3,18

Inserts	Part No.	Cutting rate	Grades								
			CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P	CBN500C	CBN400C
RNMN/RNGN E = Honed S = Chamfered and honed Solid	RNGN 090300E25	0°		■							
	060300E	0°		■			■			■	
	060300S-01020	0°		■			■				
	090300E	0°		■			■			■	
	090300S-01020	0°		■			■				
	RNMN 060300S	0°						■	■		
	090300E	0°						■			■
	090300S	0°						■	■		■
	RNGN 060300S-01525	0°								■	
	090300S-01525	0°								■	

RNGN-LF 06/09

	Tolerances (± mm)		
	D	s	
	0,025	0,13	

Size	Dimensions in mm	
	D	s
06	6,350	3,18
09	9,525	3,18

Inserts	Part No.	Cutting rate	Grades							
			CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P	CBN160C
RNGN-LF S = Chamfered and honed LF = Complete top layer	RNGN 060300S-LF	0°	■				■			
	090300S-LF	0°	■				■			
	RNGN 060300S-01525-LF	0°				■				■
	090300S-01525-LF	0°				■				■

■ Stock standard
Subject to change refer to current price and stock-list

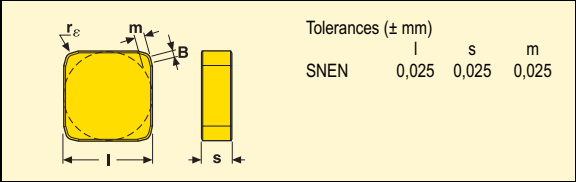
Technical drawing showing a square and a rectangular bar. The square has side length l and a fillet radius r_s . The rectangular bar has width s . The drawing includes a table of tolerances ($\pm$ mm) for different manufacturing processes.

	l	s	m
SNMN	0,05	0,013	0,08
SNEX	0,025	0,025	0,025
SNGN	0,025	0,013	0,025

Size	Dimensions in mm	
	l	s
09	9,525	3,18
12	12,7	3,18

■ **Stock standard**
Subject to change refer to current price and stock-list

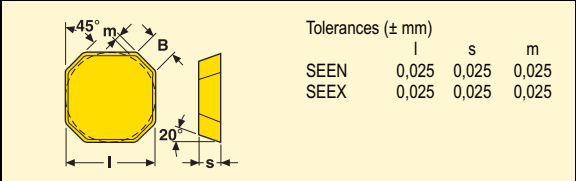
SNEN09



Size	Dimensions in mm		
	l	s	r _e
09	9,525	3,18	0,8

Inserts	Part No.	B	Cutting rake	Grades						
				CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P
	SNEN 0903ENE-M06	0,9	0°					■	■	
	0903ENS-M08	0,9	0°					■	■	

SEEN/SEEX12

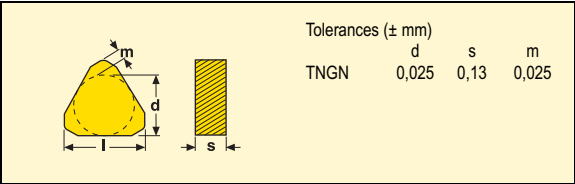


Size	Dimensions in mm	
	l	s
12	12,7	3,18

Inserts	Part No.	B	Cutting rake	Grades						
				CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P
	SEEN 1203AFTN-D16	1,6	0°						■	
 -LF	SEEX 1203AETN-MD13-LF	8,0	0°					■		

■ Stock standard
Subject to change refer to current price and stock-list

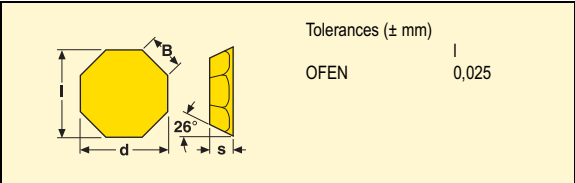
TNGN



Size	Dimensions in mm		
	~ l	d	s
16	16,5	11,857	4,76

Inserts	Part No.	Cutting rake	Grades						
			CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P
	TNGN 1103PNE	0°					■		
	1103PNS	0°					■		
	1103PRS	0°					■		
	TNGN 1604PNE	0°					■		
	1604PNS	0°					■		
	1604PRS	0°					■		

OFEN

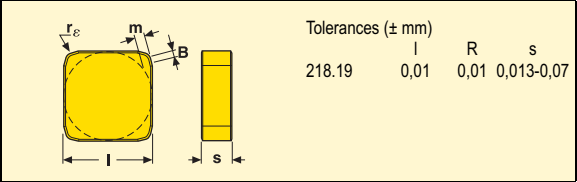


Size	Dimensions in mm		
	d	l	s
07	17,96	17,96	4,76

Inserts	Part No.	B	Cutting rake	Grades						
				CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P
 -LF	OFEN 070405TN-MD16-LF	1,6	0°					■		

■ Stock standard
Subject to change refer to current price and stock-list

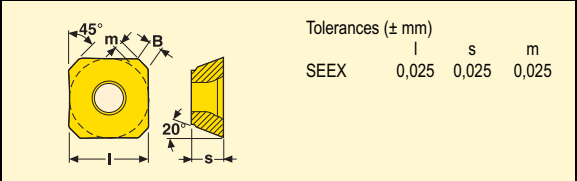
218.19-100T



Size	Dimensions in mm		
	d	s	R
100T	7,00	2,78	10

Inserts	Part No.	r _c	Cutting rake	Grades						
				CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P
	218.19 -100T-MD08-LF	0,8						■		

SEEX09/12



Size	Dimensions in mm	
	l	s
09T3	9,525	3,97
1204	12,7	4,76

Inserts	Part No.	B	Cutting rake	Grades						
				CBN10	CBN100	CBN100P	CBN150	CBN200	CBN300	CBN300P
 ZZTN	SEEX 09T3AFTN-D09-LF	1,25	0°					■		
	SEEX 1204AFTN-D16-LF	1,57	0°					■		
	SEEX 1204ZZTN-D16-LF	—	0°					■		

■ Stock standard
Subject to change refer to current price and stock-list

Size	Dimensions in mm		
	l	d	s
13...	13	7	2,5

[illegible]

* Single sided inserts.

Tolerances ($\pm$ mm)

	d	l	s
4003...	0,012	0,007	0,05

Size	Dimensions in mm		
	l	d	s
4003	40,0	–	3,5

[illegible]

530

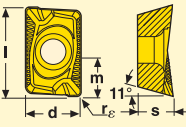
		Tolerances ($\pm$ mm)		
		d	l	s
4003...		0,012	0,007	0,05
4005...		0,012	0,015	0,05

Size	Dimensions in mm		
	l	d	s
4003	40,0	–	3,5
4005	40,0	–	5,0

[illegible]

531

ADKT



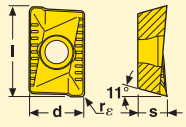
Tolerances (± mm)

	d	s	m
ADKT	0,05	0,025	0,013

Size	Dimensions in mm		
	~ l	d	s
15	15,2	9,6	5,65

Inserts	Part No.	r _e	Cutting rake	Grades											
				Coated								Uncoated			
				T150M	T200M	T25M	T350M	F15M	F17M	F25M	F40M	S10M	S25M	HX	
	ADKT 1505PDR-ME14	0,8	22°								■				

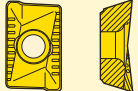
AP..



Tolerances (± mm)

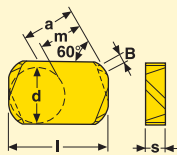
	d	s
APMT	0,05	0,13

Size	Dimensions in mm		
	~ l	d	s
10	10,28	6,65	3,5

Inserts	Part No.	r _e	Cutting rake	Grades											
				Coated								Uncoated			
				T150M	T200M	T25M	T350M	F15M	F17M	F25M	F40M	S10M	S25M	HX	
	APMT 100305TR-ME08	0,5	21°								■				

■ Stock standard
Subject to change refer to current price and stock-list

LNJN



Tolerances (± mm)

	d	s	m
LNJN22	0,08	0,025	0,007
LNJN30	0,10	0,025	0,007

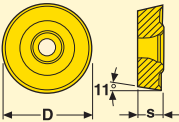
Size	Dimensions in mm		
	~ l	s	a
22	22,0	5,0	12,0
30	30,0	7,0	20,0

Inserts	Part No.	B	Cutting rake	Grades											
				Coated								Uncoated			
				T150M	T200M	T25M	T350M	F15M	F17M	F25M	F40M	S10M	S25M	HX	
	LNJN 2205DDR-MD25	2,4	0°										■		

■ Stock standard
Subject to change refer to current price and stock-list

RPHT

Size	Dimensions in mm	
	D	s
08	8,0	3,18
10	10,0	3,97

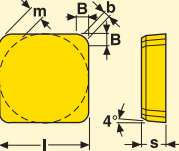


Tolerances (± mm)
RPHT D s
 0,013 0,025

Inserts	Part No.	Cutting rake	Grades											
			Coated								Uncoated			
			T150M	T200M	T350M	T25M	F15M	F17M	F25M	F40M	S10M	S25M	HX	
	RPHT 0803M0T-M06	25°				■								
	RPHT 10T3M0T-M08	25°				■								

SBAN

Size	Dimensions in mm		
	l	s	b
1203	12,7	3,18	0,7
1204	12,65	4,76	0,8



Tolerances (± mm)
SBAN l s m
 0,025 0,025 0,025
SBEX 0,025 0,025 0,025

Inserts	Part No.	B	Cutting rake	Grades											
				Coated								Uncoated			
				T150M	T200M	T25M	T350M	F15M	F17M	F25M	F40M	S10M	S25M	HX	
	SBAN 1203ZZ	0,67	0°					■							

■ Stock standard
Subject to change refer to current price and stock-list

Tolerances ($\pm$ mm)

	l	s	m
SEM25	0,13	0,13	0,18
SEM31	0,15	0,13	0,20

	Dimensions in mm	
Size	l	s
25	25,4	6,35
31	31,75	7,94

[illegible]

Technical drawing of a square nut (SNK) showing two views: a top view and a side view. The top view is a square with rounded corners, with a side length dimensioned as l . The corner radius is dimensioned as r_s with a 75° angle. The side view shows the height dimensioned as s . A dimension m indicates the thickness of the nut's flange.

Tolerances ($\pm$ mm)

	l	s	m
SNK.	0,08	0,025	0,05

Size	Dimensions in mm	
	l	s
12	12,7	4,76

[illegible]

■ **Stock standard**
Subject to change refer to current price and stock-list

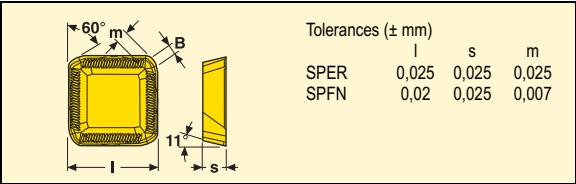
Technical drawing showing two views of a plate. The left view is a square with side length l and a tolerance of $\pm r_E$. The right view is a rectangular plate with width s and a tolerance of $\pm 12^\circ$.

Tolerances ($\pm$ mm)			
	l	s	m
SNUF12	0,13	0,13	0,20
SNUN12	0,13	0,13	0,20

Size	Dimensions in mm	
	l	s
12	12,7	4,76

[illegible]

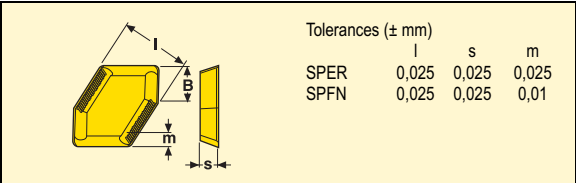
SPER/SPFN



Size	Dimensions in mm	
	l	d
1904	19,05	4,76

Inserts	Part No.	B	Cutting rake	Grades											
				Coated								Uncoated			
				T150M	T200M	T25M	T350M	F15M	F17M	F25M	F40M	S10M	S25M	HX	
SPER	SPER 1904ZETR-M17	1,0	17°			■									
	SPFN 1904ZETR-MD20	1,0	0°			■									
SPFN															

SPER-ZZ

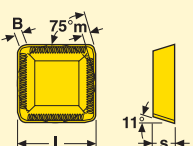


Size	Dimensions in mm		
	l	s	B
1904	19,05	4,76	12

Inserts	Part No.	r _c	Cutting rake	Grades											
				Coated								Uncoated			
				T150M	T200M	T25M	T350M	F15M	F17M	F25M	F40M	S10M	S25M	HX	
M17	SPER 1904ZZTR-M17	1,6	17°			■									

■ Stock standard
Subject to change refer to current price and stock-list

SPKN/SPKR



Tolerances (± mm)

	l	s	m
SPK.12	0,08	0,025	0,013
SPKN15	0,10	0,025	0,013
SPMN	0,08	0,13	0,13

Size	Dimensions in mm	
	l	s
1203	12,7	3,18
1504	15,875	4,76

Inserts	Part No.	B	Cutting rake	Grades											
				Coated								Uncoated			
				T150M	T200M	T25M	T350M	F15M	F25M	F30M	F40M	S10M	S25M	HX	
M13-MD15 	SPKN 1203EDR-M13	1,4	0°								■			■	
	1203EDTR-MD14	1,4	0°	■		■	■								
	1203EDTL-MD14	1,4	0°			■									
ME12-ME14 	SPKN 1203ZZR-M13	-	0°									■			
	SPKR 1203EDTR-ME12	1,2	20°								■				
	SPMN 1203EDR-MD13	1,4	0°										■		
1203ZZ/1504ZZ 	SPKR 1504EDTR-ME14	1,3	20°				■								
	SPKN 1504ZZR-M15	-	0°							■					
	1504ZZL-M15	-	0°							■					
	1504EDR-M15	1,4	0°											■	
	1504EDR-MD15	1,4	0°										■		
	1504EDTR-MD17	1,4	0°				■								

■ Stock standard
Subject to change refer to current price and stock-list

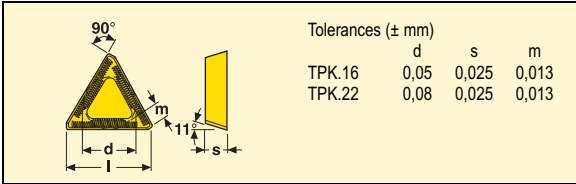
Technical drawing showing a square and a tapered plate. The square has side length l and a dashed circle with radius r_g and diameter m . The tapered plate has a thickness s and a height 11 .

Tolerances ($\pm$ mm)			
	d	s	m
SPUN	0,13	0,13	0,20

Size	Dimensions in mm	
	l	s
12	12,7	3,18

■ **Stock standard**
Subject to change refer to current price and stock-list

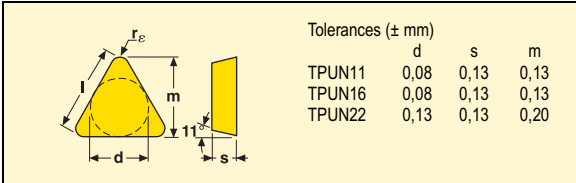
TPKN/TPKR



Size	Dimensions in mm		
	~ l	d	s
16	16,5	9,525	3,18
22	22,0	12,7	4,76

Inserts	Part No.	Cutting rake	Grades													
			Coated								Uncoated					
			T150M	T200M	T350M	T25M	T250M	F15M	F17M	F25M	F40M	S10M	S25M	HX		
 ME10-ME13	TPKN 1603PPR-M11	0°									■		■	■		
	1603PDTR-MD12	0°			■	■							■			
	TPKN 2204PPR-M14	0°													■	
	2204PDTR-MD15	0°	■		■	■					■					
	TPKR 1603PDTR-ME10	24°			■	■										
	TPKR 2204PDTR-ME13	20°			■	■					■					

TPUN

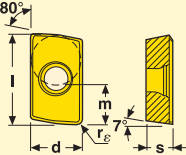


Size	Dimensions in mm		
	~ l	d	s
11	11,0	6,35	2,38
16	16,5	9,525	3,18
22	22,0	12,7	4,76

Inserts	Part No.	r _c	Cutting rake	Grades												
				Coated								Uncoated				
				T150M	T200M	T25M	T350M	F15M	F17M	F25M	F40M	S10M	S25M	HX		
	TPUN 110208												■			
	160304	0,4	0°										■	■		
	160308	0,8	0°										■	■		
	160308T	0,8	0°								■					
	TPUN 220408	0,8	0°										■	■		
	220408T	0,8	0°								■					
	220412	1,2	0°										■			
	220412T	1,2	0°								■					

■ Stock standard
Subject to change refer to current price and stock-list

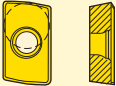
XCEX13



Tolerances (± mm)

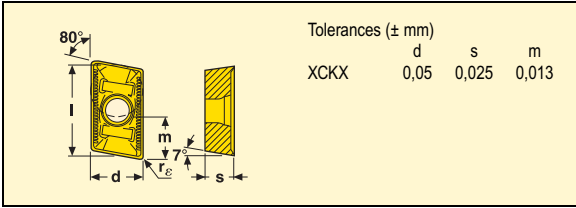
	d	s	m
XCEX	0,05	0,05	0,025

Size	Dimensions in mm		
	~ l	d	s
13T3	13,5	8,03	4,27

Inserts	Part No.	r _e	Cutting rake	Grades																				
				Coated										Uncoated										
				T150M	T200M	T25M	T250M	T350M	F15M	F17M	F20M	F25M	F30M	F40M	S10M	S25M	S60M	HX	H15	H25				
	XCEX 13T304FR-E06	0,4	18°															■						

■ Stock standard
Subject to change refer to current price and stock-list

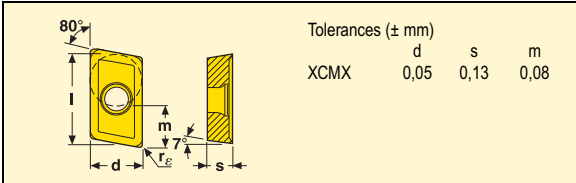
XCKX13



Size	Dimensions in mm		
	~ l	d	s
13T304R	14,7	7,922	5,03
13T308R	14,6	7,922	5,03
13T316R	14,3	7,922	5,03
13T320R	14,1	7,922	5,03
13T330R	14,1	7,922	5,03

Inserts	Part No.	r _c	Cut- ting rake	Grades																	
				Coated												Uncoated					
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F30M	F40M	S60M	HX	H15
 	XCKX 13T304R-ME10	0,4	24°				■					■	■								
	13T308R-ME10	0,8	24°									■	■				■				
	13T316R-ME10	1,6	24°														■				

XCMX13



Size	Dimensions in mm		
	~ l	d	s
13T308	14,4	8,03	4,37
13T320	14,0	8,03	4,37
13T330	13,6	8,03	4,37

Inserts	Part No.	r _c	Cut- ting rake	Grades																	
				Coated												Uncoated					
				MK1500	MK2000	MK3000	MP1500	MP2500	MP3000	MH1000	MS2500	T25M	T350M	F15M	F20M	F25M	F40M	S60M	HX	H15	H25
 	XCMX 13T308TR-M11	0,8	15°				■					■	■								
	13T320TR-M11	2,0	15°												■						
	13T330TR-M11	3,0	15°												■						

■ Stock standard
Subject to change refer to current price and stock-list
When using inserts with corner radius > 2 mm, the cutter body must be modified.



Suitable workpiece materials

- Secomax CBN10/100 and CBN150 inserts are suitable for finishing in hard steel (52-63 HRC).
- CBN200 inserts are suitable for finishing and roughing in hard steel (52-63HRC) and finishing and roughing in pearlitic cast iron with a free ferrite content of less than 5%

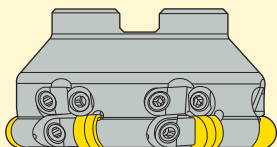
Secomax CBN300 inserts are suitable for:

- Roughing in hard steel (52-63 HRC).
- Finishing and roughing in pearlitic cast iron with a free ferrite content of less than 5%.

Note: When milling with PCBN conventional milling should be used. Use inserts with protection chamfer (S) for best tool life.

Programme

Face milling cutter type R217/220.70



Cutter especially developed for CBN inserts, 2 insert sizes. Maximum cutting depth 3 mm $D_c = 20-63$ mm and maximum cutting depth 4,5 mm $D_c = 63-200$ mm ($D_c = 125-200$ mm fitted with wiper insert).

Inserts for finishing RNGN060300E (E = honed)
RNGN/RNMN090300E

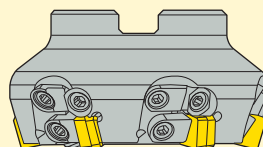
Inserts for roughing RNGN/RNMN060300S
(S = chamfered and honed)
RNGN/RNMN090300S

Wiper insert SNEX120312ZZ

The relation between cutting depth and number of usable cutting edges (per side).

D.O.C a_p (mm)	RN.. 060300	RN.. 090300	D.O.C a_p (mm)	RN.. 060300	RNMN 090300
0,1	20	24	1,2	5	7
0,15	16	20	1,5	5	6
0,2	14	17	1,8	4	5
0,25	12	15	2,0	4	5
0,3	11	14	2,5	3	4
0,4	10	12	3,0	3	4
0,5	8	10	3,5	–	4
0,8	7	8	4,0	–	3
1,0	6	7	4,5	–	–

Square shoulder and slot milling cutter type R220.68



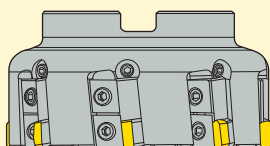
Cutter especially developed for CBN inserts, maximum cutting depth 8,0 mm $D = 63-200$ mm. ($D = 125-200$ mm fitted with wiper insert).

Inserts for finishing SNEN0903ENE-M06
(E = honed)
SNMN090308E
SNMN090312E

Inserts for roughing SNEN0903ENS-M08
(S = chamfered and honed)
SNMN090308S
SNMN090312S
SNMN090316S

Wiper insert SNEX120312ZZ

Square shoulder and slot milling cutter type R220.68



Cutter especially developed for CBN inserts. $D = 63-160$ mm

Insert with corner chamfer for finishing operations TNGN1604PNE

Insert with corner chamfer for roughing operations TNGN1604PNS

Insert with corner radius for roughing operations TNGN1604PRS

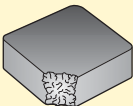
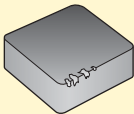
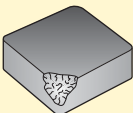
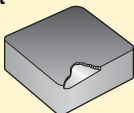
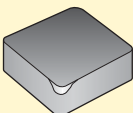
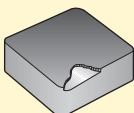
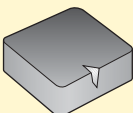
Inserts for standard milling cutters

For roughing SEEX09T3AFTN-D09-LF SEEX1204AFTN-D16-LF QuattroMill R220.53 milling cutter  Wiper insert for high quality surface finish SEEX1204ZZTN-D16-LF 	For roughing OFEN070405TN-MD16 Octomill R220.43 Face milling cutter 	For roughing SEEN1203AFTN-D16 R220.13 Face milling cutter 	For finishing SEEX1203AETN-MD13 R220.30 Face milling cutter 
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Cutting data

- Cutting speed recommendations are in the cutting data table.
- Feed rate recommendations are in the cutting data table.
- Formulae for cutting data calculation are on page 557.

Troubleshooting

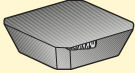
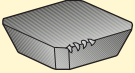
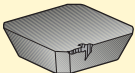
Breakage  • Do not use worn anvils. • Do not use worn wedges. • Clean seats and inserts.		Edge chipping  • Use inserts with chamfered cutting edges. • Increase the system rigidity. • Change the feed rate.	
Cutting edge breakage  • Reduce the cutting edge load (i.e. the depth of cut or feed rate). • Increase the insert corner radius (consider using round inserts). • Use inserts with chamfered cutting edges. • Change the cutting speed.		Rake face flaking while in continuous cut  • Reduce the feed rate. • Use inserts with chamfered cutting edges.	
Rapid flank wear  • Increase the cutting speed. • Increase the feed rate. • Check if the ferrite content is within the prescribed limits.		Rake face flaking when milling in irregular surfaces  • Do not use coolant. • Use chamfered inserts. • Change the feed rate. • Increase the cutting speed.	
Notching  • Reduce the feed rate. • Increase the cutting speed. • Vary the depth of cut. • Use inserts with chamfered cutting edges.			

Inserts for standard milling cutters

Cutter family range	First choice
R220.13 SEHN12	For large diameters/Wiper flat length ~ 1,6 mm.
R220.33 SEHN12	For surface finish. Due to setting angle (R220.13), Wiper flat length close to 8 mm.
OCTO R220.43 OFEN..07 OFEX..05	Roughing due to tip size. Finishing for wiper flat length, but must be properly set, and feed adjusted. Two different sizes of insert, larger selection of cutters.
R220.69 XC..13	Square shoulder milling.
R220.69-16 AP.16	Square shoulder milling, and face milling (surface finish) (Setting via cassettes, not possible with XC..13).
TURBO XOEX09 XOEX12	Square shoulder milling. Shape of the insert for chip formation (low Si alloys).

Note: All PCD milling inserts for these cutters are designed with Wiper flat for surface finish

Troubleshooting

Problem	Possible cause	Suggested actions
Rapid wear 	Wrong choice of grade Presence of Fe/Ni/Co	• Change to coarser PCD grade • Check material composition • Reduce cutting speed • Use coolant
Built-up edge 	High speed Incorrect cutting edge selection Low speed Wrong choice of grade	• Reduce cutting speed to reduce heat generation or use coolant • Choose a sharper edge • Increase speed to improve cutting action • Change to finer PCD grade
Edge chipping 	Poor rigidity Operating conditions Wrong edge design (radius or honing) High run-out Wrong choice of grade	• Minimize vibration • Check set-up, run-out • Change nose angle • Review speeds and feeds • Increase nose radius or change to chamfer type • Add a honing or slight chamfer on the edge • Check set-up • Change to a tougher grade (PCD10 → PCD20 → PCD30 → PCD30M → PCD05)
Edge breakage 	Wrong choice of grade	• Change to a tougher grade (PCD10 → PCD20 → PCD30 → PCD30M → PCD05)
Poor surface finish	Wrong choice of grade High feed speed Poor set-up of Wiper insert	• Change to finer PCD grade • Check set-up • Check offset of Wiper / Other inserts
Flaking of workpiece	Large depth of cut	• Reduce depth of cut • Add entry chamfer on the component

Recommended RPM for all Seco cutters are shown on each catalogue page.

Normally there is no need for balancing tools for RPM up to 10 000.

However in some cases balancing is necessary, for instance when using heavy tools and toolholders in small machines

Over 10 000 RPM:

We recommend balancing of tool and toolholders at least separately.

Over 20 000 RPM:

Both tool and toolholders must be balanced at least separately.

Over 30 000 RPM:

Tool and tool holders must be balanced as a unit.

The max RPM in the tables should never be exceeded.

The range of dynamomentic keys with fixed torque values are available in combinations of key grip/torque value for insert locking for most of the Seco milling products.

By using a dynamomentic key you always ensure the correct tightening force when mounting the insert.

The torque value is given in the spare part table for each cutter.

Dynamomentic keys are calibrated according to ISO 6789.

Code key: T00-15P35

T00 = Dynamomentic screw driver type for Torx Plus blade

T00T = Dynamomentic T-handle type for Torx Plus blade

H00T = Dynamomentic T-handle type for hexagonal blade

15P = Torx Plus size

35 = Torque value 3,5 Nm

Dynamomentic key*	Replaceable blade	Torque Plus size	Torque value
			
T00-06P05	T00-06P	T06P	0,5 Nm
T00-07P09	T00-07P	T07P	0,9 Nm
T00-08P12	T00-08P	T08P	1,2 Nm
T00-09P12	T00-09P	T09P	1,2 Nm
T00-09P20	T00-09P	T09P	2,0 Nm
T00-10P20	T00-10P	T10P	2,0 Nm
T00-10P30	T00-10P	T10P	3,0 Nm
T00-15P20	T00-15P	T15P	2,0 Nm
T00-15P30	T00-15P	T15P	3,0 Nm
T00-15P35	T00-15P	T15P	3,5 Nm
T00-15P50	T00-15P	T15P	5,0 Nm
T00-20P50	T00-20P	T20P	5,0 Nm

Please observe that blades are not interchangeable between screw driver type and T-handle type.

Torx Plus® is a registered trade mark belonging to Camcar-Textron (USA)

Dynamomentic key*	Replaceable blade	Torque Plus size	Torque value
			
T00T-15P50	T00T-15P	T15P	5,0 Nm
T00T-20P50	T00T-20P	T20P	5,0 Nm
T00T-20P80	T00T-20P	T20P	8,0 Nm
T00T-25P60	T00T-25P	T25P	6,0 Nm
T00T-25P80	T00T-25P	T25P	8,0 Nm
T00T-30P80	T00T-30P	T30P	8,0 Nm

Dynamomentic key*	Replaceable blade	Hexagonal size	Torque value
			
H00T-3050	H00T-3.0	3 mm	5,0 Nm
H00T-4050	H00T-4.0	4 mm	5,0 Nm
H00T-4060	H00T-4.0	4 mm	6,0 Nm
H00T-5080	H00T-5.0	5 mm	8,0 Nm
H00T-60100	H00T-6.0	6 mm	10,0 Nm

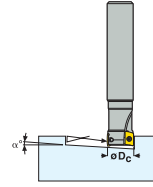
*Including blade



The milling cutter design and the clearance on the bottom side of the chosen insert determines the tool's suitability for ramping.

Maximum ramping angle and cutting depth recommendations for suitable tools are found in the tables below.

Use the cutting speeds and feed rates recommended for normal operations.



	Cutter dia Ø D _c mm	Cutter dia → D _{c2} mm	a _p max	α max
217/220.29-025	5	10	2,5	90°
	7	12	2,5	13,5°
	10	15	2,5	8°
	15	20	2,5	5°
217/220.29-03				
	4	10	3	30°
	6	12	3	90°
	10	16	3	15,5°
	14	20	3	9,6°
	19	25	3	6,5°
	26	32	3	4,5°
	29	35	3	4°
217/220.29-035				
	8	15	3,5	22°
	9	16	3,5	17,5°
	13	20	3,5	10°
	18	25	3,5	6,5°
	28	35	3,5	4°
217/220.29-04				
	4	12	4	30°
	8	16	4	90°
	12	20	4	16,5°
	17	25	4	10°
	24	32	4	6,5°
	27	35	4	5,5°
	32	40	4	4,5°
217/220.29-05				
	6	16	5	30°
	10	20	5	90°
	15	25	5	17°
	22	32	5	10°
	25	35	5	8,5°
	30	40	5	6,5°
	32	42	5	6,3°
	40	50	5	4,5°

	Cutter dia Ø D _c mm	Cutter dia Ø D _{c2} mm	a _p max	α max
217/220.29-06	4	16	6	30°
	8	20	6	30°
	12	24	6	90°
	13	25	6	90°
	20	32	6	14,7°
	23	35	6	12°
	28	40	6	9,3°
	30	42	6	4,2°
	32	44	6	7,85°
	38	50	6	6,4°
	40	52	6	6°
	50	62	6	4,65°
	51	63	6	4,55°
	54	66	6	4,25°
	63	75	6	3,6°
217/220.29-08	68	80	6	3,3°
	80	92	6	2,75°
	100	112	6	2,15°
	125	137	6	1,7°
	16	32	8	90°
	24	40	8	20°
	34	50	8	15,5°
217/220.29-10	36	52	8	13°
	47	63	8	9,5°
	50	66	8	8,5°
	64	80	8	6°
	84	100	8	5°
	109	125	8	3,5°
	144	160	8	2,5°
217/220.21	5*	25*	10	40°
	20	40	10	40°
	30	50	10	9,5°
	43	63	10	6°
	50	70	10	6°
	60	80	10	6°
	63	83	10	6°
	80	100	10	5°
	100	120	10	4,5°
	105	125	10	4,5°
	140	160	10	3°
	9	16	0,6	6,5°
	11,4	20	0,7	6°
	16,4	25	0,7	3,5°
	21	32	1,0	3,5°
	24	35	1,0	3°
	29	40	1,0	2,5°
	31	42	1,0	2°
	36	50	1,1	2°
	49,5	63	1,1	1,5°

*Centre cutting

	Cutter dia Ø D _c mm	a _p max	α max
217/220.43-05	24	3,5	19°
	32	3,5	7,75°
	40	3,5	5,65°
	42	3,5	5,25°
	50	3,5	4,25°
	63	3,5	3,25°
	80	3,5	2,5°
	100	3,5	1,8°
	125	3,5	1,5°
	160	3,5	1°
Temporary a _p max = 8 mm			
220.43-07	50	5	1,3°
	63	5	0,8°
	80	5	0,6°
	100	5	0,45°
	125	5	0,35°
	160	5	0,25°
Temporary a _p max = 12 mm			
217/220.43-07S/07SA	32	5	23°
	38	5	15,75°
	51	5	9,3°
	63	5	6°
	68	5	6,1°
	80	5	5°
	88	5	4,5°
	100	5	3,65°
	125	5	2,8°
R220.42-05	40	3,5	8°
	53	3,5	5,8°
	60	3,5	4,3°
	80	3,5	3,2°
	100	3,5	2,4°
R217/220.69-06*			
	10	5	10°
	12	5	6,5°
	14	5	5°
	16	5	4°
	18	5	3°
	20	5	2,5°
	25	5	1,5°
	32	5	1°
	40	5	1°
217/220.69-09**			
	12	8	7°
	16	8	7,6°
	18	8	6°
	20	8	4,5°
	25	8	2,9°
	32	8	1,7°
	40	8	1,5°
	50	8	1,1°
	63	8	0,9°
	80	8	0,7°
	100	8	0,55°

	Cutter dia Ø D _c mm	a _p max	α max
217/220.69-12***	20	11	8°
	25	11	5°
	32	11	3°
	40	11	2,5°
	50	11	2°
	63	11	1,5°
	80	11	1°
	100	11	0,5°
	125	11	0,5°
217/220.69-18****	32	17	7,15°
	40	17	4,5°
	50	17	3,15°
	63	17	2,4°
	80	17	1,55°
	100	17	1,3°
	125	17	1°
	160	17	0,65°
220.69-15H	50	14	1,15°
	63	14	0,8°
	80	14	0,75°
	100	14	0,45°
	125	14	0,35°
217/220.97-12	25	7,5	10°
	32	7,5	8°
	40	7,5	6°
	50	7,5	5°
217/220.97-22	32	10	15°
	40	10	10°
	50	10	8°
	63	10	6°
	80	10	5°
	100	10	4°

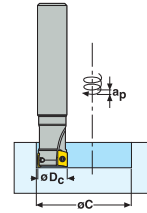
When changing ramping direction, using max. ramping angle, retract the cutter *0,6 mm, **0,8 mm, ***1,4 mm, ****1,9 mm.

Helical interpolation ramping

The milling cutter design and the clearance on the bottom side of the chosen insert determines the tool's suitability for helical interpolation ramping.

Maximum and minimum hole diameters and maximum cutting depth per revolution recommendations for suitable tools are in the tables below.

Use the cutting speeds and feed rates recommended for normal operations.



	Cutter dia Ø Dc mm	Cutter dia Ø Dc2 mm	C min/ap max		C max/ap max	
			C min Ø	ap max mm	C max Ø	ap max mm
217/220.29-025	5	10	15	2,5	19	2,5
	7	12	19	2,5	23	2,5
	10	15	25	2,5	29	2,5
	15	20	35	2,5	39	2,5
217/220.29-03	4*	10*	14	3	19	3
	6	12	18	3	23	3
	10	16	26	3	31	3
	14	20	34	3	39	3
	19	25	44	3	49	3
	26	32	58	3	63	3
	29	25	64	3	69	3
	34	40	74	3	79	3
217/220.29-035	8	15	23	3,5	29	3,5
	9	16	25	3,5	31	3,5
	13	20	33	3,5	39	3,5
	18	25	43	3,5	49	3,5
	28	35	63	3,5	69	3,5
217.29-04	4*	12*	16	4	23	4
	8	16	24	4	31	4
	12	20	32	4	39	4
	17	25	42	4	49	4
	24	32	56	4	63	4
	27	35	62	4	69	4
	32	40	72	4	79	4
	42	50	92	4	99	4
217/220.29-05	6*	16*	22	5	31	5
	10	20	30	5	39	5
	15	25	40	5	49	5
	22	32	54	5	63	5
	25	35	60	5	69	5
	30	40	70	5	79	5
	40	50	90	5	99	5

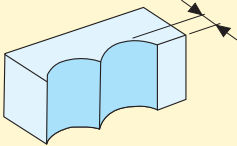
	Cutter dia Ø Dc mm	Cutter dia Ø Dc2 mm	C min/ap max		C max/ap max	
			C min Ø	ap max mm	C max Ø	ap max mm
217/220.29-06	4*	16*	25	6	30	6
	8	20	28	6	8	6
	12	24	36	6	46	6
	13	25	38	6	48	6
	20	32	52	6	62	6
	23	35	58	6	68	6
	28	40	68	6	78	6
	32	44	76	6	86	6
	28	50	88	6	98	6
	40	52	92	6	102	6
	50	62	112	6	122	6
	51	63	114	6	124	6
	54	66	120	6	130	6
	63	75	138	6	148	6
	68	80	148	6	158	6
	80	92	172	6	182	6
	100	112	212	6	222	6
	125	137	262	6	272	6
217/220.29-08						
	16	32	48	8	62	8
	24	40	64	8	78	8
	34	50	84	8	98	8
	36	52	88	8	102	8
	47	63	110	8	124	8
	50	66	116	8	130	8
	64	80	144	8	158	8
	84	100	184	8	198	8
	109	125	234	8	248	8
217/220.29-10	144	160	304	8	318	8
	5*	25*	25	10	48	10
	20	40	60	10	78	10
	30	50	80	10	98	10
	43	63	106	10	124	10
	50	70	120	10	138	10
	60	80	140	10	158	10
	63	83	146	10	164	10
	80	100	180	10	198	10
	100	120	220	10	238	10
	105	125	230	10	248	10
	140	160	300	10	318	10

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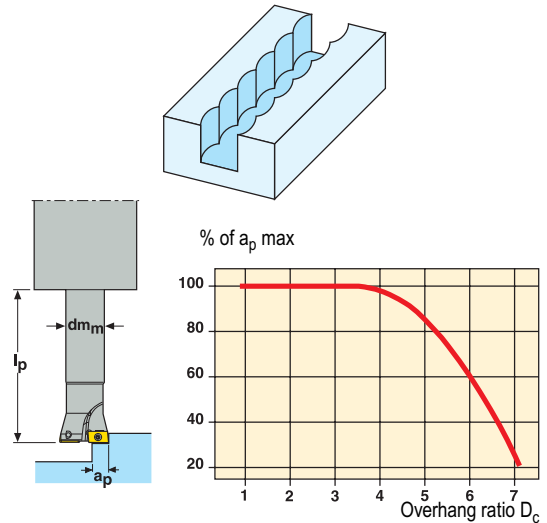
The insert design and the insert clamping system determines the tool's suitability for plunging.
Maximum cutting depth recommendations for suitable tools are in the tables below.
Note that the definition of a_p is different for plunge milling.
Use the cutting speeds and feed rates recommended for normal operations.

Values for milling cutters designed for plunge milling only can be found in the chapter Plunge milling cutters R217/220.79 Milling 2

Plunging

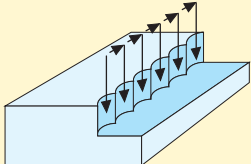


Type of cutter	a_p max mm
220.43...-05	10
220.43...-07W	8
217/220.43...07SA/07S	12
217.69-06	3,5
217/220.69...-09	4
217/220.69...-12	7
217/220.69...15H/15.xH	10
217/220.29-03	3
217/220.29-04	4
217/220.29-05	5
217/220.29-06	6
217/220.29-08	8
217/220.29-10	10
217.96-08	7,5



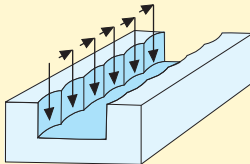
a_p max can normally be used if the overhang ratio is up to 4 but should be reduced at higher ratios as shown in the graph.

Plunging - Axial feed direction



Type of cutter	a_p max mm
220.43...-05	5*
220.43...-07W	7*
217/220.43...07SA/07S	7*
217.69-06	3,5*
217/220.69...-09	4*
217/220.69...-12	7*
217/220.69...15H/15.xH	10*
217/220.29-03	3
217/220.29-04	4
217/220.29-05	5
217/220.29-06	6
217/220.29-08	8
217/220.29-10	10
217.96-08	7,5

Slotting - Axial feed direction



Type of cutter	a_p max mm
220.43...-05	5*
220.43...-07W	7*
217/220.43...07SA/07S	7*
217.69-06	3,5*
217/220.69...-09	4*
217/220.69...-12	7*
217/220.69...15H/15.xH	10*
217/220.29-03	3
217/220.29-04	4
217/220.29-05	5
217/220.29-06	6
217/220.29-08	8
217/220.29-10	10
217.96-08	7,5

*To create a flat bottom surface, a_p max = the wiper flat width. Dimensions to be found on the cutting data pages.

Nomenclature and formulae

RPM

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_c} \quad (\text{rev/min})$$

Cutting speed

$$v_c = \frac{n \cdot \pi \cdot D_c}{1000} \quad (\text{m/min})$$

Feed speed

$$v_f = n \cdot Z_n \cdot f_z \quad (\text{mm/min})$$

$$v_f = n \cdot z_c \cdot f_z \quad (\text{mm/min})$$

Feed per revolution

$$f = Z_n \cdot f_z \quad (\text{mm/rev})$$

$$f = z_c \cdot f_z \quad (\text{mm/rev})$$

Metal removal rate

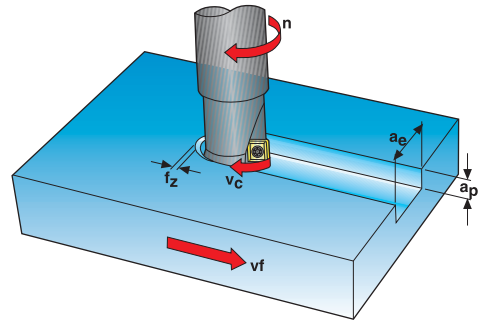
$$Q = \frac{a_e \cdot a_p \cdot v_f}{1000} \quad (\text{cm}^3/\text{min})$$

Cutting speed and RPM for copying

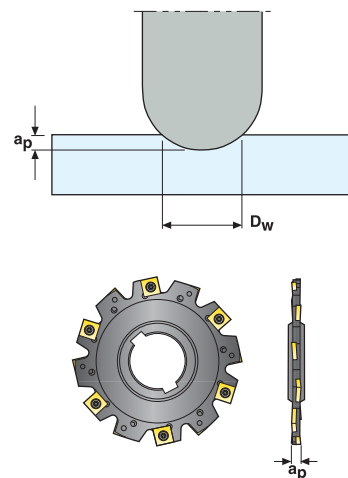
$$v_c = \frac{n \cdot \pi \cdot D_W}{1000} \quad (\text{m/min})$$

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_W} \quad (\text{RPM})$$

$$D_W = 2 \cdot \sqrt{a_p (D_C - a_p)} \quad (\text{mm})$$



a_e	= Width of cut mm/radial depth of cut	mm
a_p	= Depth of cut mm/axial depth of cut	mm
D_c	= Cutter diameter	mm
f	= Feed per revolution	mm/rev
f_z	= Feed per tooth	mm/tooth
z_c	= Effective No. of teeth for calculation of feed speed or feed per rev (see below)	
n	= RPM	rev/min
Q	= Material removal rate	cm ³ /min
v_c	= Cutting speed	m/min
v_f	= Feed speed	mm/min
Z_n	= No. of teeth	



Effective No. of teeth (z_c)

The effective No. of teeth (z_c) is used to calculate the feed speed (v_f) and the feed per revolution (f). For most of the cutters the effective No. of teeth (z_c) is equal to the No. of teeth in the cutter (z_n), but for some of the cutters z_c is less than z_n .

Example: Disc mill 335.19

Total No. of teeth (z_n) = 12

Effective No. of teeth (z_c) = 6

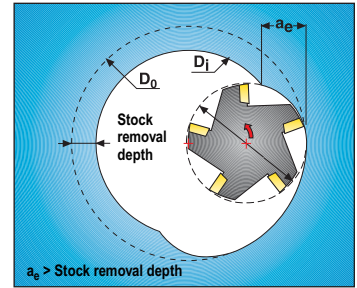
Explanation: 6 inserts on one side of the cutter and 6 overlapping inserts on the other side are used to get the full width (a_p), which means $z_c = 6$.

Internal circular interpolation

When using circular interpolation or helical interpolation ramping to increase the diameter of a hole in a workpiece, the stock removal depth is not the same as the width of cut value. The real width of cut must be calculated from the formula below.

The width of cut value is then used for calculation of feed/tooth and feed speed.

$$a_e = \frac{D_o^2 - D_i^2}{4 (D_o - D_c)}$$

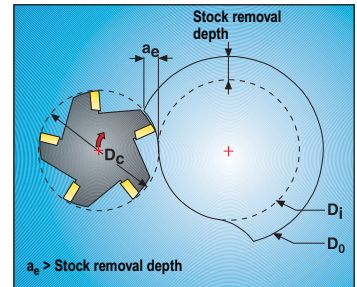


External circular interpolation

When using external circular interpolation or helical interpolation ramping to decrease the diameter of a round workpiece the stock removal depth is not the same as the width of cut value. The real width of cut must be calculated from the formula below.

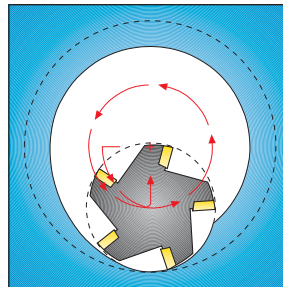
The width of cut is then used for calculation of feed/tooth and feed speed.

$$a_e = \frac{D_o^2 - D_i^2}{4 (D_i + D_c)}$$

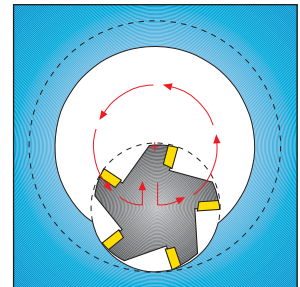


Increase the width of cut successively to full value

For circular interpolation operations it is recommended to successively increase the width of cut up to full value. When using radial infeed up to full width of cut, reduce the feed/tooth and feed speed to half.



Successive increase of width of cut – recommended method.



Radial infeed – Reduce feed/tooth.

Feed speed related to the centre of the cutter

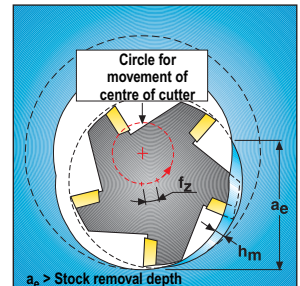
When calculating feed speed and feed/tooth from average chip thickness using circular interpolation or helical interpolation ramping in an operation, the feed speed and feed/tooth are always related to the centre and not to the periphery of the cutter.

Int.

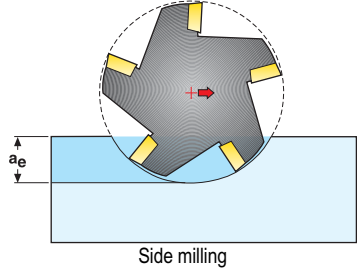
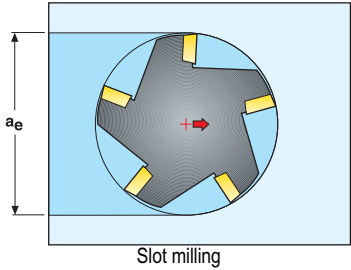
$$v_f = \frac{(D_o - D_c) \cdot n \cdot z_c \cdot f_z}{D_o}$$

Ext.

$$v_f = \frac{(D_i + D_c) \cdot n \cdot z_c \cdot f_z}{D_i}$$



Slot milling compared with side milling



Relative engagement of the cutter diameter ($a_e/D_c = \%$)	Multiply the feed per tooth by the following factor
30%	1.25
20%	1.5
10%	2.0
5%	3.0

Calculation of feed per tooth and cutting speed for side milling operations

When using side milling it is necessary to increase the feed per tooth to keep the chip thickness at the same value. It is also possible to increase the cutting speed and keep the same tool life. Use the tables below.

This table can be used for cutters with cutting edge angle = 90

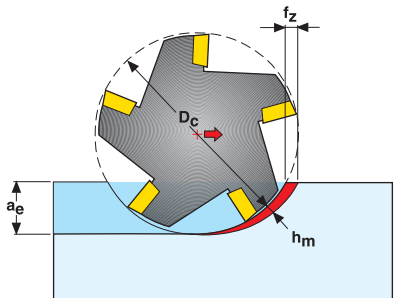
a_e/D_c %	Feed Per Tooth, mm/tooth (f_z)														Speed Factor
	0,03	0,06	0,08	0,10	0,15	0,20	0,25	0,30	0,40	0,50	0,60	0,80	1,00		
	Average Chip Thickness, mm/tooth (h_m)														
Width of cut up to and including D/2															
2 (0.02)					0,02	0,03	0,04	0,04	0,06	0,07	0,08	0,11	0,14	1.8	
3 (0.03)				0,02	0,03	0,03	0,04	0,05	0,07	0,09	0,10	0,14	0,17	1.7	
5 (0.05)			0,02	0,02	0,03	0,04	0,06	0,07	0,09	0,11	0,13	0,18	0,22	1.6	
10 (0.10)		0,02	0,02	0,03	0,05	0,06	0,08	0,09	0,12	0,16	0,19	0,25	0,31	1.5	
15 (0.15)	0,011	0,02	0,03	0,04	0,06	0,08	0,09	0,11	0,15	0,19	0,23	0,30		1.4	
20 (0.20)	0,013	0,03	0,03	0,04	0,06	0,09	0,11	0,13	0,17	0,22	0,26			1.35	
30 (0.30)	0,016	0,03	0,04	0,05	0,08	0,10	0,13	0,16	0,21	0,26	0,31			1.3	
40 (0.40)	0,018	0,04	0,05	0,06	0,09	0,12	0,15	0,18	0,23	0,29				1.25	
50 (0.50)	0,02	0,04	0,05	0,06	0,10	0,13	0,16	0,19	0,25	0,32				1.2	
Slotting (Width of cut = D)															
100 (1.00)	0,02	0,04	0,05	0,06	0,10	0,13	0,16	0,19	0,25	0,32				1.0	

--- = Feed per tooth correction example: at 20% engagement also increase speed by 1.35

Instead of using the table above for calculating h_m and f_z , the following formula could be used if $a_e/D_c < 30\%$.

$$h_m = f_z \cdot \sqrt{\frac{a_e}{D_c}}$$

$$f_z = h_m \cdot \sqrt{\frac{D_c}{a_e}}$$



Calculation of feed per tooth and cutting speed for side milling operations

Side milling can of course be used for a face milling operation with a width of cut value less than half the diameter of the cutter.

This table can be used for cutters with cutting edge angle = 45°

a_e/D_c %	Feed Per Tooth, mm/tooth (f_z)													Speed Factor
	0,03	0,06	0,08	0,10	0,15	0,20	0,25	0,30	0,40	0,50	0,60	0,80	1,00	
	Average Chip Thickness, mm (h_m)													
Width of cut up to and including $D_c/2$														
2 (0.02)					0,01	0,02	0,02	0,03	0,04	0,05	0,06	0,08	0,10	1.8
3 (0.03)				0,01	0,02	0,02	0,03	0,04	0,05	0,06	0,07	0,10	0,12	1.7
5 (0.05)			0,01	0,02	0,02	0,03	0,04	0,05	0,06	0,08	0,09	0,13	0,16	1.6
10 (0.10)		0,01	0,02	0,02	0,03	0,04	0,05	0,07	0,09	0,11	0,13	0,18	0,22	1.5
15 (0.15)	0,008	0,02	0,02	0,03	0,04	0,05	0,07	0,08	0,11	0,13	0,16	0,21		1.4
20 (0.20)	0,009	0,02	0,02	0,03	0,05	0,06	0,08	0,09	0,12	0,15	0,18			1.35
30 (0.30)	0,011	0,02	0,03	0,04	0,05	0,07	0,09	0,11	0,15	0,18	0,22			1.3
40 (0.40)	0,012	0,02	0,03	0,04	0,06	0,08	0,10	0,12	0,17	0,21				1.25
50 (0.50)	0,01	0,03	0,04	0,05	0,07	0,09	0,11	0,14	0,18	0,23				1.2
Face milling full engagement (Width of cut = D_c)														
100 (1.00)	0,01	0,03	0,04	0,05	0,07	0,09	0,11	0,14	0,18	0,23				1.0

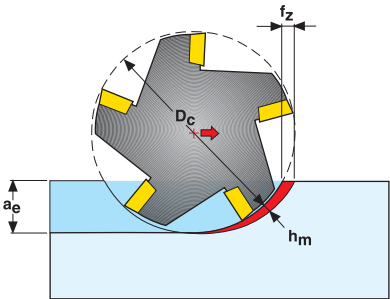
This table can be used for cutters with cutting edge angle = 60°

a_e/D_c %	Feed Per Tooth, mm/tooth (f_z)													Speed Factor
	0,03	0,06	0,08	0,10	0,15	0,20	0,25	0,30	0,40	0,50	0,60	0,80	1,00	
	Average Chip Thickness, mm (h_m)													
Width of cut up to and including $D_c/2$														
2 (0.02)					0,02	0,02	0,03	0,04	0,05	0,06	0,07	0,10	0,12	1.8
3 (0.03)				0,01	0,02	0,03	0,04	0,04	0,06	0,07	0,09	0,12	0,15	1.7
5 (0.05)			0,02	0,02	0,03	0,04	0,05	0,06	0,08	0,10	0,12	0,15	0,19	1.6
10 (0.10)		0,02	0,02	0,03	0,04	0,05	0,07	0,08	0,11	0,13	0,16	0,22	0,27	1.5
15 (0.15)	0,010	0,02	0,03	0,03	0,05	0,07	0,08	0,10	0,13	0,16	0,20	0,26		1.4
20 (0.20)	0,011	0,02	0,03	0,04	0,06	0,07	0,09	0,11	0,15	0,19	0,22			1.35
30 (0.30)	0,013	0,03	0,04	0,04	0,07	0,08	0,11	0,13	0,18	0,22	0,27			1.3
40 (0.40)	0,015	0,03	0,04	0,05	0,08	0,10	0,13	0,15	0,20	0,25				1.25
50 (0.50)	0,02	0,03	0,04	0,06	0,08	0,11	0,14	0,17	0,22	0,28				1.2
Face milling full engagement (Width of cut = D_c)														
100 (1.00)	0,02	0,03	0,04	0,06	0,08	0,11	0,14	0,17	0,22	0,28				1.0

Instead of using the table above for calculating h_m and f_z , the following formula could be used if $a_e/D_c < 30\%$.

$$h_m = f_z \cdot \sqrt{\frac{a_e}{D_c}} \cdot \sin \kappa$$

$$f_z = h_m \cdot \sqrt{\frac{D_c}{a_e}} \cdot \frac{1}{\sin \kappa}$$

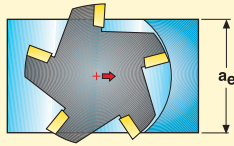


Milling

Calculating the power demand

$$P_c = \frac{a_p \cdot a_e \cdot v_f}{60\,000\,000 \cdot \eta} \cdot k_c$$

P_c = Power (kW)
 a_p = Depth of cut (mm)
 a_e = Width of cut (mm)
 v_f = Feed speed (mm/min)
 η = Efficiency
 k_c = Cutting force per mm²



Calculating average chip thickness (h_m) and cutting force per mm² (k_c)

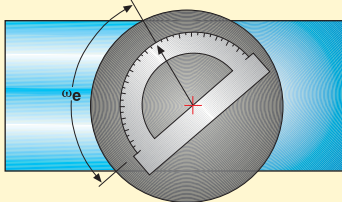
$$h_m = \frac{360 \cdot f_z \cdot a_e}{\pi \cdot D_c \cdot \omega_e} \cdot \sin \kappa$$

h_m = Average chip thickness (mm)
 f_z = Feed per tooth (mm/tooth)
 D_c = Cutter diameter (mm)
 ω_e = Engagement angle
 κ = Cutting edge angle

$$k_c = \frac{1 - 0,01 \cdot \gamma_o}{h_{mc}} \cdot k_{c1.1}$$

γ_o = Effective rake angle (rake angle of cutter+rake angle of insert)
 m_c = Exponent (see page 563)
 $k_{c1.1}$ = Cutting force for 1 mm chip thickness (N/mm²) (see page 563)

Engagement angle



Engagement a_e/D_c	Engagement angle ω_e
75%	97°
100%	180°

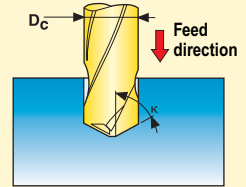
Engagement a_e/D_c	Engagement angle ω_e
5%	26°
10%	37°
25%	60°

Drilling/Plunging

Calculating the power demand

$$P_c = \frac{Q}{60\,000 \cdot \eta} \cdot k_c$$

P_c = Power (kW)
 Q = Metal removal rate (cm³/min)
 η = Efficiency
 k_c = Cutting force per mm²



Calculating metal removal rate (Q)

Example: For a drill

$$A_T = \frac{\pi \cdot D_c^2}{4}$$

$$Q = \frac{v_f \cdot A_T}{1000}$$

(The factor 1000 is used to get cm³/min)

A_T = Cross section area of the cut in feed direction

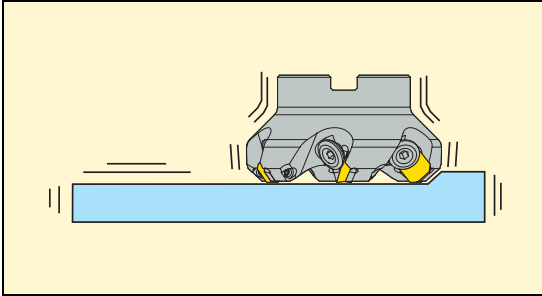
Calculating cutting force mm² (k_c) and nominal chip thickness (hD)

$$k_c = \frac{1 - 0,01 \cdot \gamma_o}{h_{Dmc}} \cdot k_{c1.1}$$

$$h_D = f_z \cdot \sin \kappa$$

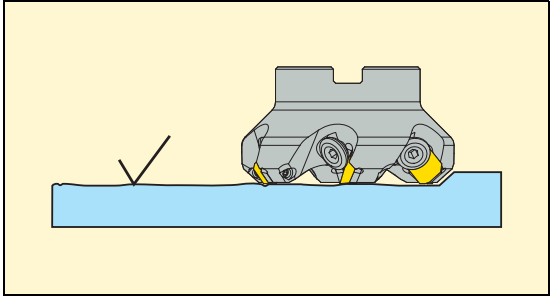
f_z = Feed per tooth (mm/tooth)
 h_D = Nominal chip thickness (mm)
 $k_{c1.1}$ = Cutting force for 1 mm chip thickness (N/mm²) (see page 563)
 m_c = Exponent (see page 563)
 κ = Cutting edge angle
 γ_o = Effective rake angle (rake angle of cutter+rake angle of insert)

Vibrations



- Improve the stability of cutter and workpiece.
- Change cutter positioning.
- Minimize tool overhang.
- Reduce the cutting speed.
- Increase the feed rate.
- Reduce the depth of cut.

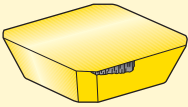
Poor surface finish



- Improve the stability of cutter and workpiece.
- Minimize tool overhang.
- Reduce the feed rate.
- Increase the cutting speed
- Use a coolant.
- Use wiper inserts.

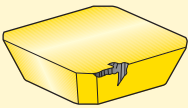
Tool life problems

Rapid flank wear



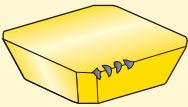
- Reduce the cutting speed.
- Increase the feed rate.
- Climb milling.

Rapid notch wear



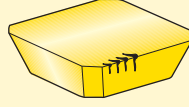
- Reduce the cutting speed.
- Increase the feed rate.
- Increase the depth of cut.
- Climb milling.
- Change cutter positioning.

Chipping



- Increase the cutting speed.
- reduce the feed rate.
- Conventional milling.
- Improve chip evacuation.
- Change cutter positioning.
- Minimize tool overhang.
- Improve stability.

Comb cracks



- Reduce the cutting speed.
- Reduce the feed rate
- No coolant.
- Change cutter positioning.

Built up edge



- Increase the cutting speed.
- Increase the feed rate
- No coolant.
- Climb milling.
- Change cutter positioning.

Steel

		R_m (N/mm ²)	$k_c 1.1$ (N/mm ²)	m_c
1	Very soft low carbon steels. Purely ferritic steels.	<450	1350	0,21
2	Free cutting steels.	400 <700	1500	0,22
3	Structural steels. Ordinary carbon steels with low to medium carbon content (<0,5%C).	450 <550	1500	0,25
4	Carbon steels with high carbon content (>0,5%C). Medium hard steels for toughening. Ordinary low alloy steels. Ferritic and martensitic stainless steels.	550 <700	1700	0,24
5	Normal tool steels. Harder steels for toughening. Martensitic stainless steels.	700 <900	1900	0,24
6	Difficult tool steels. High-alloy steels with high hardness. Martensitic stainless steels.	900 <1200	2000	0,24
7	Difficult high-strength steels with 42-56 HRC hardness. Hardened steels from material group 3-6. Martensitic stainless steels.	>1200	2900	0,22

Stainless steel

8	Easy austenitic stainless steels. Free cutting stainless steels. Calcium treated stainless steels.		1750	0,22
9	Moderately difficult stainless steels. Austenitic and duplex stainless steels.		1900	0,20
10	Difficult stainless steels. Austenitic and duplex stainless steels.		2050	0,20
11	Very difficult stainless steels. Austenitic and duplex stainless steels.		2150	0,20

Cast iron

12	Medium hard cast iron. Grey iron.		1150	0,22
13	Low alloy cast iron. Malleable cast iron. Nodular cast iron.		1225	0,25
14	Moderately difficult alloy cast iron. Moderately difficult malleable cast iron. Nodular cast iron.		1350	0,28
15	Difficult high alloy cast iron. Difficult malleable cast iron. Nodular cast iron.		1470	0,30

Other materials

16	Free cutting non-ferrous materials. Aluminium with <16% Si. Brass, Zinc, Magnesium.		700	0,25
17	Non-ferrous materials. Aluminium with >16% Si. Bronze, Cupro-nickel.		700	0,27
20	Nickel-, Cobalt- and Iron-based heat resistant alloys with hardness <30 HRC. Incoloy 800, Inconel 601, 617, 625. Monel 400.		2600	0,24
21	Nickel-, Cobalt- and Iron-based heat resistant alloys with hardness >30 HRC. Incoloy 925, Inconel 718, 750-X, Monel K-500.		3300	0,24
22	Titanium based alloys, Ti6Al-4V.		1450	0,23

$k_{c1.1}$ -values with 0 degree effective cutting rake angle. For other rake angles, reduce the $k_{c1.1}$ -value by 1% for every degree increase in the cutting rake angle and vice versa, m_c is the exponent used for calculating power demand. Bear in mind that the R_m -value is only an aid in the selection of the material group when the material has been worked by rolling, drawing, heat treatment or other methods that increase the strength of the material.

Steels

Seco mat. group No.	For power calculation $k_{c1.1} m_c$	Workpiece materials into material groups								
		AISI	W-stoff	DIN	BS	AFNOR	SS	U.N.E./ I.H.A.	JIS	UNI
1	1350 0,21	1106	1.0201	St 36	–	Fd 5	1160	–	–	–
		1010	1.1121	Ck 10	045 M 10	XC 10	1265	F.1510	S 10 C	C10
		–	1.1121	St 37-1	4360 40 A	–	1300	–	S 10 C	–
		A27 65-35	1.0443	GS-45	A1	E 23-45 M	1305	F.221	–	–
		–	1.0416	GS-38	–	230-400 M	1306	–	–	–
		A570 36	1.0038	RSt 37-2	4360 40 C	E 24-2 Ne	1311	–	–	–
		A573-81 65	1.0116	St 37-3	4360 40 B	E 24-U	1312	–	–	Fe37-3
		A515 65	1.0345	H I	1501 161	A 37 CP	1330	F.1110	SGV 410, 450, 480, 490	–
		1015	1.0401	C 15	080 M 15	CC 12	1350	F.1110	S 15 C	C15:C16
		1022	1.1133	GS-20Mn 5	120 M 19	20 M 5	1410	F.1515	SMnC 420	G22Mn3
		A36	–	St 44-2	4360 43 A	NFA 35-501 E 28	1411	–	–	–
		A573-81	1.0144	St 44-3	4360 43 C	E 28-3	1412	–	SMH 400 A, B, C	–
		–	–	StE 320-3Z	1501 160	–	1421	–	–	–
		–	1.0425	H II	–	A 42 CP	1432	–	SGV 410, 450, 480	–
		1025	1.1158	Ck 25	050 A 20	XC 25	1450	F.1120	S 25 C	–
2	1500 0,22	1213	1.0715	9 SMn 28	230 M 07	S 250	1912	–	SUM 22	CF9SMn28
		(12L13)	1.0718	9 SMnPb 28	–	S 250 Pb	1914	–	SUM 22 L	CF9SMnPb28
		–	1.0723	15 S 20	210 A 15	S 300	1922	–	SUM 32	–
		(12L14)	1.0737	9 SMnPb 36	–	S 300 Pb	1926	–	–	CF9SMnPb36
		(12L13)	1.0718	9 SMnPb 28	–	–	1940	–	(SUM 32 L)	CF9SMnPb28
		1140	1.0726	35 S 20	212 M 36	35 MF 4	1957	–	–	–
		1151	1.0727	45 S 20	212 M 44	45 MF 4	1973	–	–	–
		–	–	–	–	–	–	–	–	–
3	1500 0,25	1015	1.1141	Ck 15	080 M 15	XC 18	1370	F.1511	S 15 CK	C16
		A27 70-36	1.0551	GS-52	A2	280-480 M	1505	–	–	–
		1035	1.0501	C 35	060 A 35	AF 55 C 35	1550	F.1130	S 35 C	C35
		1035	1.1181	CK 35	080 A 32	XC 38	1572	F.1135	S 35 C	C35
		A148 80-40	1.0553	GS-60	A3	320-560 M	1606	–	–	C45
		1043	1.0503	C 45	080 M 46	AF 65 C 45	1650	F.5110	S 45 C	C45
		1055	1.0535	C 55	070 M 55	–	1655	F.1150	S 55 C	C55
		1042	1.1191	Ck 45	080 A 47	XC 45	1660	F.1140	S 45 C	C45
		A537 1	1.0473	19 Mn 6	1501 224	A 52 CP	2101	F.1518	SGV 410, 450, 480	–
		A662 C	1.0436	ASt 45	1501 224	A 48 FP	2103	–	–	–
		A738	1.0577	ASt 52	1501 224	A 52 FP	2107	–	–	–
		–	1.0570	St 52-3	4360 50 B	E 36-3	2132	–	SM 490 A, B, C	Fe52BFN/Fe52CFN
		A572-60	–	17 MnV 6	4360 55 E	NFA 35-501 E 36	2142	–	–	–
		A572-60	1.8900	StE 380	4360 55 E	–	2145	–	–	FeE390KG
		–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–

Steels

Seco mat. group No.	For power calculation $k_{c1.1} m_c$	Workpiece materials into material groups								
		AISI	W-stoff	DIN	BS	AFNOR	SS	U.N.E./ I.H.A.	JIS	UNI
4	1700 0,24	1045	1.1730	C 45W	En 43 B	–	1672	F.114	–	–
		1042	1.1191	Ck 45	080 M 46	–	1672	–	S 45 C	C45
		1064	1.1221	Ck 60	060 A 62	XC 65	1678	F.1150	S 58 C	C60
		1070	1.1231	Ck 67	070 A 72	XC 68	1770	F.5103	–	C70
		1080	1.1248	Ck 75	060 A 78	XC 75	1774	F.5107	–	–
		1095	1.1274	Ck 101	060 A 96	XC 100	1870	F.5117	SUP 4	–
		9254	1.0904	55 Si 7	250 A 53	55 S 7	2090	F.144	–	55Si8
		1335	1.1167	36 Mn 5	150 M 36	40 M 5	2120	F.411	SMn 438(H)	–
		5120	1.0841	St 52-3	150 M 19	20 MC 5	2172	F.431	–	Fe52
		A387 12-2	1.7337	16 CrMo 4 4	1501 620	15 CD 4.5	2216	–	–	12CrMo910/
		A182 F-22	1.7380	10 CrMo 9 10	1501 622	12 CD 9.10	2218	F.155	–	G14CrMo910
		4130	1.7218	25 CrMo 4	CDS 110	25 CD 4	2225	F.1251	SCM 420	25CrMo4
		6150	1.8159	50 CrV 4	735 A 50	50 CV 4	2230	F.143	SUP 10	50CrV4
		4135	1.2330	35 CrMo 4	708 A 37	34 CD 4	2234	F.1250	SCM 432	–
		–	1.8515	31 CrMo 12	722 M 24	30 CD 12	2240	F.1712	–	30CrMo12
		4142	1.2332	47 CrMo 4	708 M 40	42 CD 4	2244	–	SCM 440	–
		4140	1.7225	42 CrMo 4	708 M 40	42 CD 4	2244	F.1252	SCM 440	42CrMo4
		5140	1.7045	42 Cr 41	530 A 40	42 C 4 TS	2245	F.1207	SCr 440	–
		5155	1.7176	55 Cr 31	527 A 60	55 C 3	2253	–	SUP 9(A)	55Cr31
		52100	1.3505	100 Cr 6	534 A 99	100 C 6	2258	F.5230	SUJ 2, SUJ 4	100Cr6
		8620	1.6523	21 NiCrMo 2	805 H 20	20 NCD 2	2506	F.1522	SNCM 220(H)	20NiCrMo2
		5115	1.7131	16 MnCr 5	527 M 17	16 MC 5	2511	F.1516	–	16MnCr5
		A204A	1.5415	15 Mo 3	1501 240	15 D 3	2912	–	–	16Mo3
		A355A	1.8509	42 CrAlMo 7	905 M 39	40 CAD 6.12	2940	F.1740	SUS 403	41CrAlMo7
		403	1.4000	X6 Cr 13	403 S 17	Z 8 C 13	2301	–	SUS 410 S	X6Cr13
		(410S)	1.4001	X7 Cr 14	(403 S17)	Z 8 C 13	2301	F.3110	SUS 410	X6Cr13
		410	(1.4006)	G-X 10 Cr 13	410 S21	Z 10 C 13 M	2302	F.3401	–	X12Cr13
		P4	1.2341	X6 CrMo 4	–	–	–	–	SUS 405	–
		405	1.4724	X6 CrAl 13	405 S 17	Z 8 CA 12	–	–	SUS 430	X10CrAl12
		430	1.4016	X6 Cr 17	430 S 17	Z 8 C 17	2320	F.3113	SUS 434	X8Cr17
		434	1.4113	X6 CrMo 17	434 S 17	–	2325	–	–	X8CrMo17
		416	1.4005	X12 CrS 13	416 S 21	Z 11 CF 13	2380	F.3411	SUS 430 F	X12CrS13
		430F	1.4104	X12 CrMoS 17	420 S 37	Z 13 CF 17	2383	F.3117	SUH 409	X10CrS17
		409	1.4512	X5 CrTi 12	409 S 19	Z 6 CT 12	–	–	–	X6CrTi12
		430Ti	1.4510	X6 CrTi 17	–	Z 4 CT 17	–	–	–	X6CrTi17
5	1900 0,24	W1	1.1545	C105W1	BW1A	Y 105	1880	F.5118	–	C38KU
		420	1.4021	X42 Cr 13	420 S 37	Z 20 C 13	(2314)	F.3402	SUS 420 J1	X20Cr13
		–	1.2108	90 CrSi 5	–	–	2092	F.5230	–	C100KU
		L3	1.2210	115 CrV 3	BL 3	Y 100 C 6	(2140)	F.520L	–	–
		P20 + 1	1.2312	40 CrMnMoS 8 6	–	–	–	X210CrW12	–	–
		O1	1.2510	100 MnCrW 4	BO1	8 Mo 8	2140	F.5220	–	95MnWCr5KU
		6 F7	1.2767	X45 NiCrMo 6 7	En 30 B	–	–	–	–	–
		–	–	31 NiCrMo 13 4	830 M 31	–	2534	F.1270	–	–
		4340	1.6582	34 CrNiMo 6	817 M 40	35 NCD 6	2541	F.1280	SNCM 447	35NiCrMo6KB
		–	1.6746	32 NiCrMo 14 5	830 M 31	35 NCD 14	–	F.1260	–	–
		S1	1.2542	45 WCrV 7	BS1	55 WC 20	2710	F.5241	–	45WCrV8KU
		420	1.4021	X20 Cr 13	420 S 37	Z 20 C 13	2303	F.5261	SUS 420 J 1	X20Cr13
		(420)	1.4028	X30 Cr 13	420 S 45	Z 30 C 13	(2304)	F.5263	(SUS 420 J 1)	X30Cr13/XG40Cr13
		(420)	1.4031	X40 Cr 13	–	Z 40 C 14	(2304)	F.3404	(SUS 420 J 1)	X40Cr14
		–	1.4923	X22 CrMoV 12 1	–	–	–	–	–	–
		431	1.4057	X20 CrNi 17 2	431 S 29	Z 15 CN 16-02	2321	F.313	SUS 431	X16CrNi16
		440B	1.4112	X90 CrMoV 18	–	–	–	–	SUS 440 B	–

Steels

Seco mat. group No.	For power calculation $k_{c1.1} m_c$	Workpiece materials into material groups								
		AISI	W-stoff	DIN	BS	AFNOR	SS	U.N.E./ I.H.A.	JIS	UNI
6	2000 0,24	P3	1.2080	X210 Cr 12	BD3	Z 200 C 12	2710	F.5212	SKD 1	–
		P20	1.2311	40 CrMnMo 7	–	–	–	F.5263	–	–
		H13	1.2344	X40CrMoV 5 1	BH11	Z 38 CDV 5	2242	F.5318	SKD 61	X40CrMoV511KU
		A2	1.2363	X100 CrMoV 5 1	BA2	Z 100 CDV 5	2260	F.5227	SKD 12	X100CrMoV51KU
		D2	1.2379	X155 CrMoV 12 1	BD2	Z 160 CDV 12	2310	F.5211	–	X155CrVMo121KU
		D4 (D6)	1.2436	X210 CrW 12	BD6	Z 200 CD 12	2312	F.5213	SKD 2	X215CrW121K
		–	1.2713	55NiCrMoV 6	–	–	–	F.520.S	–	–
		L6	1.2721	50 NiCr 13	–	55 NCV 6	2550	F.528	SKT 4	–
		–	1.7321	20 MoCr 4	–	–	2625	F.1523	–	30CrMo4
		M 2	1.3343	S6/5/2	BM2	Z 85 WDCV	2722	F.5603	SKH 9	HS6-5-2-2
		M 35	1.3243	S6/5/2/5	–	6-5-2-5	2723	F.5613	SKH 55	HS6-5-5
		M 7	1.3348	S2/9/2	–	–	2782	–	–	HS2-9-2
		446	1.4749	X18 CrN 28	–	–	–	–	SUH 446	X16Cr26
		422	1.4935	X20 CrMoWV 12 1	–	–	–	–	–	–
		429	–	X10 CrNi 15	–	–	–	–	–	–
		440C	1.4125	X105 CrMo 17	–	Z 100 CD 17	–	–	SUS 440 C	–
7	2900 0,22	A128 75	1.3401	G-X120 Mn 12	BW10	Z 120 M 12	2183	–	SCMnH 1	–

Stainless steels

Seco mat. group No.	For power calculation $k_{c1.1} m_c$	Workpiece materials into material groups								
		AISI	W-stoff	DIN	BS	AFNOR	SS	U.N.E./ I.H.A.	JIS	UNI
8	1750 0,20	304	1.4301	X5 CrNi 18 10	304 S 10	Z 5 CN 18-09	2333	F.3504	SUS 304	X5CrNi1810
		304H	1.4948	X6 CrNi 18 11	304 S 51	Z 5 CN 18-09	2333	F.3504	SUS 304 H	–
		303	1.4305	X10 CrNiS 18 9	303 S 31	Z 8 CNF 18-09	2346	F.3508	SUS 303	X10CrNiS1809
		304L	1.4306	X2 CrNi 18 10	304 S 11	Z 3 CN 19-11	2352	F.3504	SUS 304 L	X2CrNi1811
		305	1.4312	X8 CrNi 18 12	305 S 19	–	–	F.3503	SUS 305	X8CrNi1910
		302	–	X12 CrNi 18 9	302 S 31	Z 10 CN 18-09	2330	F.3507	SUS 302	X10CrNi1809
		301	1.4310	X12 CrNi 17 7	301 S 21	Z 11 CN 17-08	2331	F.3517	SUS 301	X12CrNi1707
		CF-8	1.4308	X6 CrNi 18 9	304 C 15	Z 6 CN 18-10M	2333	–	SCS 13	–
9	1900 0,20	321	1.4541	X6 CrNiTi 18 10	321 S 31	Z 6 CNT 18-10	2337	F.3523	SUS 321	X6CrNiTi1811
		347	1.4550	X6 CrNiNb 1810	347 S 31	Z 6 CNNb 18-10	2338	F.3524	SUS 347	X6CrNiNb1811
		316	1.4436	X5 CrNiMo 17 13 3	316 S 33	Z 6 CND 19-12-03	2343	–	SUS 316	X5CrNiMo1713
		316Ti	1.4571	X8 CrNiMoTi 17 12 2	320 S 31	–	–	–	–	X6CrNiTi1811
		316	1.4401	X5 CrNiMo 17 12 2	316 S 31	Z 7 CND 17-11-02	2347	F.3534	SUS 316	X5CrNiMo1712
		316L	1.4404	X2 CrNiMo 17 13 2	316 S 11	Z 3 CND 17-12-02	2348	F.3533	SUS 316 L	X2CrNiMo1712
		316Ti	1.4571	X6 CrNiMoTi 17 12 2	320 S 31	Z 6 CNDT 17-12-02	2350	F.3535	–	X6CrNiMoTi1712
		316L	1.4435	X2 CrNiMo 18 14 3	316 S 13	Z 3 CND 18-14-03	2353	F.3533	SUS 316 L	X2CrNiMo1713
		317	1.4449	X5 CrNiMo 17 13	317 S 16	–	–	–	SUS 317	–
		310S	1.4845	X12 CrNi 25 20	310 S 16	Z 12 CN 25-20	2361	–	SUH 310	X6CrNi2520
		317L	1.4428	X2 CrNiMo 18 16 4	317 S 12	Z 2 CND 19-15-04	2367	F.3539	SUS 317 L	X2CrNiMo1816
		–	1.4418	X4 CrNiMo 16 5	–	Z 6 CND 16-04-01	2387	–	–	–
		304LN	1.4311	X2 CrNiN 18 10	304 S 61	Z 2 CN 18-10 AZ	2371	F.3541	SUS 304 LN	X2CrNiN1811
		309S	1.4833	X6 CrNi 22 13	309 S 13	Z 15 CN 24-13	–	–	SUS 309 S	X6CrNi2314
		CF-8M	1.4408	X6 CrNiMo 18 10	304 C 15	–	2343	–	SCS 14	–
10	2050 0,20	S44400	1.4521	X1CrMoTi 18 2	–	–	2326	F.3123	SUS 444	–
		202	1.4371	X3 CrMnNiN 18 8 7	284 S 16	Z 8 CMN 18-08-05	–	–	SUS 202	–
		S30815	1.4893	X8 CrNiNb 11	–	–	2368	–	–	–
		CA6-NM	1.4313	(G-)X4 CrNi 13 4	(425 C 11)	Z 4 CND 13-04 M	2385	–	SCS 5	(G)X6CrNi304
		660	1.4980	X5 NiCrTi 25 15	–	Z 8 NCTV 25-15 B FF	2570	–	–	–
		(S31726)	1.4439	X2 CrNiMoN 17 13 5	–	Z 3 CND 18-14-06 AZ	–	–	–	–
		330	1.4864	X12 NiCrSi 16	NA 17	Z 12 NCS 35-16	–	F.3313	SUH 330	–
		309	–	X15 CrNi 23 13	309 S 24	Z 15 CNS 20-12	–	F.3312	–	–
		310	1.4841	X15 CrNiSi 25 20	314 S 31	Z 15 CNS 25-20	–	F.3310	–	X16CrNiSi2520
11	2150 0,20	(329)	(1.4460)	X4 CrNiMo 27 5 2	–	Z 5 CND 27-05 AZ	2324	–	SUS 329 J 1	–
		S32304	1.4362	X2 CrNiN 23 4	–	Z 2 CN 23-04 AZ	2327	–	–	–
		SS30415	1.4891	X5 CrNiNb 18 10	–	– 2372	–	–	–	–
		316LN	1.4406	X2 CrNiMoN 17 13 2	316 S 61	Z2 CND 17-12 Az	2375	F.3543	SUS 316 LN	–
		316LN	1.4429	X2 CrNiMoN 17 13 2	316 S 63	Z2 CND 17-13 AZ	2375	–	SUS 316 LN	–
		S31500	1.4417	X2 CrNiMoSi 15	–	– 2376	–	–	–	–
		S31803	1.4462	X2 CrNiMoN 22 5 3	318 S 13	Z3 CND 22-05 Az	2377	–	–	–
		CN-7M	1.4539	(G-)X1 NiCrMoCu 25 20 5	–	Z1 NCDU 25-02 M	2564	–	–	–
		No8904	1.4539	X2 NiCrMoCu 25 20 5	904 S 13	Z1 NCDU 25-20	2562	–	–	–
		S31254	–	X1 CrNiMoN 20 18 7	–	–	2378	–	–	–
		S31753	–	X2 CrNiMoN 18 13 4	–	–	–	–	–	–
		–	–	X2 CrNiMoN 25 22 7	–	–	–	–	–	–
		S32750	1.4410	X3 CrNiMoN 25 7 4	–	–	–	–	–	–
		–	–	X5 NiCrN 35 25	–	–	2328	–	–	–
		S17400	1.4542	X5 CrNiCuNb 17 4	–	–	–	–	SCS 24	–

Cast iron

Seco mat. group No.	For power calculation $k_{c1.1} m_c$	Workpiece materials into material groups								
		AISI	W-stoff	DIN	BS	AFNOR	SS	U.N.E./ I.H.A.	JIS	UNI
12	1150 0,22	A48-25B	0.6015	GG-15	Grade 150	Ft 15 D	0115-00	FG 15	FC 150	G15
		60/40/18	0.7040	GGG-40	400/17	FGS 370/17	0717-02	FGE 38-17	FCD 400	GS 370-17
		60/40/18	0.7043	GGG-40.3	370/17	FGS 370/17	0717-15	–	–	–
		–	0.7033	GGG-35.3	350/22L40	FGS 370/17	0717-15	–	–	–
		A220-40010	0.8145	GTS-45-06	P440/7	Mn 450-6	0852-00	–	FCMP 440/490	GMN 45
		A220-50005	0.8155	GTS-55-04	P510/4	Mn 550-4	0854-00	–	FCMP 540	GMN 55
13	1225 0,25	A48-30B	0.6020	GG-20	Grade 200	Ft 20 D	0120-00	FG 20	FC 200	G 20
		A48-40B	0.6025	GG-25	Grade 260	Ft 25 D	0125-00	FG 25	FC 250	G 25
		A436 Type 2	0.6660	GGL-NiCr 20 2	L-NiCuCr202	L-NC 202	0523-00	–	–	–
		65/45/12	0.7050	GGG-50	500/7	FGS 500/7	0727-02	FGE 50-7	FCD 500	GS 500-7
		80/55/06	0.7060	GGG-60	600/3	FGS 600/3	0727-03	FGE 60-2	FCD 600	GS 600-2
		–	0.7652	GGG-NiMn 13 7	S-NiMn 137	S-Mn 137	0772-00	–	–	–
		A220-50005	0.8155	GTS-55-04	P510/4	Mn 550-4	0854-00	–	FCMP 540	GMN 55
		A220-70003	0.8165	GTS-65-02	P570/3	Mn 650-3	0856-00	–	FCMP 590	GMN 65
14	1350 0,28	A48-45B	0.6030	GG-30	Grade 300	Ft 30 D	0130-00	FG 30	FC 300	G 30
		100/70/03	0.7070	GGG-70	700/2	FGS 700/2	0737-01	FGE 70-2	FCD 700	GS 700-2
		A43D2	0.7660	GGG-NiCr 20 2	Grade S6	S-NC 202	0776-00	–	–	–
		A220-70003	0.8165	GTS-65-02	P570/3	Mn 650-3	0856-00	–	FCMP 590	GMN 65
		A220-80002	0.8170	GTS-70-02	P690/2	Mn 700-2	0862-00	–	FCMP 690	GMN 70
		A220-90001	0.8170	GTS-70-02	–	–	0864-00	–	–	GMN 70
15	1470 0,30	A48-50B	0.6035	GG-35	Grade 350	Ft 35 D	0135-00	FG 35	FC 35	G 35
		A48-60B	0.6040	GG-40	Grade 400	Ft 40 D	0140-00	–	FC 40	–
		A220-90001	0.8170	GTS-70-02	–	Mn 700-2	0864-00	–	FCMP 690	GMN 70

Cemented carbide inserts and insert carriers

Cemented carbide inserts and Cemented carbide insert carriers from Seco Tools are not included in the product range intended for the following requirements. Nevertheless Seco Tools can make the following declaration.

These product meets all requirements in RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment), WEEE (Waste Electrical & Electronic Equipment) and ELV (End of Life Vehicles) requirements.

Products do not contain mercury, lead, hexavalent chromium, cadmium, CFC, HCFC, flame retardants or solvents in concentrations that exceed specifications in the regulations.

Regrinding:

Wet or dry grinding can produce potentially hazardous dusts or mists that can irritate skin, eyes, nose, throat and result in lung damage or disease. To avoid injury use proper safety precautions and protective equipment.

Disposal:

Seco Tools will buy back used inserts and solid carbide tools for recycling. Inserts and solid carbide tools should be separated from other metal waste (steel, aluminium, copper etc).

All packing material is fully recyclable.

CBN and PCD inserts

Inserts from Seco Tools are not included in the product range intended for the following requirements. Nevertheless Seco Tools can make the following declaration.

This product meets all requirements in RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment), WEEE (Waste Electrical & Electronic Equipment) and ELV (End of Life Vehicles) requirements.

Products do not contain mercury, lead, hexavalent chromium, cadmium, CFC, HCFC, flame retardants or solvents in concentrations that exceed specifications in the regulations.

Regrinding:

Wet or dry grinding can produce potentially hazardous dusts or mists that can irritate skin, eyes, nose, throat and result in lung damage or disease. To avoid injury use proper safety precautions and protective equipment.

Disposal:

Seco Tools will buy back used CBN- or PCD-tipped inserts for recycling. Inserts should be separated from other metal waste (steel, aluminium, copper etc). Solid CBN-insert may be discarded as landfill waste.

All packing material is fully recyclable.

Black oxide insert carriers

Insert carriers from Seco Tools are not included in the product range intended for the following requirements. Nevertheless Seco Tools can make the following declaration.

This product meets all requirements in RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment), WEEE (Waste Electrical & Electronic Equipment) and ELV (End of Life Vehicles) requirements.

Products do not contain mercury, lead, hexavalent chromium, cadmium, CFC, HCFC, flame retardants or solvents in concentrations that exceed specifications in the regulations.

Disposal:

Used insert carriers may be sent for recycling together with ordinary steel waste (swarf and discarded steel scrap) for recycling. All packing material is fully recyclable.

Cermet inserts

Inserts from Seco Tools are not included in the product range intended for the following requirements. Nevertheless Seco Tools can make the following declaration.

This product meets all requirements in RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment), WEEE (Waste Electrical & Electronic Equipment) and ELV (End of Life Vehicles) requirements.

Inserts do contain Nickel and will leach Nickel when in contact with the skin. Amount of leaching is higher than specified in norm SS-EN 1811 Reference test method for release of nickel from products intended to come into direct and prolonged contact with the skin. These norms are intended for products that are in direct and prolonged contact with the skin and are therefore not directly applicable for cermet inserts. Persons with known allergic reactions to nickel are advised to wear protective gloves when handling cermet inserts.

Regrinding:

Wet or dry grinding can produce potentially hazardous dusts or mists that can irritate skin, eyes, nose, throat and result in lung damage or disease. To avoid injury use proper safety precautions and protective equipment.

Disposal:

Used inserts may be recycled. Inserts should be separated from other metal waste (steel, aluminium, copper, etc) including cemented carbide inserts.

All packing material is fully recyclable.

Nickel coated insert carriers

Insert carriers from Seco Tools are not included in the product range intended for the following requirements. Nevertheless Seco Tools can make the following declaration.

This product meets all requirements in RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment), WEEE (Waste Electrical & Electronic Equipment) and ELV (End of Life Vehicles) requirements.

Products do not contain mercury, lead, hexavalent chromium, cadmium, CFC, HCFC, flame retardants or solvents in concentrations that exceed specifications in the regulations.

Insert carriers do contain Nickel and will leach Nickel when in contact with the skin. Amount of leaching is higher than norm SS-EN 1811 Reference test method for release of nickel from products intended to come into direct and prolonged contact with the skin. These norms are intended for products that are in direct and prolonged contact with the skin and are therefore not directly applicable for insert carriers. Persons with known allergic reactions to nickel are advised to wear protective gloves when handling Nickel coated insert carriers.

As Ni leaching is regarded as the highest priority within our environmental portfolio, SECO TOOL will continue to focus on solving this issue and we expect to implement a new process during 2009 that will meet the demand according to SS-EN 1811.

Disposal:

Used tools maybe sent for recycling together with ordinary steel waste (swarf and discarded steel scrap) for recycling. All packing material is fully recyclable.

Intentionally added alloying elements

Grade	Cemented carbide										Coating				
	W	Ti	Ta	Nb	Co	Cr	Ni	Mo	C	N	Ti	Al	C	N	O
CM	■	■	■	■	■		■	■	■	■					
CMP	■	■	■	■	■		■	■	■	■	■	■		■	
CP200	■				■	■			■		■	■		■	
CP250	■		■		■				■		■	■		■	
CP300	■	■	■	■	■				■		■	■		■	
CP500	■				■	■			■		■	■		■	
CP600	■				■	■			■		■	■		■	
C15M	■	■	■	■	■		■	■	■	■					
DP2000	■		■	■	■				■		■	■	■	■	■
F15M	■				■	■			■		■	■		■	
F25M	■	■	■	■	■				■		■	■		■	
F30M	■				■	■			■		■	■		■	
F40M	■				■	■			■		■	■		■	
HX	■		■		■				■						
H15	■				■	■			■						
H25	■				■	■			■						
KX	■				■	■			■						
MH1000	■				■	■			■		■	■		■	
MK1500	■		■		■				■		■	■	■	■	■
MK2000	■		■		■				■		■	■		■	
MK3000	■		■	■	■				■		■	■	■	■	■
MP1500	■		■	■	■				■		■	■	■	■	■
MP2500	■		■	■	■				■		■	■	■	■	■
MP3000	■				■	■			■		■	■		■	
MS2500	■		■	■	■				■		■	■	■	■	■
TK1000	■		■	■	■				■	■	■	■	■	■	■
TK2000	■	■	■	■	■				■	■	■	■	■	■	■
TM2000	■	■	■	■	■				■	■	■	■	■	■	■
TM4000	■	■	■	■	■				■	■	■	■	■	■	■
TP1000	■	■	■	■	■				■	■	■	■	■	■	■
TP1500	■	■	■	■	■				■	■	■	■	■	■	■
TP200	■	■	■	■	■				■	■	■	■	■	■	■
TP2000	■	■	■	■	■				■	■	■	■	■	■	■
TP2500	■	■	■	■	■				■	■	■	■	■	■	■
TP3000	■	■	■	■	■				■	■	■	■	■	■	■
TP40	■		■	■	■				■		■		■	■	
TS2000	■				■	■			■		■	■		■	
TS2500	■		■		■				■		■	■		■	
T1000D	■	■	■	■	■				■	■	■	■	■	■	■
T150M	■		■		■				■		■	■	■	■	■
T200M	■		■	■	■				■		■	■	■	■	■
T2000D	■		■	■	■				■		■	■	■	■	■
T25M	■		■	■	■				■		■		■	■	
T250M	■		■	■	■				■		■	■	■	■	■
T250D	■				■	■			■		■	■		■	
T3000D	■		■	■	■				■		■	■	■	■	■
T350M	■		■	■	■				■		■	■	■	■	■
T400D	■				■	■			■		■	■		■	
T60M	■	■	■	■	■				■		■	■		■	
883	■		■		■				■						
890	■				■	■			■						