

Milling Grades

Milling Insert Grades

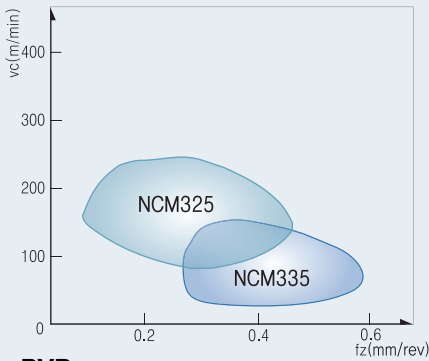
Selection system

Workpiece	P					M				K				N			S			H					
	ISO	P01	P10	P20	P30	P40	P50	M10	M20	M30	M40	K01	K10	K20	K30	N10	N20	N30	S01	S10	S20	H01	H10	H20	
Coated carbide			NCM325					NCM325								PD2000									
				NCM335					NCM335				PC205K								PC8520				
			PC3525						PC9530				PC6510				ND2000								
				PC3535						PC3545				PC215K											
				PC3545																					
Cermet		CN20																							
			CN30																						
cBN / PCD															DA150				KB360				KB350		
Cemented carbide			ST20									H01				H1									
								U10				H05													
								U20				H10													
								U40				G10													

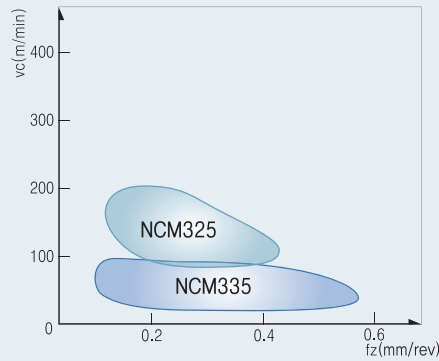
Application range

• CVD

1) P : Steel

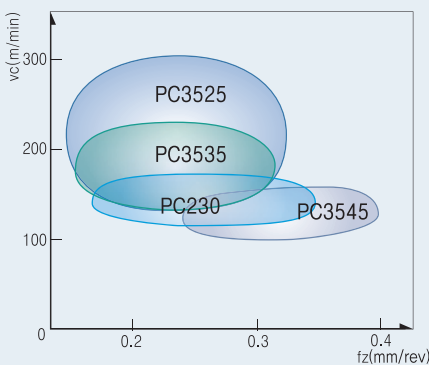


2) M : Stainless steel

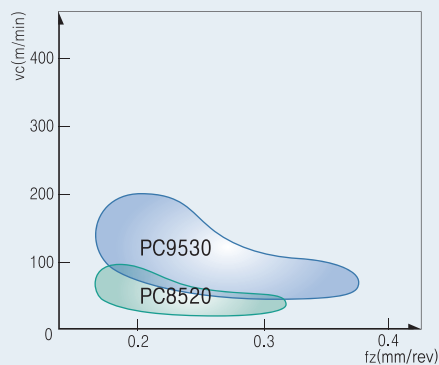


• PVD

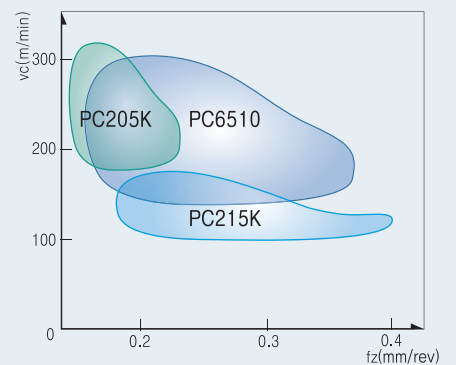
1) P : Steel



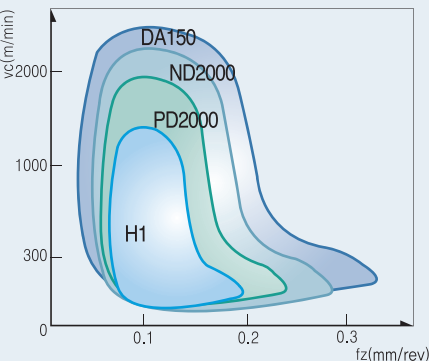
2) M : Stainless steel



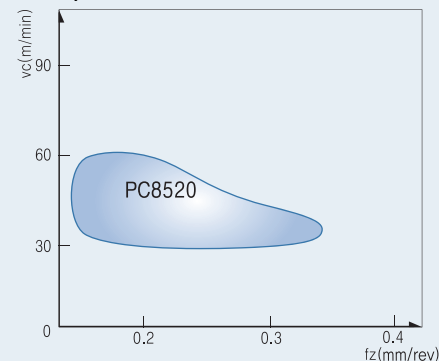
3) K : Cast iron



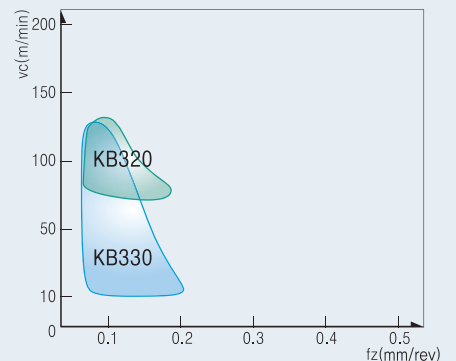
4) N : Non-ferrous metal



5) S : Heat resistant steel



6) H : Hardened steel



Milling

Milling Grades

Milling Inserts

Face Milling Cutters

Cutters for Mold

Cutters for Aluminum

Thread Milling

High feed Cutter for Cast Iron

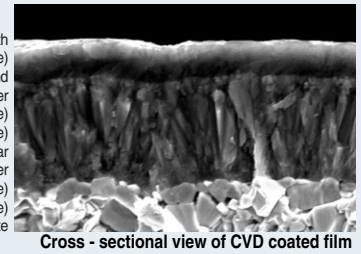
Side Milling Cutters

CVD Coated Grades

Features

- Due to the special crystalline structure, superior wear resistance and toughness have been acquired.
- It is good for general purpose.

- Improved coating adhesion strength (Welding resistance)
 - Thermal resistance and tough fine grain Al₂O₃ layer (Welding resistance) (Crater wear resistance)
- Extremely tough and excellent wear resistant thick TiCN layer (Flank wear resistance) (Crater wear resistance)
- Special carbide substrate



Cross-sectional view of CVD coated film

Selection system

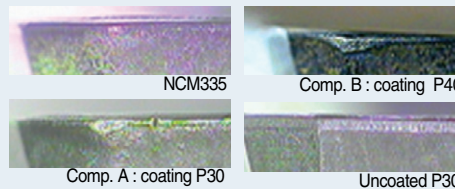
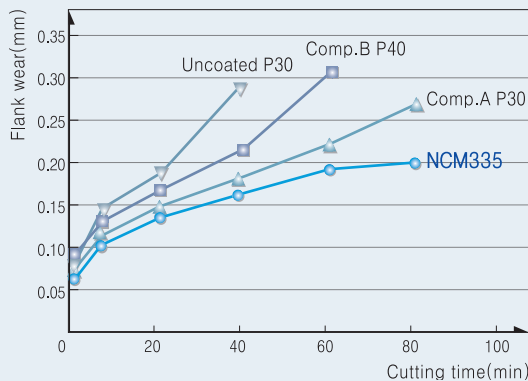
Workpiece	Grade	Recommended cutting speed(m/min)	ISO	Application range
P Steel & Stainless steel M	NCM325	250 (150~300)	P20	
			M20	
	NCM335	200 (150~250)	P30	
			M30	
			P40	
			M40	

The features of CVD coated grades

CVD coated grades	ISO	Features
NCM325	P20 ~ P30 M20 ~ M30	<ul style="list-style-type: none"> For high speed milling of steel and stainless steel. Optimized grade for steel & stainless steel by employing proper substrate. (optimal hardness & toughness combination) and hard coating. MT-TiCN + Al₂O₃ + TiN
NCM335	P30 ~ P40 M30 ~ M40	<ul style="list-style-type: none"> For interrupted and rough milling of steel and stainless steel. The toughest substrate with hard coating provides stable tool life even in severe interrupted cutting. MT-TiCN + Al₂O₃ + TiN

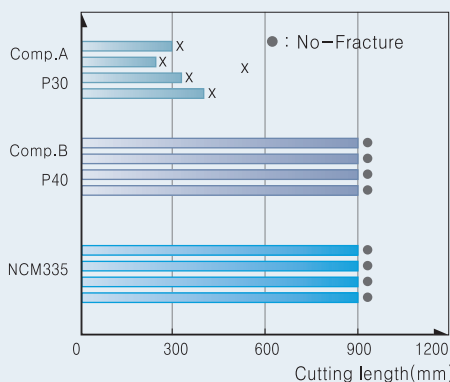
Cutting performance

Wear resistance



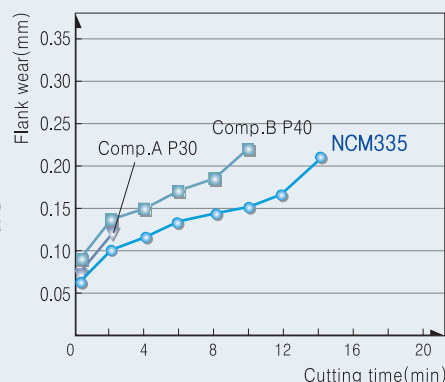
- Workpiece : SCM440(HB280)
- Designation : SPXN1203EDR
- Cutting condition : vc = 188m/min
fz = 0.20mm/t
ap = 2.0mm
Dry

Impact resistance



- Workpiece : SCM440(HB280)
- Designation : SPXN1203EDR
- Cutting condition : vc = 125m/min
fz = 0.36mm/t
ap = 2.0mm
Dry

Interrupted wear resistance for difficult-to-cut material



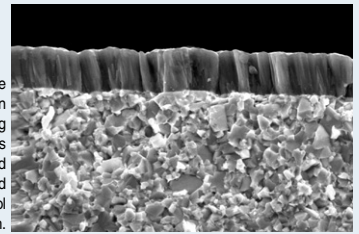
- Workpiece : STS304
- Designation : SPXN1203EDR
- Cutting condition : vc = 126m/min
fz = 0.36mm/t
ap = 2.0mm
Dry

PVD coated Grades

Features

- ▶ New TiAlN enhances wear resistance and toughness than conventional TiAlN. It can be used in dryness, high speed cutting.

- 1) Developed wear resistance
- Developed adhesion force between substrate and coating
- 2) Developed toughness
- Combination of tough and heat resistant substrate and PVD coating have good tool life in heavy interruption.



Cross - sectional view of PVD coated film

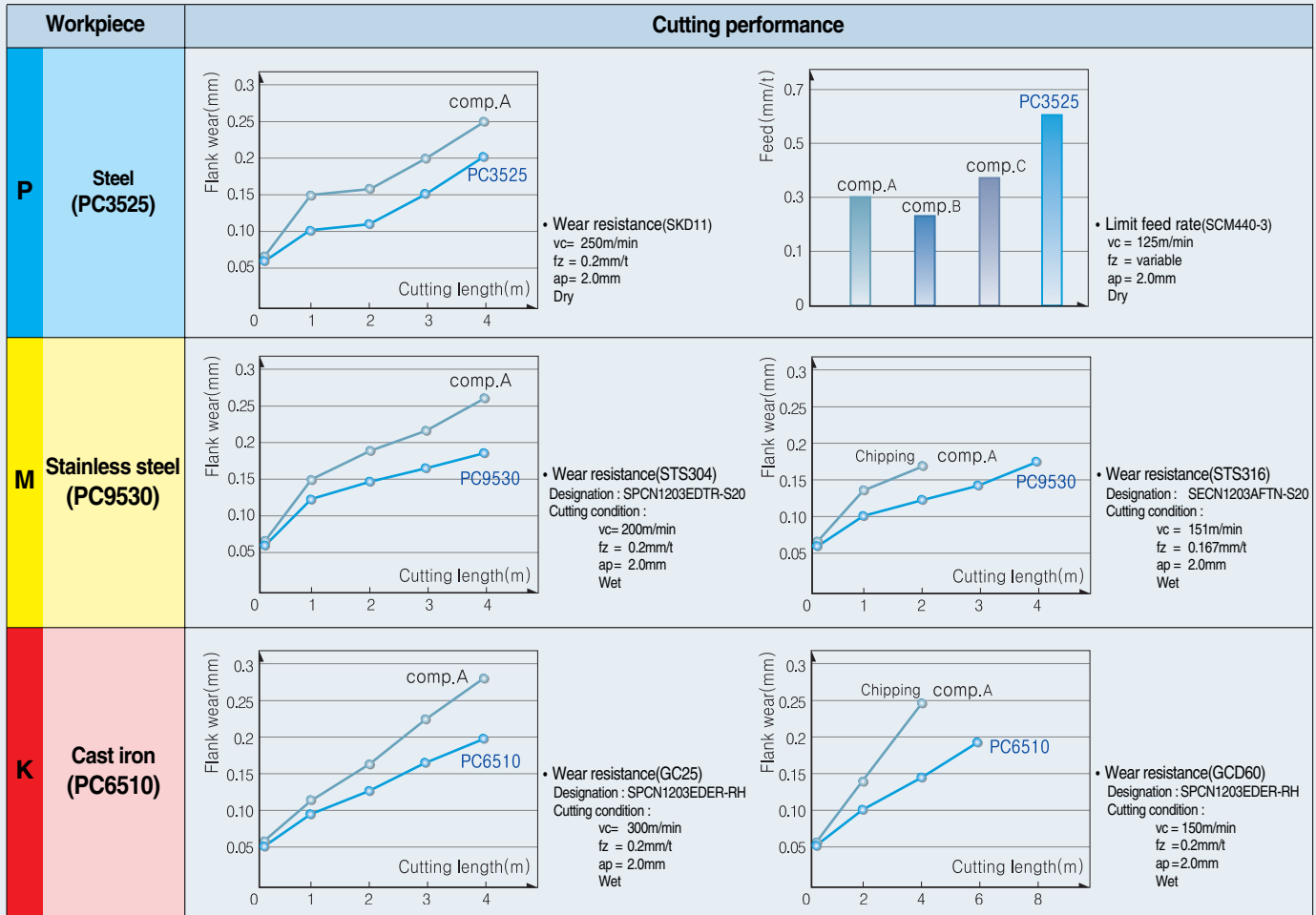
Selection system

Workpiece	Machining types	Grade	Recommended cutting speed(m/min)	ISO	Application range
P	Steel	Continuous cutting	200 (150~250)	P20	PC3525, PC3535
		Interrupted cutting		P30	
		Continuous cutting	120 (100~150)	P40	PC3545
		Interrupted cutting	120 (100~150)	P50	
M	Stainless steel	Continuous cutting	120 (100~150)	M20	PC8520, PC9530
		Interrupted cutting	130 (50~200)	M30	
		Continuous cutting	120 (100~150)	M40	
K	Cast iron	Continuous cutting	200 (150~250)	K01	PC6510
		Interrupted cutting	165 (120~210)	K05	
		Continuous cutting	200 (150~250)	K10	PC215K
		Interrupted cutting	165 (120~210)	K20	

The features of main PVD coated grades

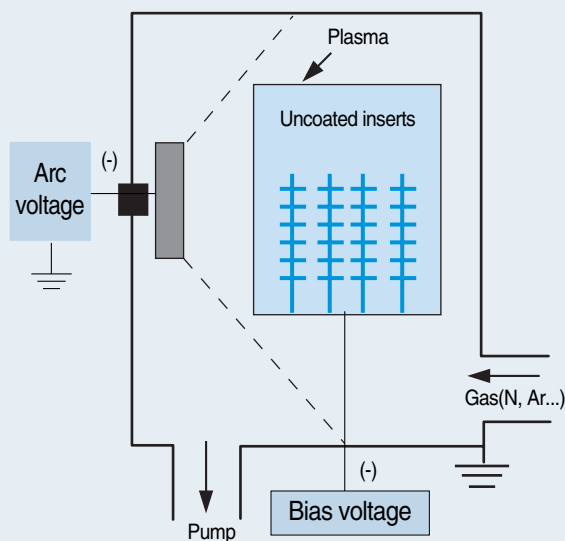
PVD coated grades	ISO	Features
PC3525	P15 ~ P35	<ul style="list-style-type: none"> • It is harder grade than PC3535. • Due to excellent wear resistance and crater resistance. It can be used in high speed. • New TiAlN.
PC3535	P20 ~ P35	<ul style="list-style-type: none"> • Milling grade for steel. • First recommended grade for general purpose, because the substrate has good wear resistance and toughness with good heat resistant coating.
PC3545	P30 ~ P50	<ul style="list-style-type: none"> • Medium and rough milling for steel. • Enhanced chipping resistant substrate. • K-Gold coating.
PC8520	S20 ~ S30	<ul style="list-style-type: none"> • For medium and rough milling for difficult-to-cut materials and stainless steels. • Enhanced chipping resistant substrate. • K-Gold coating.
PC6510	K01 ~ K15	<ul style="list-style-type: none"> • High speed milling grade for cast iron and aluminum. • K-Gold coating.
PC215K	K15 ~ K30	<ul style="list-style-type: none"> • Milling grade for cast iron and aluminum in medium to low cutting speed. • TiAlN.
PC9530	M20 ~ M35	<ul style="list-style-type: none"> • Milling grade for cast iron and aluminum in medium to low cutting speed. • The toughest sub-micron substrate provides excellent cutting performance at high feed. • TiAlN.

■ Cutting performance

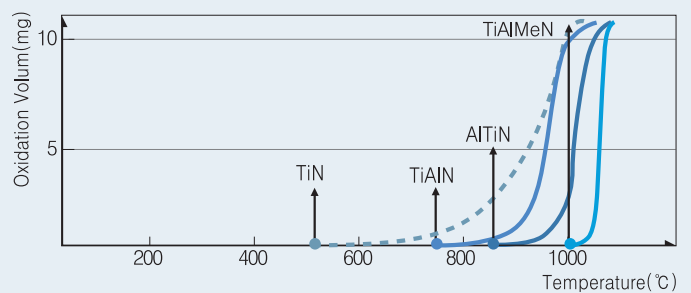


■ Equipment and features

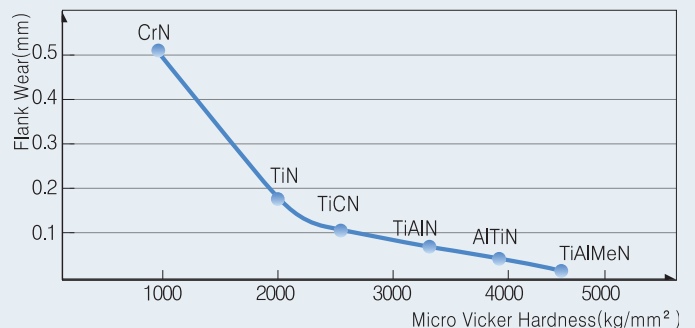
● Process



● Oxidation starting temperature



● Hardness & Cutting performance

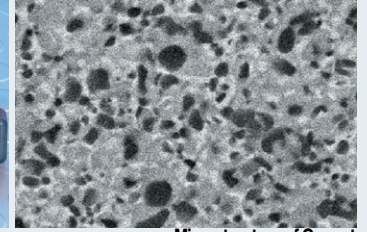
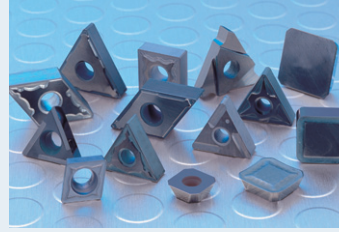


Milling Grades

Cermet Grades

Features

- ▶ Korloy cermet is a kind of carbonitride type cermet which has ultra fine micro structure by adding TiN, TiCN powders as additives. It has superior quality than conventional cermet when it comes wear resistance and thermal shock resistance as well as toughness.



Microstructure of Cermet

Selection system

Workpiece	Machining types	Grade	Recommended cutting speed(m/min)	ISO	Application range
P Steel	Continuous cutting	CN20	180 (130 ~ 230)	P01	CN20
	Interrupted cutting	CN30	150 (100 ~ 200)	P10	
				P20	CN30

The features of main cermet grades

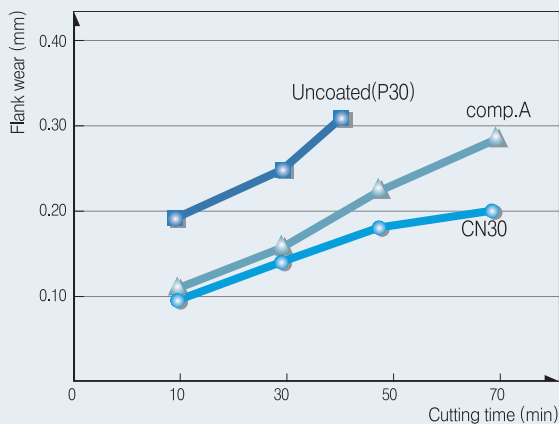
Cermet Grade	ISO	Features
CN20	P10 ~ P20	<ul style="list-style-type: none"> • Turning and milling for steel. • For general purpose cermet with wear resistance and toughness.
CN30	P20 ~ P30	<ul style="list-style-type: none"> • Milling for steel. • The toughest cermet with chipping resistance.

The physical properties of grades

ISO	Grade	Hardness	TRS	SG
P	CN20	<1600	220<	7.0~7.2
	CN30	<1500	240<	7.5~8.0

Cutting performance

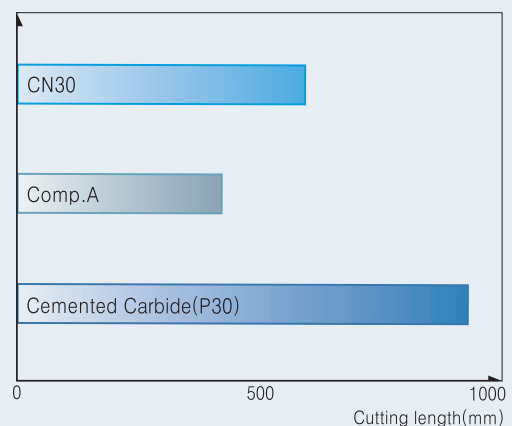
Wear resistance



vc : 190m/min
fz : 0.2mm/t
ap : 2.0mm

SDCN42MT
AD4160R
SCM440(HB270)

Impact resistance



vc : 130m/min
fz : 0.3mm/t
ap : 3.0mm

SDCN42MT
AD4160R
SCM440(HB270)

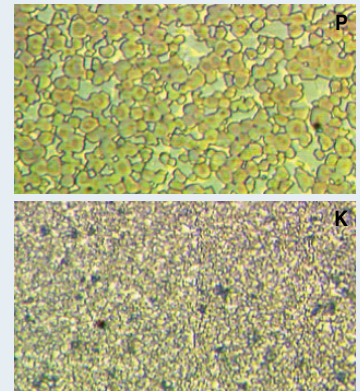
Cemented Carbide Grades

Features

- Due to the advanced sintering technology that Korloy use, Korloy uncoated carbide grades have fine alloy structure which is necessary to get superior quality as a cutting tool.

Advantages

- Consist of P,M,K carbide grades and can be used in all kinds of workpiece.
- Excellent quality at machining with coolant, due to the great thermal crack resistance of carbide.
- Due to the special design of carbides, it has fine micro structure and low affinity with workpiece.
- It has excellent toughness and low cutting load.



Selection system

Workpiece	Grade	Recommended cutting speed(m/min)	ISO	Application range
P Steel	ST30A	130 (70 ~ 180)	P30	ST30A
K Cast iron	H01, H05	150 (100 ~ 200)	K01	H01, H05
	H10, G10	140 (90 ~ 190)	K10	H01, H05, G10
Aluminum alloy	H01	500 (300 ~ 800)	K20	H01, H05, G10
Copper alloys	H01	200 (150 ~ 300)	K30	H01, H05, G10

Main composition and application range

ISO	Composition	Features	Workpiece
P	WC-TiC-TaC-Co	Excellent thermal shock resistance and plastic deformation resistance.	Carbon steel, Alloy steel, Stainless steel.
M	WC-TiC-TaC-Co	General grades with thermal shock resistance and hardness.	Carbon steel, Alloy steel, Stainless steel, Cast steel.
K	WC-Co	High hardness and superior wear resistance.	Cast iron, Non-ferrous metal, Non metal.

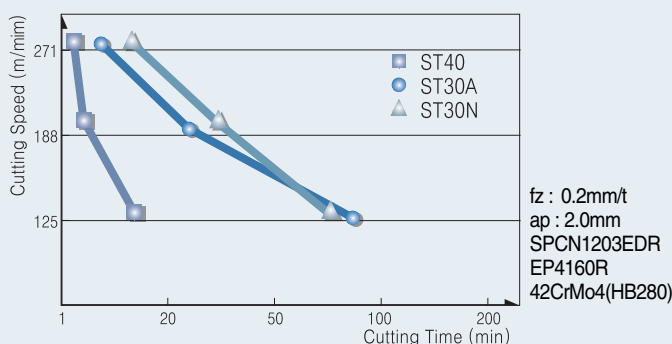
The physical properties of grades

ISO	Grade	Hardness (H _v A)	TRS (kgf/mm ²)	Young's modulus (10 ³ kgf/mm ²)	Thermal expansion coefficient(10 ⁻⁶ /°C)	Thermal conductivity (cal/cm · sec · °C)
P	ST05	92.7	140	-	-	-
	ST10	92.1	175	48	6.2	25
	ST20	91.9	200	56	5.2	45
	ST30A	91.3	230	53	5.2	-
M	U10	92.4	170	47	-	-
	U20	91.1	210	-	-	88
	ST30A	91.3	230	53	5.2	-
	U40	89.2	270	-	-	-
K	H02	93.2	185	61	4.4	105
	H01	92.9	210	66	4.7	109
	G10	90.9	250	63	-	105

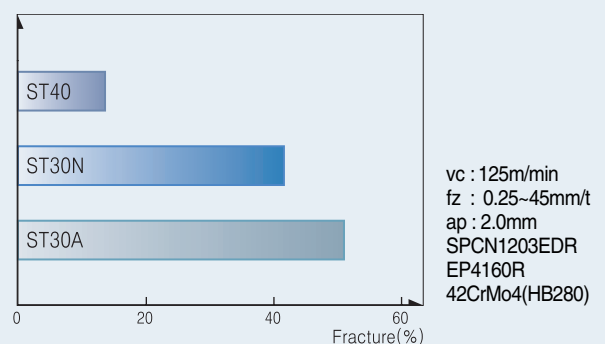
* 1Gpa = 102kg/m², 1w/m · k = 2.59 × 10⁻³cal/cm · sec · °C

Cutting performance

Wear resistance



Impact resistance



Milling Insert Code System(ISO)

S

1

P

2

K

3

R

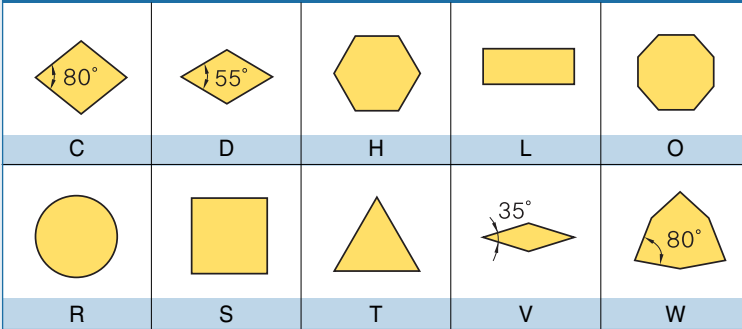
4

12

5

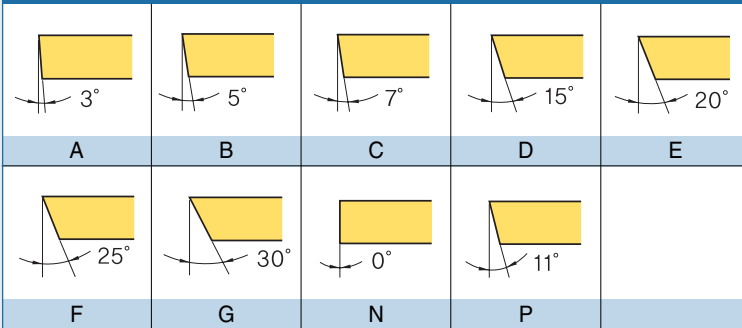
1 S P K R 12 03 ED08 S R - MX

Insert Shape



2 S P K R 12 03 ED08 S R - MX

Relief Angle



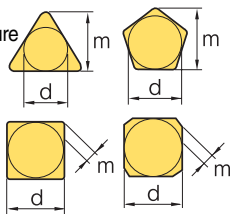
3 S P K R 12 03 ED08 S R - MX

Tolerance

ap : Inscribed Circle

t : Thickness

m : refer to figure



Tolerance on C,H,R,T,W class (exceptional case)

d	Tolerance on d		Tolerance on m	
	J,K,L,M,N	U	M,N	U
6.35	±0.05	±0.08	±0.08	±0.13
9.525	±0.05	±0.08	±0.08	±0.13
12.7	±0.08	±0.13	±0.13	±0.20
15.875	±0.10	±0.18	±0.15	±0.27
19.05	±0.10	±0.18	±0.15	±0.27
25.4	±0.13	±0.25	±0.18	±0.38

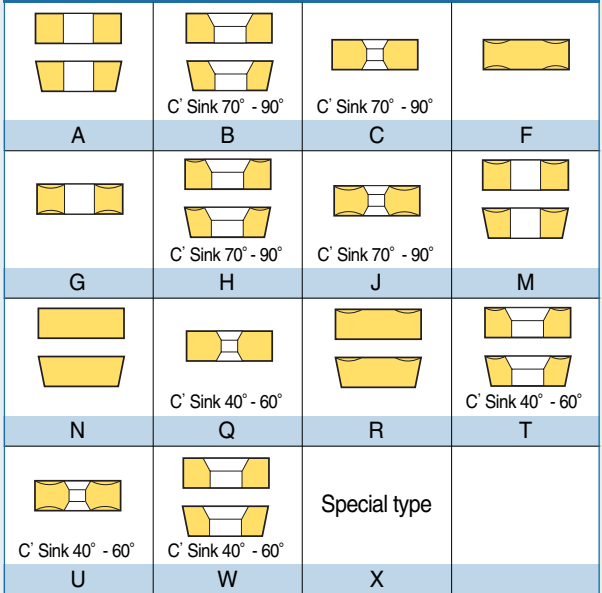
Tolerance on D class (exceptional case)

d	Tolerance on d		Tolerance on m	
	J,K,L,M,N	U	M,N	U
6.35	±0.05	±0.08	±0.08	±0.13
9.525	±0.05	±0.08	±0.08	±0.13
12.7	±0.08	±0.13	±0.13	±0.20
15.875	±0.10	±0.18	±0.15	±0.27
19.05	±0.10	±0.18	±0.15	±0.27

Class	d	m	t
A	±0.025	±0.005	±0.025
C	±0.025	±0.013	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.05 - ±0.15	±0.005	±0.025
K	±0.05 - ±0.15	±0.013	±0.025
L	±0.05 - ±0.15	±0.025	±0.025
M	±0.05 - ±0.15	±0.08 - ±0.20	±0.13
U	±0.08 - ±0.25	±0.13 - ±0.38	±0.13

4 S P K R 12 03 ED08 S R - MX

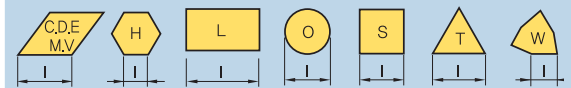
Cross Section Type



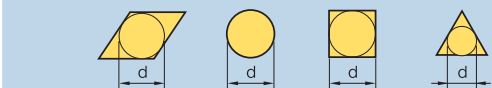
5 S P K R 12 03 ED08 S R - MX

Cutting Edge Length, Diameter of Inscribed circle

Metric system



Inch system



- Use 1/32" unit for a insert having smaller I.C under 1/4"
- Use 1/8" unit for a insert having larger I.C over 1/4"



※ In case of rectangular and rhombic insert indicate cutting edge length instead of inscribed circle.

Cross over chart for "Metric" and "Inch" system

	06	09	11	16	22	27	33	44
	03	05	06	09	12	15	19	25
	04	06	07	11	15	19	23	31
	03	05	06	09	12	16	19	25
Inscribed circle	5/32"	7/32"	1/4"	3/8"	1/2"	5/8"	3/4"	1"
Inch system	5	7	2(8)	3	4	5	6	8