














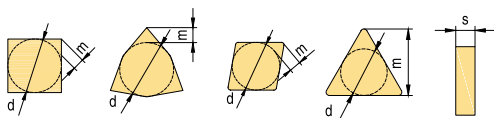


Milling Insert Denomination System

<div>A</div> <div>1</div>	<div>O</div> <div>2</div>	<div>M</div> <div>3</div>	<div>T</div> <div>4</div>	
1- Shape/Code		2- Clearance Angle		
A	H	M	O	R
				
85°	120°	86°	135°	360°
S	T	Z	X	
			X	Special
90°	60°	86°		
C	D	E	F	
				
7°	15°	20°	25°	
G	N	P	O	
			O	Other clearance angle
30°	0°	11°		

3- Tolerance



Class	Unit	In.Circle dimension d	Nose height m	Thickness s
A	in	± 0,0010	± 0,0002	± 0,0010
C	in	± 0,0010	± 0,0005	± 0,0010
E	in	± 0,0010	± 0,0010	± 0,0010
F	in	± 0,0005	± 0,0002	± 0,0010
G	in	± 0,0010	± 0,0010	± 0,0050
H	in	± 0,0005	± 0,0005	± 0,0250
J	in	*	± 0,0002	± 0,0010
K	in	*	± 0,0005	± 0,0010
L	in	*	± 0,0010	± 0,0010
M	in	*	*	± 0,0050
U	in	*	*	± 0,0050
N	in	*	*	± 0,0010

* For details refer to right and below tables

Shape: C, E, H, M, O, P, S, T, R, W				
IC	d		m	
	J,K,L,M,N	U	M, N	U
3/16	± 0,0020	± 0,0030	± 0,0030	± 0,0050
7/32	± 0,0020	± 0,0030	± 0,0030	± 0,0050
0.236	± 0,0020	± 0,0030	± 0,0030	± 0,0050
1/4	± 0,0020	± 0,0030	± 0,0030	± 0,0050
5/16	± 0,0020	± 0,0030	± 0,0030	± 0,0050
0.315	± 0,0020	± 0,0030	± 0,0030	± 0,0050
3/8	± 0,0020	± 0,0030	± 0,0030	± 0,0050
0.394	± 0,0020	± 0,0030	± 0,0030	± 0,0050
0.472	± 0,0030	± 0,0050	± 0,0050	± 0,0080
1/2	± 0,0030	± 0,0050	± 0,0050	± 0,0080
5/8	± 0,0040	± 0,0070	± 0,0060	± 0,0110
0.630	± 0,0040	± 0,0070	± 0,0060	± 0,0110
3/4	± 0,0040	± 0,0070	± 0,0060	± 0,0110
0.787	± 0,0040	± 0,0070	± 0,0060	± 0,0110
0.984	± 0,0050	± 0,0100	± 0,0070	± 0,0150
1	± 0,0050	± 0,0100	± 0,0070	± 0,0150
1 1/4	± 0,0060	± 0,0100	± 0,0080	± 0,0150
1.260	± 0,0060	± 0,0100	± 0,0080	± 0,0150

M&N shape	D shape		V shape	
IC	d	m	d	m
7/32	± 0,0020	± 0,0043		
1/4	± 0,0020	± 0,0043	± 0,0020	± 0,0060
5/16	± 0,0020	± 0,0043	± 0,0020	± 0,0060
3/8	± 0,0020	± 0,0043	± 0,0020	± 0,0060
1/2	± 0,0030	± 0,0060	± 0,0030	± 0,0080
5/8	± 0,0040	± 0,0070	± 0,0040	± 0,0110
3/4	± 0,0040	± 0,0070	± 0,0040	± 0,0110

4- Clamping Type				
A	B	C	F	G
H	J	M	N	Q
R	T	U	W	Z
				Special

12

5

04

6

08

7

E

8

R

9








-

-

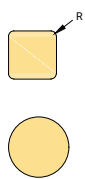
MM4

10

5- Cutting edge length

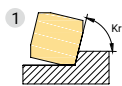
In. Circle dimension (mm)	H	M	O	R	S	T	Z
							
0.125						05	
0.157						06	
0.196				05			
7/32						09	
0.236				06			
1/4						11	
5/16						13	
0.315				08			
3/8				09	09	16	
0.394				10			
0.472				12			
1/2			04	12	12	22	
5/8				15	15	27	
0.630			06	16			
3/4				19	19	33	
0.787				20			
0.984				25	25		
1				25			
1 1/4				31			
1.260				32			

7-Corner radius and wiper edge



00 = sharp	24 = 0.093
01 = 0.004	28 = 0.109
02 = 0.008	32 = 0.125
04 = 0.015	40 = 0.157
08 = 0.031	48 = 0.188
12 = 0.047	56 = 0.220
16 = 0.062	64 = 0.251
20 = 0.078	X = others

Round insert:MO refers to metric dia. size



1 Approach angle(Entering angle)

(kr)

A = 45°

D = 60°

E = 75°

F = 85°

P = 90°

Z = Others

2 Clearance angle of wiper edge

(n)

A = 3°

B = 5°

C = 7°

D = 15°

E = 20°

F = 25°

G = 30°

N = 0°

P = 11°

Z = Others

6- Insert thickness



01=1/16in

T1=5/64in

02=3/32in

T2=0.109in

03=1/8in

T3=5/32in

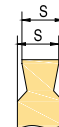
04=3/16in

05=7/32in

06=1/4in

07=5/16in

09=3/8in



8- Edge Preparation

F

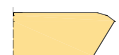
Sharp cutting edge

E

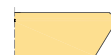
Honed cutting edge

T

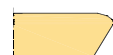
Negative land

K

Double negative land

S

Negative land +honed

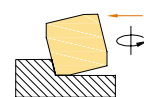
P

Double negative land +honed

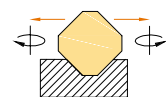
9-Hand of Tool

R

Right hand

L

Left hand

N

Neutral

10-Geometry Refers to Geometry Introduction

Marked: if it has corner radius, the information needs to put between thickness and wipers.

Example: APET 160408PDFR-FM2

ACHTECK

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THE EXPERTS OF DIFFICULT MACHINING



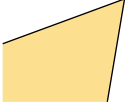








Milling Inserts

Geometry Application Guide

Materials				Milling geometry application table						
				FM2	MM3	MM4	MR2	MR6	RR2	HR2
ISO	Material classification	Tensile strength (N/mm ²)	Hardness (HB)	Suitable for machining aluminium alloy	Light cutting	General purpose	Medium machining	Roughing	Heavy roughing	Roughing
P	Unalloyed steel	<600	<180	-	●	●	●	●	-	-
		<950	<280	-	●	●	●	●	-	-
	Alloyed steel	700-950	200-280	-	●	●	●	●	-	-
		950-1200	280-355	-	●	●	●	●	-	-
		1200-1400	355-415	-	●	●	●	●	-	-
M	Duplex stainless steel	778	230	-	●	●	●	-	-	-
	Austenitic stainless steel	675	200	-	●	●	●	-	-	-
	Precipitation-hardening stainless steel	1013	300	-	●	●	●	-	-	-
K	Grey cast iron	700	220	-	-	●	●	●	●	●
	Nodular cast iron	880	260	-	-	●	●	●	●	●
	Malleable cast iron	800	250	-	-	●	●	●	●	●
N	Aluminum	260	75	●	-	-	-	-	-	-
	Aluminum alloy	447	130	●	-	-	-	-	-	-
S	Fe-based alloy	943	280	-	●	●	●	-	-	-
	Co-based alloy	1076	320	-	●	●	●	-	-	-
	Ni-based alloy	1177	350	-	●	●	●	-	-	-
	Ti-alloy	1262	370	-	●	●	●	-	-	-
H	Hardened steel	-	50-60HRC	-	-	●	●	-	-	-
	Chilled cast iron	-	55HRC	-	-	●	●	-	-	-

- 1st choice
- ◐ 2nd choice
- Inapplicable

Milling Geometry Introduction

Insert geometry	Edge shape	Application
FM2		<ul style="list-style-type: none"> ▪ Low cutting force, for weak machining condition ▪ Sharp geometry ▪ For aluminium material machining
MM3		<ul style="list-style-type: none"> ▪ Low cutting force, for weak machining condition ▪ Sharp geometry ▪ For steel, stainless-steel and heat resistant alloy machining.
MM4		<ul style="list-style-type: none"> ▪ For medium machining condition ▪ Universal geometry ▪ For machining most materials
MR2		<ul style="list-style-type: none"> ▪ For medium or better machining condition ▪ Universal geometry ▪ For machining most materials
MR6		<ul style="list-style-type: none"> ▪ For stable machining condition ▪ Roughing geometry ▪ For machining most materials
HR2		<ul style="list-style-type: none"> ▪ For stable machining condition ▪ Roughing geometry ▪ Mainly for cast iron machining
RR2		<ul style="list-style-type: none"> ▪ For stable machining condition ▪ Heavy roughing geometry ▪ Mainly for cast iron and steel machining
IT		<ul style="list-style-type: none"> ▪ Sharp geometry, for specified product
DT		<ul style="list-style-type: none"> ▪ Universal geometry, for specified product

Grade Application Guide

Milling grade ISO group														
Material Group	Materials	ISO	coated											ISO
			PVD	PVD	PVD	PVD	PVD	PVD	PVD	PVD	CVD	CVD	Uncoated	
P	unalloy steels / Alloyed steels	P01												P01
		P05												P05
		P10												P10
		P15												P15
		P20	AP251U											P20
		P25												P25
		P30	AP251U	AP351U	AP351M						AC301P			P30
		P35												P35
		P40		AP351U	AP351M									P40
		P45												P45
		P50												P50
M	Stainless steels	M01												M01
		M05												M05
		M10												M10
		M15	AP251U											M15
		M20												M20
		M25	AP251U											M25
		M30			AP351M									M30
		M35						AP403S	AP403M					M35
		M40			AP351M									M40
		M45						AP403S	AP403M					M45
		M50												M50
K	Cast iron	K01												K01
		K05												K05
		K10		AP151H										K10
		K15	AP251K								AC301K			K15
		K20		AP151H										K20
		K25	AP251K											K25
		K30												K30
		K35												K35
		K40												K40
		K45												K45
		K50												K50
N	Aluminum/ Aluminum alloys	N01												N01
		N05												N05
		N10											AW100K	N10
		N15												N15
		N20												N20
		N25												N25
		N30												N30
		N50												N50
S	Heat resistant alloys	S01												S01
		S05												S05
		S10												S10
		S15												S15
		S20												S20
		S25		AP351M										S25
		S30												S30
		S35												S35
		S40			AP403S	AP403M								S40
		S45												S45
		S50												S50
H	Hardened steels/ Chilled cast iron	H01												H01
		H05												H05
		H10	AP151H											H10
		H15												H15
		H20												H20
		H25												H25
		H30												H30

Grade Application Guide

Materials				Milling grade application										
				PVD coated						CVD coated		PVD coated		Uncoated
ISO	Material classification	Tensile strength (N/mm ²)	Hardness (HB)	AP251U	AP351U	AP351M	AP401U	AP403S	AP403M	AC301P	AC301K	AP251K	AP151H	AW100K
P	Unalloyed steel	<600	<180	●	●	●	●		●	●	●	-	-	-
		<950	<280	●	●	●	●		●	●	●	-	-	-
	Alloyed steel	700-950	200-280	●	●	●	●		●	●	●	-	-	-
		950-1200	280-355	●	●	●	●		●	●	●	-	-	-
		1200-1400	355-415	●	●	●	●		●	●	●	-	-	-
M	Duplex stainless steel	778	230	●	●	●	●	●	●	●	-	-	-	-
	Austenitic stainless steel	675	200	●	●	●	●	●	●	●	-	-	-	-
	Precipitation-hardening stainless steel	1013	300	●	●	●	●	●	●	●	-	-	-	-
K	Grey cast iron	700	220	-	-	-	-	-	-	-	●	●	●	-
	Nodular cast iron	880	260	-	-	-	-	-	-	-	●	●	●	-
	Malleable cast iron	800	250	-	-	-	-	-	-	-	●	●	●	-
N	Aluminum	260	75	-	-		-			-	-	-	-	●
	Aluminum alloy	447	130	-	-		-			-	-	-	-	●
S	Fe-based alloy	943	280	-	●	●	●	●	●	-	-	-	-	-
	Co-based alloy	1076	320	-	●	●	●	●	●	-	-	-	-	-
	Ni-based alloy	1177	350	-	●	●	●	●	●	-	-	-	-	-
	Ti-alloy	1262	370	-	●	●	●	●	●	-	-	-	-	●
H	Hardened steel	-	50-60HRC	-	-		-			-	-	-	●	-
	Chilled cast iron	-	55HRC	-	-		-			-	-	-	●	-

- 1st choice
- ◐ 2nd choice
- Inapplicable

Milling Grade Description

Grade for Normal Milling

P

Steel, alloyed steel, unalloyed steel

Basic grade

AP251U P25(P15-P35)

PVD-coated grade, suitable for most applications. First choice for steel machining. It is recommended to be used in rough to finish machining of steel under stable working conditions, good for dry and wet machining with small cutting width, complex tool path and sticky materials.

AC301P P35(P25-P40)

CVD coated grade is suitable for big cutting depth, medium to high speed milling of steel under bad machining conditions.

Supplemental grade

AP351M P35(P25-P45)

PVD coated grade, medium hardness substrate, which is a supplement for AP251U in steel milling when high toughness is required.

AP351U P35(P30-P45)

PVD coated grade, medium hardness substrate, which is a supplement for AP251U in steel milling when high-toughness is required.

M

Stainless steel, austenite stainless steel, martensite stainless steel

Basic grade

AP351M M35(M25-M45)

PVD coated grade is used for milling stainless steel and steel at medium and low speed under bad machining conditions.

AP403M M35(M35-M50)

Ultra-thick PVD coated grade is the first choice for stainless steel milling. It is suitable for rough milling of stainless steel under bad machining conditions.

Supplemental grade

AP251U M25(M15-M35)

PVD coated grade is used in rough and finish milling of stainless steel under very stable machining conditions.

AP403S M15(M35-M50)

PVD coated grade, the substrate has both toughness and hot hardness characteristics, and is the first choice for titanium alloy machining, as well as the machining of heat resistant alloy under weak rigidity. It is applicable to the milling at low cutting speed and can get longer tool life.

AP351U M35(M30-M45)

PVD coated grade, medium hardness substrate, which is a supplement for AP251U in steel milling when high-toughness is requested. On the way to phase out.

K

Cast iron, grey cast iron, nodular cast iron

Basic grade

AC301K K25(K10-K35)

CVD coated grade, suitable for semi-finish milling and rough milling of grey cast iron at medium and high cutting speed, Recommended for dry cutting conditions, can achieve longer tool life.

AP251K K25(K15-K40)

PVD coated grade is suitable for semi-finish and rough milling of grey cast iron and nodular cast iron at medium and low cutting speed, and has good tool life under dry and wet conditions.

Supplemental grade

AP151H K15(K10-K20)

PVD coated grade is suitable for finish milling of grey cast iron and nodular cast iron, which can get constant surface quality and longer tool life.

N

Non-ferrous metals

Basic grade

AW100K N15 (N10-N20)

Uncoated grade, combined with sharp cutting edge, used in aluminum alloy milling.

S

Heat resistant alloy

Basic grade

AP403S S15(S35-S50)

PVD coated grade, the substrate has both toughness and red hardness characteristics, and is the first choice for titanium alloy machining, as well as the machining of heat resistant alloy under weak rigidity. It is applicable to the milling at low cutting speed and can get longer tool life.

Supplemental grade

AP351M S35(S25-S45)

PVD coated grade is suitable for semi-finishing to light rough machining of heat resistant alloy and titanium alloys.

AP403M S35(S35-S50)

The super-thick PVD coated grade is suitable for low-speed milling of heat resistant alloy and titanium alloys when high toughness is requested, especially in case of large cutting width.

H

Hard material, hardened steel

Basic grade

AP151H H15(H10-H20)

PVD coated grade, suitable for milling hardened steel, can be used in rough and finish milling, meeting the needs of most occasions.