



Data Sheet

Indexable carbide milling inserts and tooling

Introduction

Originally developed in the 1950s, tungsten carbide inserts are preformed shapes made from a mixture of cemented carbides. They are manufactured by a 'sintering' rather than a melting process.

Commonly known as 'tooling systems' the basic principle uses replacement carbide inserts fitted into a specific type of toolholder.

Milling cutter bodies and the clamping system can vary in detail from different manufacturers but all follow standard ISO (International Standards Organisation) identification codes. However, without exception, all standard carbide inserts conform to ISO codes in relation to shapes and profiles etc.

Milling

This is a machining process in which work is fed past a rotating cutter having its teeth on the periphery or sides, or both. Milling is used essentially for the rapid removal of metal and is particularly suitable for the production of flat surfaces or a combination of surfaces. It is also possible to produce contoured surfaces by using form cutters. Holes may also be drilled and bored. Generally tolerances of $\pm 0.025\text{mm}$ may be held by milling, although 0.075mm is generally more practical.

The choice of cutter type and its size will depend upon several factors.

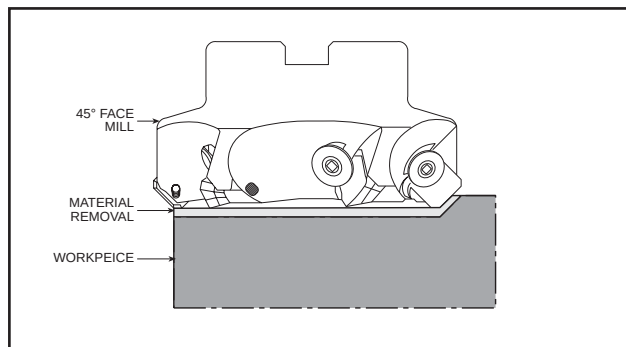
- Type of work being performed
- Power of machine available.

Generally, use of a cutter incorporating carbide inserts will reduce power requirement on the machine or allow use of increased feed and cutting speeds.

Milling cutters

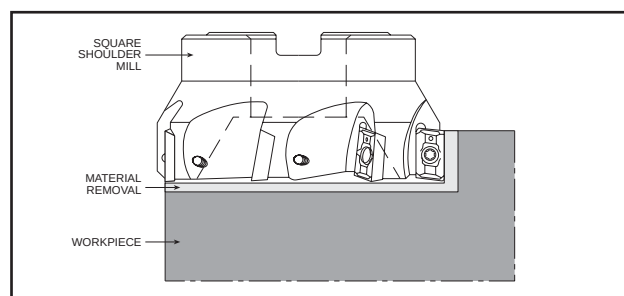
Applications

45° face mill



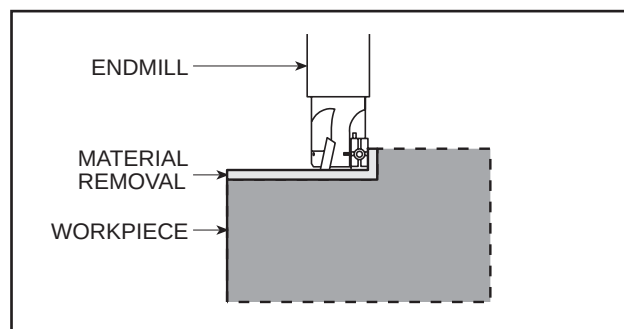
Primarily intended for surface preparation where the complete area is to be machined.

Square shoulder mill



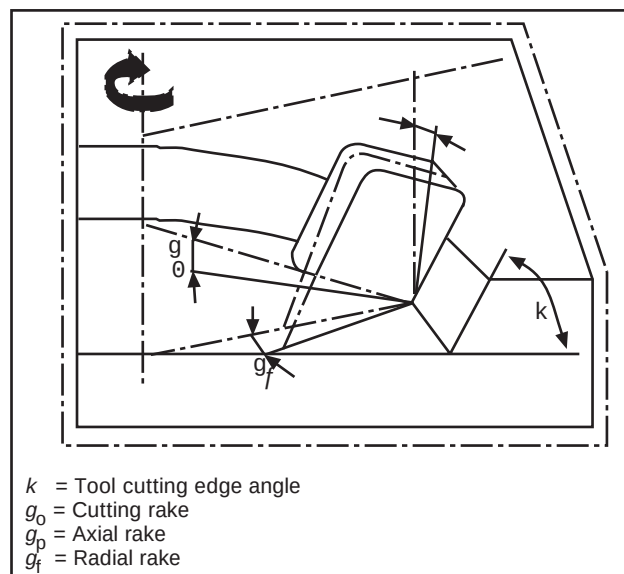
This cutter will produce steps with square edges, or can be used for surface preparation as per 45° face mills.

End mill

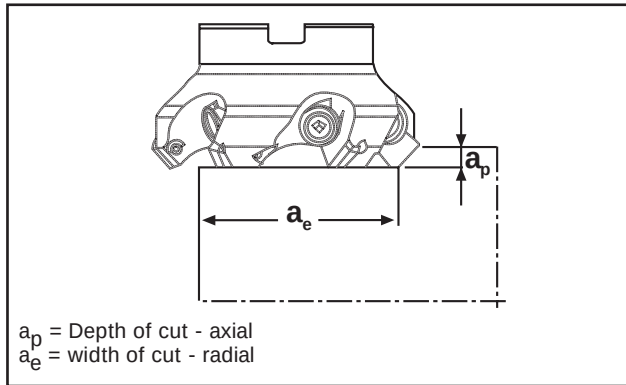


This cutter can be used to produce slots, ramps, shoulders etc.

Cutter geometry



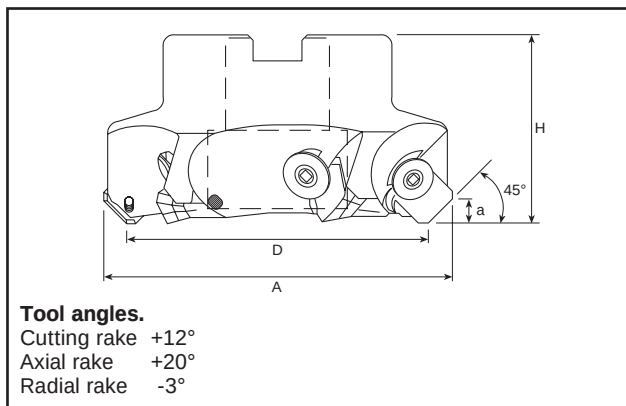
Radial and axial depth of cut



Milling cutters

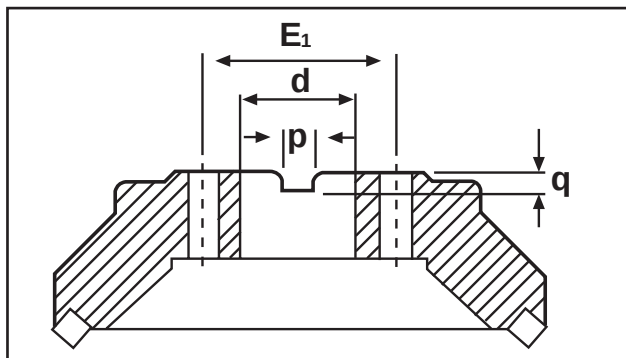
Dimensions and specification

45° face mill



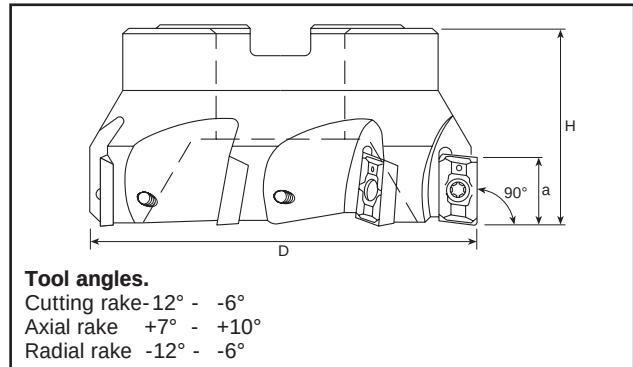
Dimensions in mm				No. of teeth
D	A	H	a	
63	77	40	6	5

Dimensions of mounting



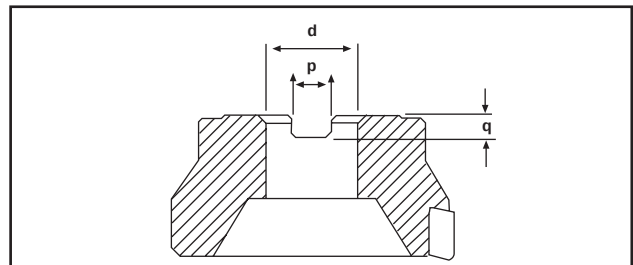
D	p	q
22	10.4	6.3

Square shoulder mill



Dimensions in mm			No. of teeth
D	H	a	
50	40	16	5
63	40	16	6
80	50	16	7

Dimensions of mounting



D	p	q
22	10.4	6.3
22	10.4	6.3
27	12.4	7

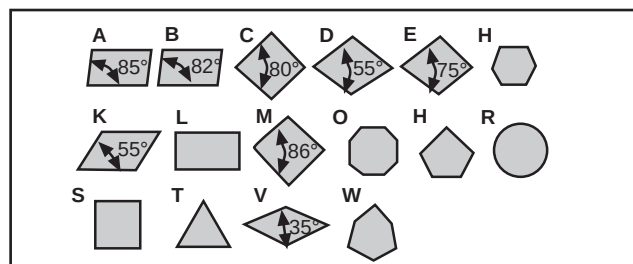
Milling cutter inserts

Metric series ISO 1832-1991

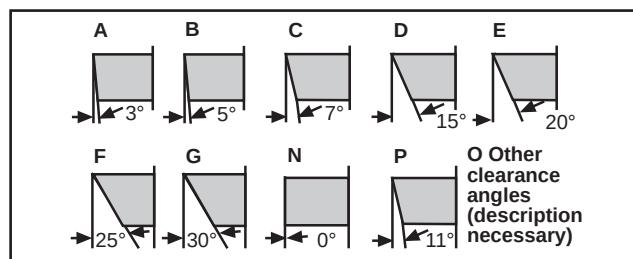
SEAN 12 03 AFT N-M16

1 2 3 4 5 6 7 8 9 10

1. Shape



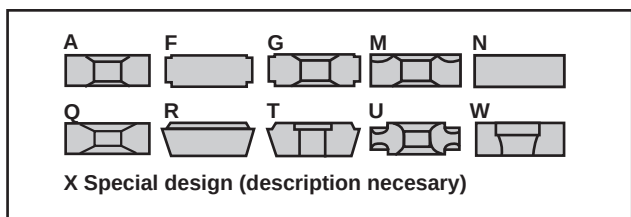
2. Clearance angle



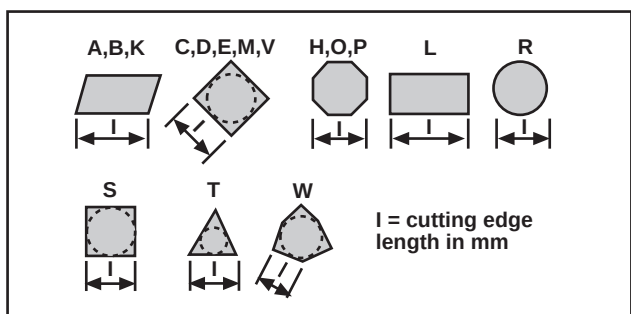
3. Tolerances

Tol class	Tolerance $\pm$ mm			For d,dimension mm					
	m	s	d	6,53	9,525	12,70	15,875	19,05	25,40
A	0,005	0,025	0,025	•	•	•	•	•	•
E	0,025	0,025	0,025	•	•	•	•	•	•
F	0,005	0,025	0,013	•	•	•	•	•	•
G	0,025	0,13	0,025	•	•	•	•	•	•
H	0,013	0,025	0,013	•	•	•	•	•	•
J	0,005	0,025	0,05	•	•				
	0,005	0,025	0,08			•			
	0,005	0,025	0,10				•	•	
	0,005	0,025	0,13						•
K	0,013	0,025	0,05	•	•				
	0,013	0,025	0,08			•			
	0,013	0,025	0,10				•	•	
	0,013	0,025	0,13						•
M	0,08	0,13	0,05	•	•				
	0,13	0,13	0,08			•			
	0,15	0,13	0,10				•	•	
	0,18	0,13	0,13						•
U	0,13	0,13	0,08	•	•				
	0,20	0,13	0,13			•			
	0,27	0,13	0,18				•	•	
	0,38	0,13	0,25						•

4. Type of insert



5. Cutting edge length



Comparison

Cutting edge length/I.C. (d)

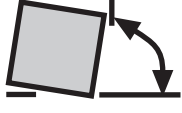
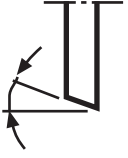
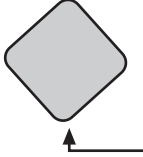
IC (d)	Shape					
	C	D	R,S	T	V	W
	Cutting edge length					
0,56						03
6,35	06	07	06	011		04
12,70	09	11	09	016	16	06
15,88	16	19	15	22		08
19,05	19	23	19	33		
25,40	25	31	25	44		

IC = Theoretical diameter of inscribed circle

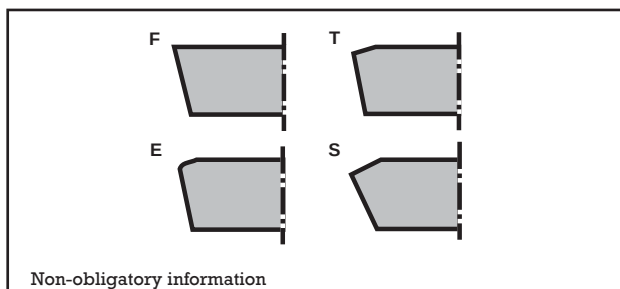
6. Thickness

	mm	mm
01 = 1,59		05 = 5,56
T1 = 1,98		06 = 6,35
02 = 2,38		07 = 7,94
03 = 3,18		08 = 8,00
T3 = 3,97		09 = 9,52
04 = 4,76		

7. Insert with wiper edge/radius

1st digit		A = 45° D = 60° E = 75° F = 85° P = 90° Z = Special
2nd digit		A = 3° F = 25° D = 5° G = 30° E = 7° N = 0° F = 15° P = 11° P = 20° Z = Special
radius mm		M0* = round inserts 00 = sharp 01 = 0,1 02 = 0,2 04 = 0,4 08 = 0,8 12 = 1,2 etc, *metric sizes

8. Cutting edge condition



9. Direction of cutting

R	L	N
		Neutral
Right-rotated	Left-rotated	R- and L-rotated

10. Internal manufacturers designation

M16

- E = Easy machining conditions, (soft workpiece materials, thin chips, pre-machined work pieces, rolled workpieces, good chip flow). Insert with geometry designation E have sharp cutting edges.
- ME = Medium to easy machining conditions
- M = Medium machining condition
- MD = Medium to difficult machining conditions
- D = Difficult machining conditions, (hard workpiece materials, thick chips difficult rough surfaces, intermittent cutting process, chip jamming). Insert with geometry designation D have strong (protected) cutting edges.
- 16 = The digit combination indicates the most suitable average chip thickness for the geometry under normal conditions ie. 0.16mm.

ISO milling inserts

All RS inserts are held in the cutter bodies using torx screws. The torque values are given in the following table. For optimum performance ensure that screws are coated with grease (molcote 1000 or similar) before insertion.

This will reduce friction and ensure the screws can be released when required. Please note that some clamping screws have left-handed threads!

The maximum figures are shown, generally a value between 75% and 100% should be used.

Torx screw	Thread M	Torque values Nm	
		Max	75%
T07	M2,2	1,2	0,9
T07	M2,5	1,5	1,5
T09	M3	2,0	1,5
T15	M3,5	4,0	3,0
T15	M4	5,0	3,8
T15	M4,5	6,8	5,0
T15	M5	6,8	5,0
T20	M4,5	6,8	5,0
T20	M5	6,8	5,0
T20	M6	10,0	8,0
T25	M8	12,0	10,0

Grade

All RS inserts are supplied in manufacturers grade T25M. The relationship between this designation and the ISO grades is given below.

Coated grades

	ISO-P						ISO-M				ISO-K				
	P01	P10	P20	P30	P40	P50	M10	M20	M30	M40	K01	K10	K20	K30	K40
T25M															

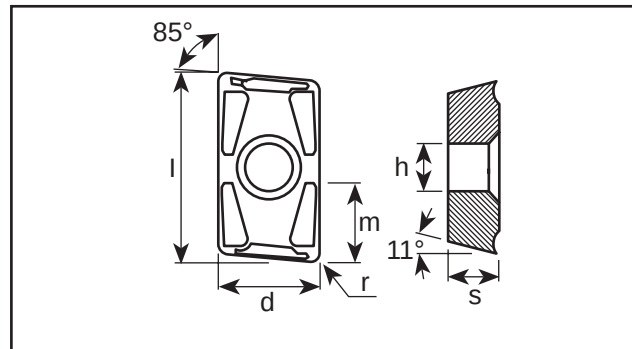
Cross reference

In many cases one insert will fit several cutters. The compatibility is shown in the following table.

RS Insert ISO code	Cutter description
APFT 1604 PDTR	Square shoulder cutter 50mm
APFT 1604 PDR	Square shoulder cutter 63mm
	Square shoulder cutter 80mm
SEKN 1203 AFN	Face cutter 63mm

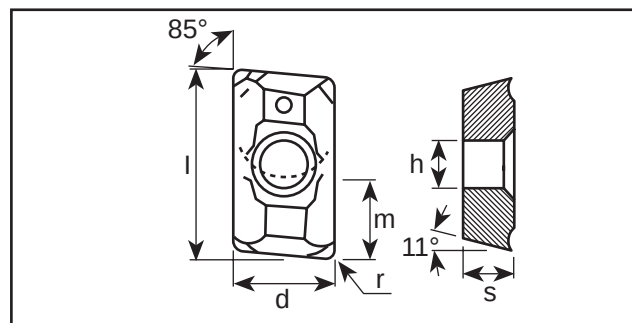
Insert specifications

APFT 1604 PDTR D15 T25M



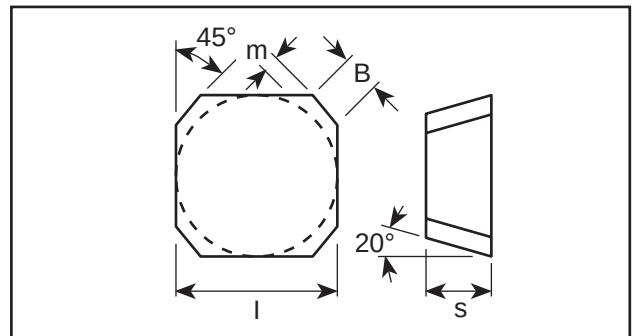
Tolerances (±mm)			Dimensions in mm				
d	s	m	d	l	s	r	h
0.013	0.015	0.005	9.525	17	4.76	0.8	4.5

APFT 1604 PDR M12 T25M



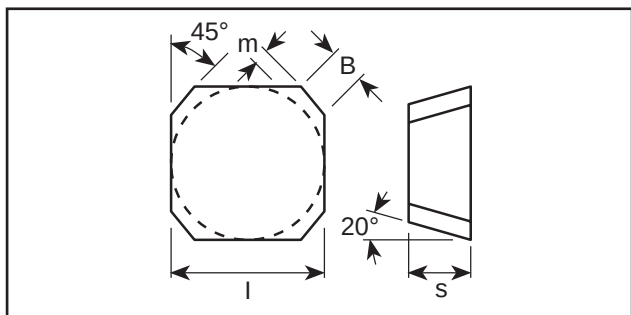
Tolerances (±mm)			Dimensions in mm				
d	s	m	d	l	s	r	h
0.013	0.015	0.005	9.525	17	4.76	0.8	4.5

SEKN 1203 AFN E12 T25N



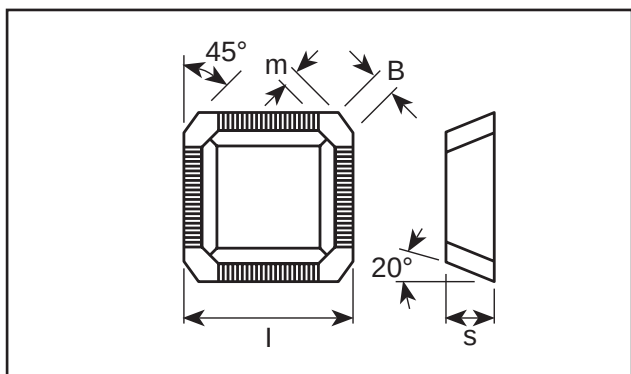
Tolerances (±mm)			Dimensions in mm		
d	s	m	d	l	s
0.08	0.025	0.010	13.44	3.36	3.5

SEKN 1203 AFTN M14 T25M



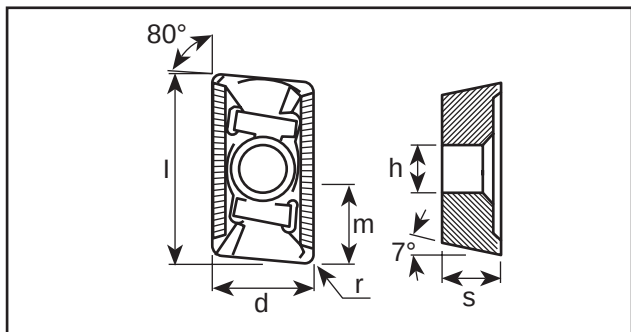
Tolerances ($\pm$ mm)			Dimensions in mm		
l	s	m	l	s	B
0.08	0.025	0.010	12.70	3.18	1.6

SEKR 1203 AFTN ME10 T25M



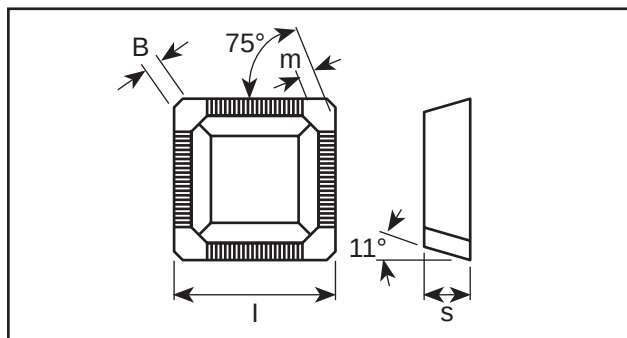
Tolerances ($\pm$ mm)			Dimensions in mm		
l	s	m	l	s	B
0.08	0.025	0.010	12.70	3.18	1.5

XCKX 13 T304 R ME10 T25M



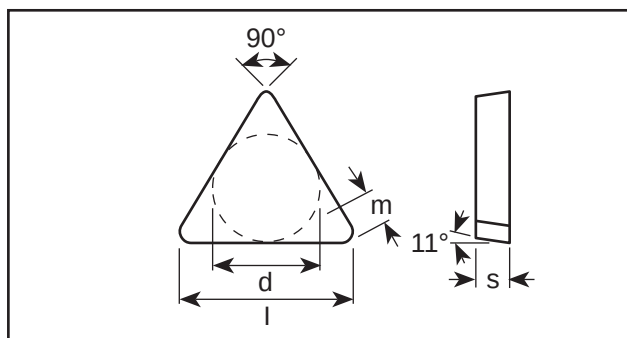
Tolerances ($\pm$ mm)			Dimensions in mm				
d	s	m	d	l	s	r	h
0.050	0.025	0.013	7.922	14.7	5.03	0.4	3.5

SPKR 1203 EDTR ME12 T25M



Tolerances ($\pm$ mm)			Dimensions in mm		
l	s	m	l	s	B
0.05	0.025	0.013	12.70	3.18	1.2

TPKN 1603 PDTR MD12 T25M



Tolerances ($\pm$ mm)			Dimensions in mm		
l	s	m	l	s	B
0.05	0.025	0.010	9.525	16.5	3.18

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