

 **MITSUBISHI MATERIALS**

AQX Series

**MULTI-FUNCTIONAL
INDEXABLE INSERT END MILL**

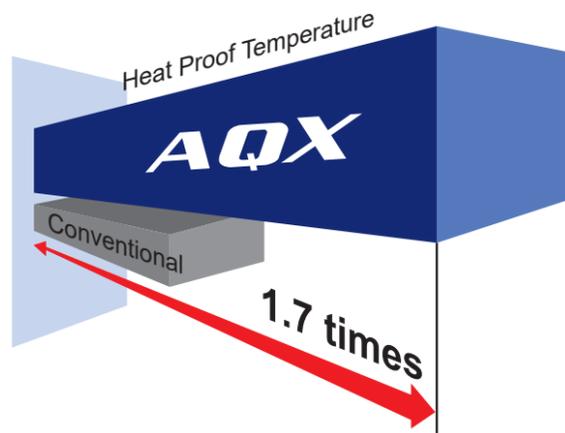


TOOL NEWS B021A

AQX Series

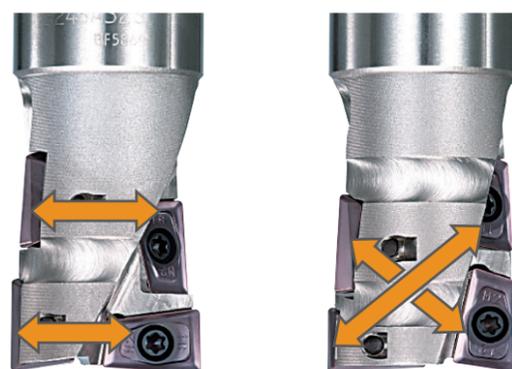
Heat Resistant Body

The body of the tool is made from a special alloy steel that has high heat resistant properties. A special surface treatment is used to increase wear and corrosion resistance.

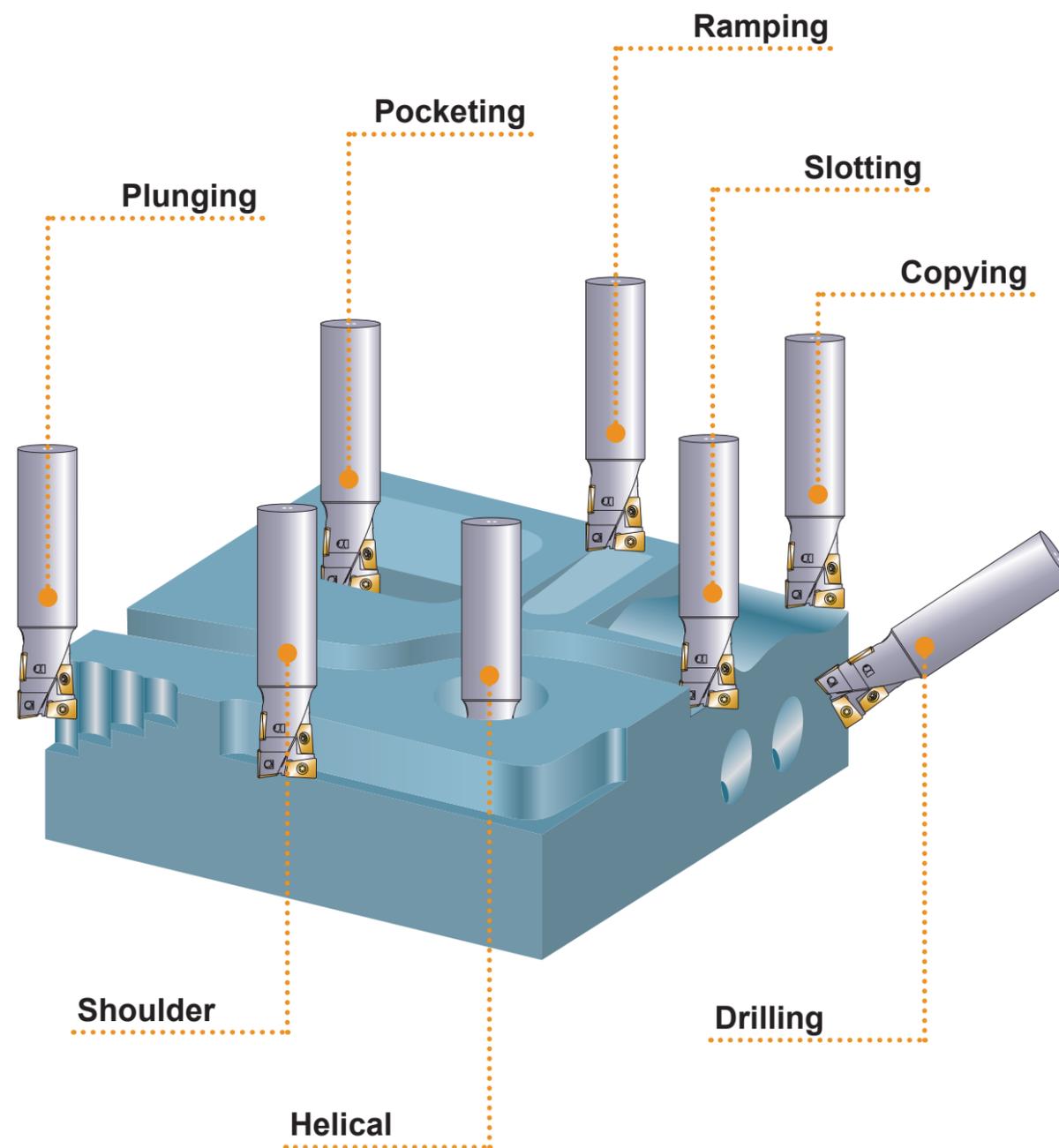


One Insert Type

Tool management is simplified by using only one type of insert for all 4 cutting edges. By rotating the inserts it's possible to use inserts twice.



Insert Rotation



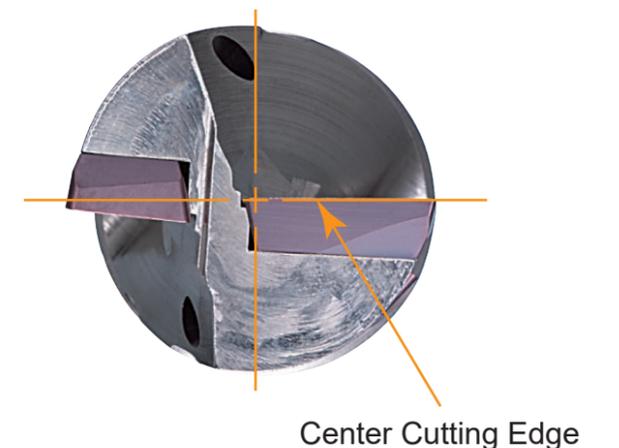
2 Insert Bottom Cutting Edge

The lower cutting edge consists of 2 inserts, resulting in higher cutting edge strength and increased tool life.



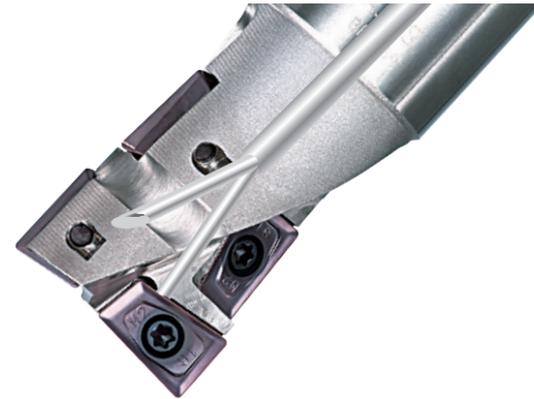
Center Cutting Edge

The AQX is designed with a center cutting edge, making it possible to drill, helical mill and pocket without a prepared hole.



Through Coolant Holes

The body is designed with through coolant holes to improve cooling and chip disposal.
The AQX is also available without coolant holes.



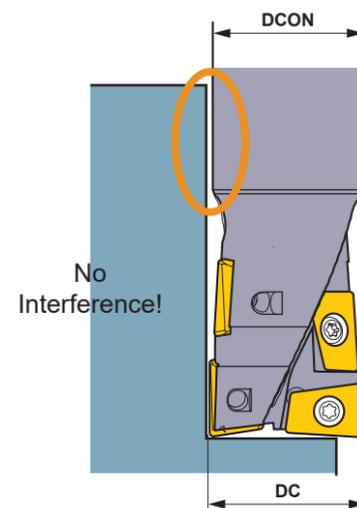
Short Edge Type

An economical short edge type body is available with only 2 inserts for short depth of cut applications.



Undercut Type Standardized

The cutting edge diameter DC has been designed so that it is larger than the shank diameter DCON, making it possible to machine vertical faces without any interference.

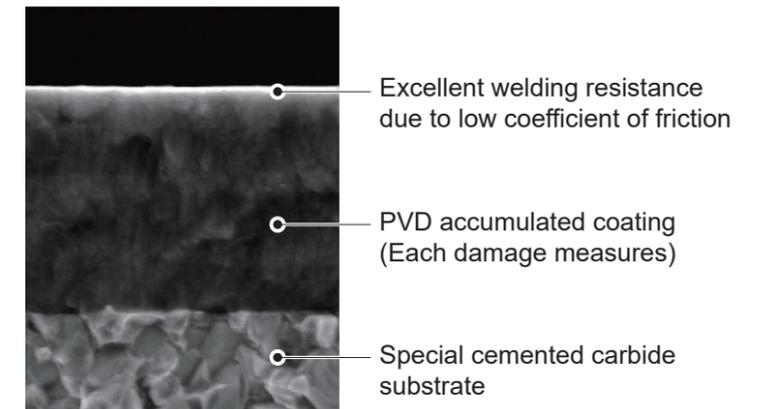


Order Number	DC (inch)	DCON (inch)
AQXUR11○SA10L	.672	.625
AQXUR13○SA12L	.797	.750
AQXUR17○SA16L	1.047	1.000
AQXUR21○SA20L	1.297	1.250
AQXUR24○A20○	1.500	1.250

For further details please refer to page 6.

NEW New PVD Coated Grades MP6100/MP7100/MP9100

Wide range of grades for specific materials
MIRACLE SIGMA accumulated Al-Ti-Cr-N based PVD coating.



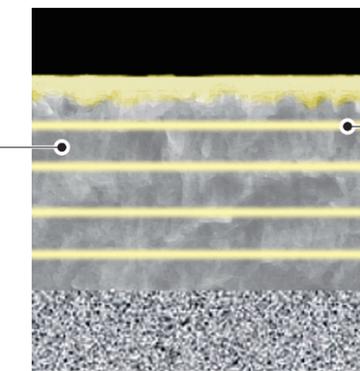
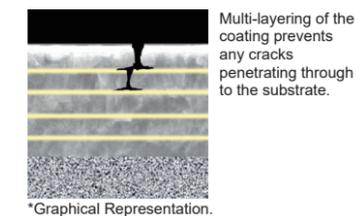
TOUGH-Σ Technology

A fusion of the separate coating technologies;
PVD and multi-layering provides extra toughness.

PVD Accumulated Coating

Base Layer High Al-(Al, Ti)N

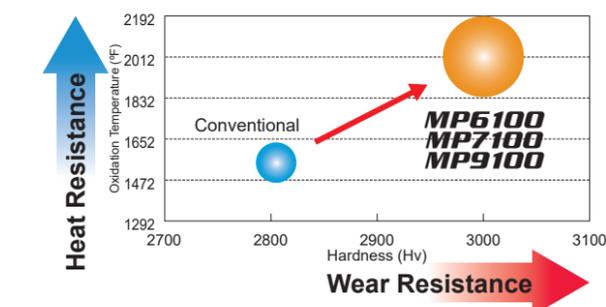
The new technology Al-(Al, Ti)N coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Best Layer of Each Work Material

P		(Al,Cr)N	Tough! Thermal Cracks
M		TiN	Tough! Notching
S		CrN	Tough! Resistant Chipping

Dramatically improving the heat and wear resistance!



Excellent welding resistance due to low coefficient friction!

Work Material	Grade	Coefficient of Friction Measured at 1112°F		
		1055	304	Ti-6Al-4V
P Carbon Steel, Alloy Steel	MP6100	.4		
M Stainless Steel	MP7100		.5	
S Titanium Alloy, Heat Resistant Alloy	MP9100			.3
Conventional		.7	.7	.7

Insert Grades for a Wide Range of Materials

ISO	PVD
Steel	P10
	P20
	P30
	P40

ISO	PVD
Stainless Steel	M10
	M20
	M30
	M40

ISO	PVD
Cast Iron	K10
	K20
	K30
	K40

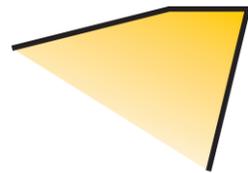
ISO	Cemented Carbide
Non-Ferrous Metal	N01
	N10
	N20
	N30

ISO	PVD
Heat Resistant Alloy - Ti Alloy	S01
	S10
	S20
	S30

ISO	PVD
Hardened Materials	H01
	H10
	H20
	H30

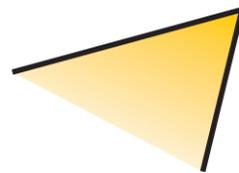
Wide Range of Inserts

M2 Breaker



Economical molded inserts. Suitable for machining a wide range of work materials under various cutting conditions.

G1 Breaker



High accuracy peripherally ground inserts. Large rake angle to provide high cutting edge sharpness. An HT10 insert is available with a polished rake face to prevent welding problems when machining aluminum alloys.

Multi-functional Indexable Insert End Mill

MULTI FUNCTIONAL MILLING

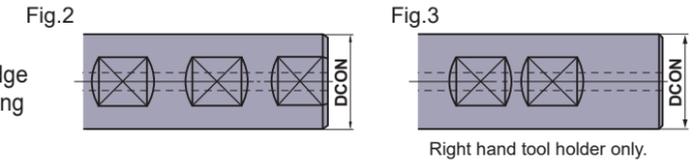
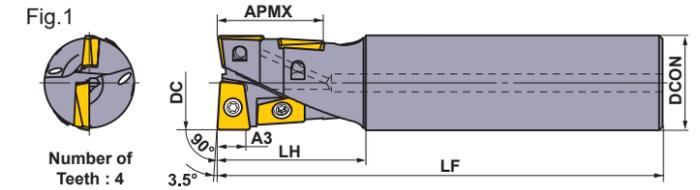


AQX

- P
- M
- K
- N
- S
- H



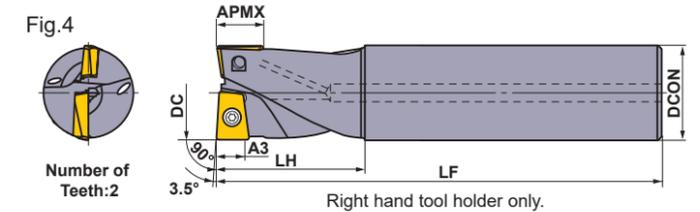
- Air / coolant through.
- The center bottom cutting edge enables drilling and end milling without prepared hole.



Standard Edge Type KAPR :90°

Type	Order Number	Stock	Dimensions (inch)						Fig.	Tools		
			R	DC	LF	DCON	LH	A3*1		APMX	Insert Screw	Wrench
Standard	AQXUR124WA12S	●	.750	4.125	.750	1.375	.219	.750	3	TS25	①TKY08F	QOG/MT0934R-∞
	AQXUR164WA16S	●	1.000	4.875	1.000	1.625	.281	1.000	2	TS32	②TKY08D	QOG/MT1443R-∞
	AQXUR204WA20S	●	1.250	5.250	1.250	2.000	.375	1.250	2	TS407	②TKY15D	QOG/MT1651R-∞
	AQXUR244WA20S	●	1.500	5.625	1.250	2.375	.438	1.500	2	TS5	②TKY25D	QOG/MT1959R-∞
Long	AQXUR124SA12L	●	.750	7.250	.750	2.375	.219	.750	1	TS25	①TKY08F	QOG/MT0934R-∞
	AQXUR134SA12L	●	.797	7.250	.750	1.375	.219	.750	1	TS25	①TKY08F	QOG/MT0934R-∞
	AQXUR164SA16L	●	1.000	8.500	1.000	3.000	.281	1.000	1	TS32	②TKY08D	QOG/MT1443R-∞
	AQXUR174SA16L	●	1.047	8.500	1.000	1.625	.281	1.000	1	TS32	②TKY08D	QOG/MT1443R-∞
	AQXUR204SA20L	●	1.250	9.000	1.250	3.500	.375	1.250	1	TS407	②TKY15D	QOG/MT1651R-∞
	AQXUR214SA20L	●	1.297	9.000	1.250	2.000	.375	1.250	1	TS407	②TKY15D	QOG/MT1651R-∞
	AQXUR244SA20L	●	1.500	9.500	1.250	2.375	.438	1.500	1	TS5	②TKY25D	QOG/MT1959R-∞

*2 Clamp Torque (lbf-in) : TS25=8.9, TS32=8.9, TS407=31, TS5=66



Short Edge Type KAPR :90°

Type	Order Number	Stock	Dimensions (inch)						Fig.	Tools		
			R	DC	LF	DCON	LH	A3*1		APMX	Insert Screw	Wrench
Standard	AQXUR102WA10S	●	.625	3.688	.625	1.125	.188	.281	3	TS2A	①TKY06F	QOG/MT0830R-∞
	AQXUR122WA12S	●	.750	4.125	.750	1.375	.219	.344	3	TS25	①TKY08F	QOG/MT0934R-∞
	AQXUR162WA16S	●	1.000	4.875	1.000	1.625	.281	.469	2	TS32	②TKY08D	QOG/MT1443R-∞
	AQXUR202WA20S	●	1.250	5.250	1.250	2.000	.375	.563	2	TS407	②TKY15D	QOG/MT1651R-∞
	AQXUR242WA20S	●	1.500	5.625	1.250	2.375	.438	.688	2	TS55	②TKY25D	QOG/MT1959R-∞
Long	AQXUR102SA10L	●	.625	6.875	.625	2.000	.188	.281	4	TS2A	①TKY06F	QOG/MT0830R-∞
	AQXUR112SA10L	●	.672	6.875	.625	1.125	.188	.281	4	TS2A	①TKY06F	QOG/MT0830R-∞
	AQXUR122SA12L	●	.750	7.250	.750	2.375	.219	.344	4	TS25	①TKY08F	QOG/MT0934R-∞
	AQXUR132SA12L	●	.797	7.250	.750	1.375	.219	.344	4	TS25	①TKY08F	QOG/MT0934R-∞
	AQXUR162SA16L	●	1.000	8.500	1.000	3.000	.281	.469	4	TS32	②TKY08D	QOG/MT1443R-∞
	AQXUR172SA16L	●	1.047	8.500	1.000	1.625	.281	.469	4	TS32	②TKY08D	QOG/MT1443R-∞
	AQXUR202SA20L	●	1.250	9.000	1.250	3.500	.375	.563	4	TS407	②TKY15D	QOG/MT1651R-∞
	AQXUR212SA20L	●	1.297	9.000	1.250	2.000	.375	.563	4	TS407	②TKY15D	QOG/MT1651R-∞
AQXUR242SA20L	●	1.500	9.500	1.250	2.375	.438	.688	4	TS55	②TKY25D	QOG/MT1959R-∞	

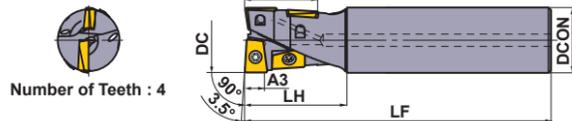
(Note) When exceeding A3 depth of cut, reduce feed rates by 50%(Do not exceed APMX depth of cut). Reference page 10.

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.

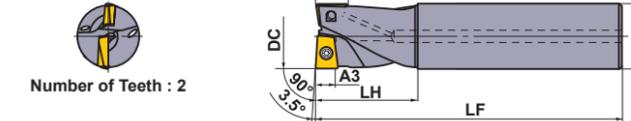
*2 Clamp Torque (lbf-in) : TS2A=5.3, TS25=8.9, TS33=8.9, TS407=31, TS5=66

● : Inventory maintained.

Multi-functional Indexable Insert End Mill



Right hand tool holder only.



Right hand tool holder only.

Metric Standard

Standard Edge Type KAPR :90°

Type	Order Number	Stock R	Coolant Thru *3	Dimensions (mm)						Insert Screw	Wrench	Insert
				DC	LF	DCON	LH	A3 *1	APMX			
Standard	AQXR164SA16S	★	Y	16	120	16	30	4.5	17.6	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16S	★	N	16	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SA16S	★	Y	17	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SN16S	★	N	17	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR204SA20S	★	Y	20	130	20	35	6	22	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20S	★	N	20	130	20	35	6	22	TS25	①TKY08F	
	AQXR214SA20S	★	Y	21	130	20	35	6	22	TS25	①TKY08F	
	AQXR214SN20S	★	N	21	130	20	35	6	22	TS25	①TKY08F	
	AQXR254SA25S	★	Y	25	140	25	40	7.5	27.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25S	★	N	25	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SA25S	★	Y	26	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SN25S	★	N	26	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR324SA32S	★	Y	32	150	32	50	9.5	35.2	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32S	★	N	32	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SA32S	★	Y	33	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SN32S	★	N	33	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR354SA32S	★	Y	35	150	32	50	11	40	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32S	★	N	35	150	32	50	11	40	TS407	②TKY15D	
	AQXR404SA32S	★	Y	40	160	32	60	12	44	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32S	★	N	40	160	32	60	12	44	TS55	②TKY25D	
AQXR504SA42S	★	Y	50	170	42	70	15	55	TS6S	③TKY30T	QOG/MT2576R-G1/M2	
AQXR504SN42S	★	N	50	170	42	70	15	55	TS6S	③TKY30T		
Long	AQXR164SA16L	★	Y	16	175	16	50	4.5	17.6	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16L	★	N	16	175	16	50	4.5	17.6	TS2A	①TKY06F	
	AQXR174SA16L	★	Y	17	175	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SN16L	★	N	17	175	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR204SA20L	★	Y	20	185	20	60	6	22	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20L	★	N	20	185	20	60	6	22	TS25	①TKY08F	
	AQXR214SA20L	★	Y	21	185	20	35	6	22	TS25	①TKY08F	
	AQXR214SN20L	★	N	21	185	20	35	6	22	TS25	①TKY08F	
	AQXR254SA25L	★	Y	25	220	25	75	7.5	27.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25L	★	N	25	220	25	75	7.5	27.5	TS33	②TKY08D	
	AQXR264SA25L	★	Y	26	220	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SN25L	★	N	26	220	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR324SA32L	★	Y	32	230	32	90	9.5	35.2	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32L	★	N	32	230	32	90	9.5	35.2	TS407	②TKY15D	
	AQXR334SA32L	★	Y	33	230	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SN32L	★	N	33	230	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR354SA32L	★	Y	35	230	32	50	11	40	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32L	★	N	35	230	32	50	11	40	TS407	②TKY15D	
	AQXR404SA32L	★	Y	40	240	32	60	12	44	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32L	★	N	40	240	32	60	12	44	TS55	②TKY25D	
AQXR504SA42L	★	Y	50	250	42	70	15	55	TS6S	③TKY30T	QOG/MT2576R-G1/M2	
AQXR504SN42L	★	N	50	250	42	70	15	55	TS6S	③TKY30T		

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.

*2 Clamp Torque (lbf-in) : TS2A=5.3, TS25=8.9, TS33=8.9, TS407=31, TS55=66, TS6S=89

*3 Y=Yes, N=No

Metric Standard

Short Edge Type KAPR :90°

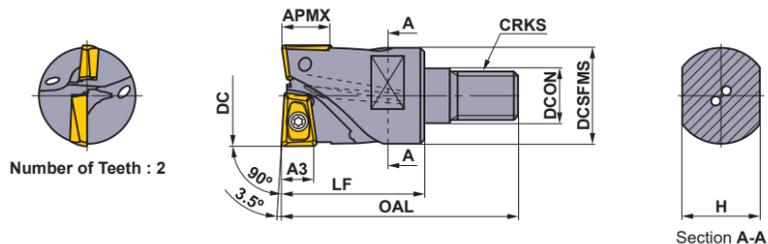
Type	Order Number	Stock R	Coolant Thru *3	Dimensions (mm)						Insert Screw	Wrench	Insert
				DC	LF	DCON	LH	A3 *1	APMX			
Standard	AQXR162SA16S	★	Y	16	120	16	30	4.5	7.4	TS2A	①TKY06F	QO○T0830R-○○
	AQXR162SN16S	★	N	16	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR172SA16S	★	Y	17	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR172SN16S	★	N	17	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR202SA20S	★	Y	20	130	20	35	6	9.2	TS25	①TKY08F	QO○T1035R-○○
	AQXR202SN20S	★	N	20	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR212SA20S	★	Y	21	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR212SN20S	★	N	21	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR252SA25S	★	Y	25	140	25	40	7.5	11.5	TS33	②TKY08D	QO○T1342R-○○
	AQXR252SN25S	★	N	25	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR262SA25S	★	Y	26	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR262SN25S	★	N	26	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR322SA32S	★	Y	32	150	32	50	9.5	14.5	TS407	②TKY15D	QO○T1651R-○○
	AQXR322SN32S	★	N	32	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR332SA32S	★	Y	33	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR332SN32S	★	N	33	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR352SA32S	★	Y	35	150	32	50	11	16	TS407	②TKY15D	QO○T1856R-○○
	AQXR352SN32S	★	N	35	150	32	50	11	16	TS407	②TKY15D	
	AQXR402SA32S	★	Y	40	160	32	60	12	18	TS55	②TKY25D	QO○T2062R-○○
	AQXR402SN32S	★	N	40	160	32	60	12	18	TS55	②TKY25D	
AQXR502SA42S	★	Y	50	170	42	70	15	23	TS6S	③TKY30T	QO○T2576R-○○	
AQXR502SN42S	★	N	50	170	42	70	15	23	TS6S	③TKY30T		
Long	AQXR162SA16L	★	Y	16	175	16	50	4.5	7.4	TS2A	①TKY06F	QO○T0830R-○○
	AQXR162SN16L	★	N	16	175	16	50	4.5	7.4	TS2A	①TKY06F	
	AQXR172SA16L	★	Y	17	175	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR172SN16L	★	N	17	175	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR202SA20L	★	Y	20	185	20	60	6	9.2	TS25	①TKY08F	QO○T1035R-○○
	AQXR202SN20L	★	N	20	185	20	60	6	9.2	TS25	①TKY08F	
	AQXR212SA20L	★	Y	21	185	20	35	6	9.2	TS25	①TKY08F	
	AQXR212SN20L	★	N	21	185	20	35	6	9.2	TS25	①TKY08F	
	AQXR252SA25L	★	Y	25	220	25	75	7.5	11.5	TS33	②TKY08D	QO○T1342R-○○
	AQXR252SN25L	★	N	25	220	25	75	7.5	11.5	TS33	②TKY08D	
	AQXR262SA25L	★	Y	26	220	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR262SN25L	★	N	26	220	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR322SA32L	★	Y	32	230	32	90	9.5	14.5	TS407	②TKY15D	QO○T1651R-○○
	AQXR322SN32L	★	N	32	230	32	90	9.5	14.5	TS407	②TKY15D	
	AQXR332SA32L	★	Y	33	230	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR332SN32L	★	N	33	230	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR352SA32L	★	Y	35	230	32	50	11	16	TS407	②TKY15D	QO○T1856R-○○
	AQXR352SN32L	★	N	35	230	32	50	11	16	TS407	②TKY15D	
	AQXR402SA32L	★	Y	40	240	32	60	12	18	TS55	②TKY25D	QO○T2062R-○○
	AQXR402SN32L	★	N	40	240	32	60	12	18	TS55	②TKY25D	
AQXR502SA42L	★	Y	50	250	42	70	15	23	TS6S	③TKY30T	QO○T2576R-○○	
AQXR502SN42L	★	N	50	250	42	70	15	23	TS6S	③TKY30T		

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.

*2 Clamp Torque (lbf-in) : TS2A=5.3, TS25=8.9, TS33=8.9, TS407=31, TS55=66, TS6S=89

*3 Y=Yes, N=No

Multi-functional Indexable Insert End Mill



Number of Teeth : 2

Section A-A

Right hand tool holder only.

Metric Standard

Screw-in Type

KAPR : 90°

Order Number	Stock	Coolant Thru *4	Dimensions (mm)										Insert Screw	Wrench	Insert
			DC	DCON	DCSFMS	OAL	LF	H	CRKS *3	A3 *1	APMX				
AQXR162M08A30	★	Y	16	8.5	14.7	48	30	10	M8	4.5	7.4	TS2A	⊕TKY06F	QO○T0830R-○○	
AQXR172M08A30	★	Y	17	8.5	14.5	48	30	10	M8	4.5	7.4	TS2A	⊕TKY06F		
AQXR202M10A30	★	Y	20	10.5	18.6	49	30	14	M10	6	9.2	TS25	⊕TKY08F	QO○T1035R-○○	
AQXR212M10A30	★	Y	21	10.5	18.5	49	30	14	M10	6	9.2	TS25	⊕TKY08F		
AQXR252M12A35	★	Y	25	12.5	23.5	57	35	19	M12	7.5	11.5	TS33	⊕TKY08D	QO○T1342R-○○	
AQXR262M12A35	★	Y	26	12.5	23.5	57	35	19	M12	7.5	11.5	TS33	⊕TKY08D		
AQXR322M16A40	★	Y	32	17	28.5	63	40	24	M16	9.5	14.5	TS407	⊕TKY15D	QO○T1651R-○○	
AQXR332M16A40	★	Y	33	17	28.5	63	40	24	M16	9.5	14.5	TS407	⊕TKY15D		
AQXR352M16A40	★	Y	35	17	28.5	63	40	24	M16	11	16	TS407	⊕TKY15D	QO○T1856R-○○	
AQXR402M16A45	★	Y	40	17	28.5	68	45	24	M16	12	18	TS55	⊕TKY25D		

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.

*2 Clamp Torque (lbf-in) : TS2A=5.3, TS25=8.9, TS33=8.9, TS407=31, TS55=66

*3 Clamp Torque of the Head (lbf-ft) : M8=17.1, M10=33.8, M12=59.2, M16=66.7

*4 Y=Yes

Inserts

(inch)

Work Material	P Steel		M Stainless Steel		K Cast Iron		N Non-ferrous Metal		S Heat-resistant Alloy, Titanium Alloy		H Hardened Materials		Cutting Conditions (Guide):							
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
Shape	Order Number	DC	Class	Honing	Coated						Carbide		L	LE	W1	S	RE	Geometry		
					MP6120	MP6130	MP7130	MP7140	MP9120	VP15TF	VP30RT	HTi10								
	QOMT0830R-M2	.625, .672	M	E	●	●	●	●	●	●	●	●			.350	.291	.220	.120	.031	
	QOMT0934R-M2	.750, .797	M	E	●	●	●	●	●	●	●	●			.401	.342	.264	.134	.031	
	QOMT1443R-M2	1.000, 1.047	M	E	●	●	●	●	●	●	●	●			.528	.469	.350	.169	.031	
	QOMT1651R-M2	1.250, 1.297	M	E	●	●	●	●	●	●	●	●			.650	.571	.433	.200	.031	
	QOGT0830R-G1	.625, .672	G	E*	●	●	●	●	●	●	●	●	●		.350	.291	.220	.120	.016	
	QOGT0934R-G1	.750, .797	G	E*	●	●	●	●	●	●	●	●	●		.401	.342	.264	.134	.016	
	QOGT1443R-G1	1.000, 1.047	G	E*	●	●	●	●	●	●	●	●	●		.528	.469	.350	.169	.016	
	QOGT1651R-G1	1.250, 1.297	G	E*	●	●	●	●	●	●	●	●	●		.650	.571	.433	.200	.016	
	QOGT1959R-G1	1.500	G	E*	●	●	●	●	●	●	●	●	●		.768	.709	.512	.232	.016	

* HTi10 insert honing is "F" type.

For Metric Standard

(mm)

Work Material	P Steel		M Stainless Steel		K Cast Iron		N Non-ferrous Metal		S Heat-resistant Alloy, Titanium Alloy		H Hardened Materials		Cutting Conditions (Guide):							
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
Shape	Order Number	DC	Class	Honing	Coated						Carbide		L	LE	W1	S	RE	Geometry		
					MP6120	MP6130	MP7130	MP7140	MP9120	VP15TF	VP30RT	HTi10								
	QOMT0830R-M2	φ16,17	M	E	●	●	●	●	●	●	●	●	●		8.4	7.4	5.5	3	0.8	
	QOMT1035R-M2	φ20,21	M	E	★	★	★	★	★	★	★	★	★		10.6	9.2	7	3.5	0.8	
	QOMT1342R-M2	φ25,26	M	E	★	★	★	★	★	★	★	★	★		13.1	11.5	8.7	4.2	0.8	
	QOMT1651R-M2	φ32,33	M	E	●	●	●	●	●	●	●	●	●		16.5	14.5	11	5.1	0.8	
	QOMT1856R-M2	φ35	M	E	★	★	★	★	★	★	★	★	★		18	16	12	5.6	0.8	
	QOMT2062R-M2	φ40	M	E	★	★	★	★	★	★	★	★	★		20.4	18	13.6	6.2	0.8	
	QOGT0830R-G1	φ16,17	G	E*	●	●	●	●	●	●	●	●	●		8.4	7.4	5.5	3	0.4	
	QOGT1035R-G1	φ20,21	G	E*	★	★	★	★	★	★	★	★	★		10.6	9.2	7	3.5	0.4	
	QOGT1342R-G1	φ25,26	G	E*	★	★	★	★	★	★	★	★	★		13.1	11.5	8.7	4.2	0.4	
	QOGT1651R-G1	φ32,33	G	E*	●	●	●	●	●	●	●	●	●		16.5	14.5	11	5.1	0.4	
	QOGT1856R-G1	φ35	G	E*	★	★	★	★	★	★	★	★	★		18	16	12	5.6	0.4	
	QOGT2062R-G1	φ40	G	E*	★	★	★	★	★	★	★	★	★		20.4	18	13.6	6.2	0.4	
QOGT2576R-G1	φ50	G	E*	★	★	★	★	★	★	★	★	★		25.8	23	17.2	7.6	0.4		

* HTi10 insert honing is "F" type.

Recommended Cutting Conditions

Cutting Speed

(inch)

Work Material	No.	Hardness	Breaker	Cutting Speed for Different Grades vc (SFM)		
				MP6120	VP15TF	MP6130
P				MP6120	VP15TF	MP6130
Mild Steel	1	≤180HB	M2	655 (560-785)	590 (490-720)	525 (425-655)
Carbon Steel Alloy Steel	2	180-350HB	M2	590 (460-720)	525 (395-655)	460 (330-590)
M				MP7130	MP7140	VP30RT (VP15TF)
Austenitic Stainless Steel	1	≤200HB	M2	560 (395-655)	525 (330-590)	490 (395-590)
Austenitic Stainless Steel	2	>200HB	M2			
Ferritic and Martensitic Stainless Steel	3	≤200HB	M2			
Ferritic and Martensitic Stainless Steel	4	>200HB	M2			
K				VP15TF		
Gray Cast Iron	1	≤350MPa	M2	590 (490-720)	-	-
Ductile Cast Iron	2	≤450MPa	M2	590 (490-720)	-	-
N				HT110		
Aluminum Alloy	1	Si<5%	G1	1640 (655-2625)	-	-
Aluminum Alloy	2	5%≤Si≤10%	G1	330 (165-985)	-	-
Aluminum Alloy	3	Si>5%	G1	330 (165-985)	-	-
S				MP9120		
Titanium Alloy	1	-	M2	165 (100-230)	-	-
H				VP15TF		
Hardened Steel	1	40-55HRC	M2	260 (165-395)	-	-

* Wet cutting is recommended for Titanium alloy.

Cutting Conditions for Shoulder Milling

(inch)

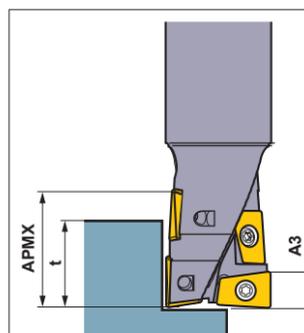
Work Material	No.	Hardness	φ.625", .672"			φ.750", .797"			φ1.000", 1.047"			
			φ16mm, 17mm			φ20mm, 21mm			φ25mm, 26mm			
			ap	ae	f (IPR)	ap	ae	f (IPR)	ap	ae	f (IPR)	
P	Mild Steel	1	≤180HB	≤.177	≤.315	.010	≤.236	≤.394	.012	≤.295	≤.492	.014
				.177-.472	≤.197	.006	.236-.551	≤.276	.010	.295-.669	≤.315	.011
P	Carbon Steel Alloy Steel	2	180-350HB	≤.177	≤.315	.008	≤.236	≤.394	.010	≤.295	≤.492	.012
				.177-.472	≤.157	.006	.236-.551	≤.236	.008	.295-.669	≤.276	.010
M	Stainless Steel	1,2,3,4	≤270HB	≤.177	≤.315	.008	≤.236	≤.394	.010	≤.295	≤.492	.012
				.177-.472	≤.157	.006	.236-.551	≤.236	.008	.295-.669	≤.276	.010
K	Cast Iron	1,2	≤350MPa	≤.177	≤.315	.010	≤.236	≤.394	.012	≤.295	≤.492	.014
				.177-.472	≤.197	.006	.236-.551	≤.276	.010	.295-.669	≤.315	.011
N	Aluminum Alloy	1,2,3	-	≤.177	≤.433	.012	≤.236	≤.551	.014	≤.295	≤.492	.016
				.177-.472	≤.315	.008	.236-.551	≤.394	.012	.295-.669	≤.276	.013
S	Titanium Alloy	1	-	≤.177	≤.315	.006	≤.236	≤.394	.007	≤.295	≤.689	.008
				.177-.472	≤.157	.004	.236-.551	≤.236	.006	.295-.669	≤.492	.007
H	Hardened Steel	1	40-55HRC	≤.177	≤.197	.006	≤.236	≤.236	.008	≤.295	≤.276	.009
				.177-.472	≤.118	.004	.236-.551	≤.157	.006	.295-.669	≤.157	.007

Work Material	No.	Hardness	φ1.250", 1.297"			φ1.500"			
			φ32mm, 33mm			φ40mm			
			ap	ae	f (IPR)	ap	ae	f (IPR)	
P	Mild Steel	1	≤180HB	≤.374	≤.630	.016	≤.472	≤.787	.020
				.374-.866	≤.433	.013	.472-1.102	≤.512	.016
P	Carbon Steel Alloy Steel	2	180-350HB	≤.374	≤.630	.014	≤.472	≤.787	.016
				.374-.866	≤.394	.011	.472-1.102	≤.472	.013
M	Stainless Steel	1,2,3,4	≤270HB	≤.374	≤.630	.014	≤.472	≤.787	.016
				.374-.866	≤.394	.011	.472-1.102	≤.472	.013
K	Cast Iron	1,2	≤350MPa	≤.374	≤.630	.016	≤.472	≤.787	.020
				.374-.866	≤.433	.013	.472-1.102	≤.512	.016
N	Aluminum Alloy	1,2,3	-	≤.374	≤.630	.018	≤.472	≤.787	.022
				.374-.866	≤.394	.015	.472-1.102	≤.472	.018
S	Titanium Alloy	1	-	≤.374	≤.906	.010	≤.472	≤1.102	.011
				.374-.866	≤.630	.008	.472-1.102	≤.787	.009
H	Hardened Steel	1	40-55HRC	≤.374	≤.315	.010	≤.472	≤.394	.012
				.374-.866	≤.197	.008	.472-1.102	≤.236	.009

(Note 1) Please pay special attention on the depth of cut when using the short edge type.

(Note 2) When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.

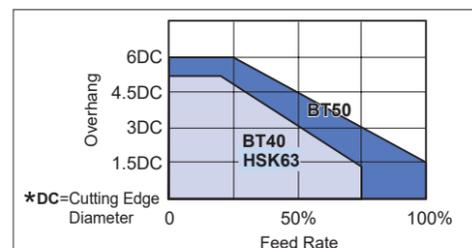
(Note 3) For more information on "No.", please refer to page 11 for cutting speed.



- A3 is the depth of cut for the full dual blade portion at the end of the cutting edge.
- Beyond the range of A3 where overlapping occurs, there is an area where the cutting edge becomes single bladed, not forming full dual blade configuration. As such, please pay special attention to the relationship between depth of cut and feed.
- In general, the edge at the border of cut tends to suffer from damages. At large depth of cut operations, applying the following depth of cut (t), at which the edge is full dual bladed at the border of cut, is recommended to prevent damage to the cutting edge.

Tool Diameter	Recommended Depth of Cut t
φ.625, .672	.472-.551
φ.750, .797	.551-.669
φ1.000, 1.047	.669-.866
φ1.250, 1.297	.866-1.102
φ1.500	1.102-1.378

*Figures for A3 and APMX are shown in the table of holder standard.



- Chatter vibration and other problems tend to occur at operations where overhang length is large and/or machine rigidity is low, resulting in unstable machining.
- Please reduce feed accordingly, using the above chart as a guideline.

Cutting Conditions for Slotting

(inch)

Work Material	No.	Hardness	φ.625", .672"		φ.750", .797"		φ1.000", 1.047"	
			φ16mm, 17mm		φ20mm, 21mm		φ25mm, 26mm	
			ap	f (IPR)	ap	f (IPR)	ap	f (IPR)
P Mild Steel	1	≤180HB	≤.177	.006	≤.236	.007	≤.295	.008
			.177-.472	.004	.236-.551	.006	.295-.669	.006
			.472-.669	.003	.551-.866	.004	.669-1.063	.005
Carbon Steel Alloy Steel	2	180-350HB	≤.177	.006	≤.236	.006	≤.295	.007
			.177-.472	.004	.236-.551	.005	.295-.669	.006
			.472-.669	.002	.551-.866	.004	.669-1.063	.004
M Stainless Steel	1,2,3,4	≤270HB	≤.177	.006	≤.236	.006	≤.295	.007
			.177-.472	.004	.236-.551	.005	.295-.669	.006
			.472-.669	.002	.551-.866	.004	.669-1.063	.004
K Cast Iron	1,2	≤350MPa	≤.177	.006	≤.236	.007	≤.295	.008
			.177-.472	.004	.236-.551	.006	.295-.669	.006
			.472-.669	.003	.551-.866	.004	.669-1.063	.005
N Aluminum Alloy	1,2,3	-	≤.177	.007	≤.236	.008	≤.295	.009
			.177-.472	.005	.236-.551	.006	.295-.669	.007
			.472-.669	.004	.551-.866	.005	.669-1.063	.006
S Titanium Alloy	1	-	≤.177	.004	≤.236	.005	≤.295	.006
			.177-.472	.002	.236-.551	.003	.295-.669	.004
			.472-.669	.001	.551-.866	.002	.669-1.063	.003
H Hardened Steel	1	40-55HRC	≤.177	.004	≤.236	.005	≤.295	.006
			.177-.472	.003	.236-.551	.004	.295-.669	.005

Work Material	No.	Hardness	φ1.250", 1.297"		φ1.500"	
			φ32mm, 33mm		φ40mm	
			ap	f (IPR)	ap	f (IPR)
P Mild Steel	1	≤180HB	≤.374	.010	≤.472	.012
			.374-.866	.008	.472-1.102	.010
			.866-1.378	.006	1.102-1.732	.007
Carbon Steel Alloy Steel	2	180-350HB	≤.374	.008	≤.472	.010
			.374-.866	.006	.472-1.102	.008
			.866-1.378	.005	1.102-1.732	.006
M Stainless Steel	1,2,3,4	≤270HB	≤.374	.008	≤.472	.010
			.374-.866	.006	.472-1.102	.008
			.866-1.378	.005	1.102-1.732	.006
K Cast Iron	1,2	≤350MPa	≤.374	.010	≤.472	.012
			.374-.866	.008	.472-1.102	.010
			.866-1.378	.006	1.102-1.732	.007
N Aluminum Alloy	1,2,3	-	≤.374	.011	≤.472	.013
			.374-.866	.009	.472-1.102	.011
			.866-1.378	.006	1.102-1.732	.008
S Titanium Alloy	1	-	≤.374	.007	≤.472	.009
			.374-.866	.005	.472-1.102	.008
			.866-1.378	.004	1.102-1.732	.006
H Hardened Steel	1	40-55HRC	≤.374	.006	≤.472	.007
			.374-.866	.005	.472-1.102	.006

(Note 1) Please pay special attention on the depth of cut when using the short edge type.
 (Note 2) When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.
 (Note 3) For more information on "No.", please refer to page 11 for cutting speed.

For Helical Cutting

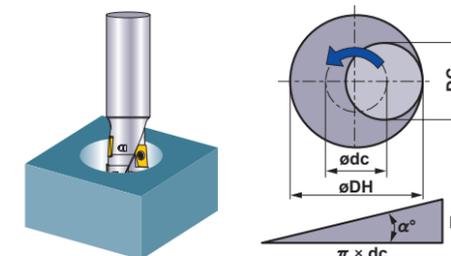
(inch)

Work Material	No.	Hardness	φ.625", .672"				φ.750", .797"				φ1.000", 1.047"			
			φ16mm, 17mm				φ20mm, 21mm				φ25mm, 26mm			
			DH	APMX	f (IPR)	P (inch/pass)	DH	APMX	f (IPR)	P (inch/pass)	DH	APMX	f (IPR)	P (inch/pass)
P Mild Steel	1	≤180HB	.787	.315	.006	.017	.945	.394	.007	.017	1.181	.492	.008	.022
			.984	.472	.006	.039	1.181	.591	.006	.043	1.496	.748	.007	.056
			1.142	.630	.005	.056	1.417	.787	.006	.069	1.772	.984	.006	.087
Carbon Steel Alloy Steel	2	180-350HB	.787	.315	.006	.013	.945	.394	.006	.019	1.181	.492	.007	.016
			.984	.472	.005	.029	1.181	.591	.006	.032	1.496	.748	.006	.042
			1.142	.630	.004	.042	1.417	.787	.005	.052	1.772	.984	.006	.065
M Stainless Steel	1,2,3,4	≤270HB	.787	.118	.006	.009	.945	.157	.006	.009	1.181	.197	.007	.011
			.984	.197	.005	.019	1.181	.276	.006	.022	1.496	.354	.006	.028
			1.142	.315	.004	.028	1.417	.394	.005	.035	1.772	.492	.006	.043
K Cast Iron	1,2	≤350MPa	.787	.394	.006	.022	.945	.551	.007	.022	1.181	.709	.008	.027
			.984	.512	.006	.048	1.181	.669	.006	.054	1.496	.827	.007	.070
			1.142	.630	.005	.070	1.417	.787	.006	.086	1.772	.984	.006	.108
N Aluminum Alloy	1,2,3	-	.787	.394	.007	.017	.945	.551	.008	.017	1.181	.709	.009	.022
			.984	.512	.006	.039	1.181	.669	.007	.043	1.496	.827	.008	.056
			1.142	.630	.006	.056	1.417	.787	.006	.069	1.772	.984	.007	.087
S Titanium Alloy	1	-	.787	.118	.004	.009	.945	.157	.004	.009	1.181	.197	.005	.011
			.984	.197	.003	.019	1.181	.276	.004	.022	1.496	.354	.004	.028
			1.142	.315	.003	.028	1.417	.394	.003	.035	1.772	.492	.004	.043
H Hardened Steel	1	40-55HRC	.787	.118	.004	.009	.945	.157	.005	.009	1.181	.197	.006	.011
			.984	.197	.003	.019	1.181	.276	.004	.022	1.496	.354	.005	.028
			1.142	.315	.002	.028	1.417	.394	.003	.035	1.772	.492	.004	.043

Work Material	No.	Hardness	φ1.250", 1.297"				φ1.500"			
			φ32mm, 33mm				φ40mm			
			DH	APMX	f (IPR)	P (inch/pass)	DH	APMX	f (IPR)	P (inch/pass)
P Mild Steel	1	≤180HB	1.496	.630	.010	.026	1.890	.787	.012	.035
			1.890	.945	.009	.069	2.362	1.181	.010	.086
			2.283	1.260	.008	.112	2.835	1.575	.009	.138
Carbon Steel Alloy Steel	2	180-350HB	1.496	.630	.008	.019	1.890	.787	.010	.026
			1.890	.945	.007	.052	2.362	1.181	.009	.065
			2.283	1.260	.006	.084	2.835	1.575	.008	.104
M Stainless Steel	1,2,3,4	≤270HB	1.496	.236	.008	.013	1.890	.315	.010	.017
			1.890	.433	.007	.035	2.362	.551	.009	.043
			2.283	.630	.006	.056	2.835	.787	.008	.069
K Cast Iron	1,2	≤350MPa	1.496	.866	.010	.032	1.890	1.102	.012	.043
			1.890	1.063	.009	.086	2.362	1.339	.010	.108
			2.283	1.260	.008	.141	2.835	1.575	.009	.173
N Aluminum Alloy	1,2,3	-	1.496	.866	.011	.026	1.890	1.102	.013	.035
			1.890	1.063	.009	.069	2.362	1.339	.011	.086
			2.283	1.260	.009	.112	2.835	1.575	.009	.138
S Titanium Alloy	1	-	1.496	.236	.006	.013	1.890	.315	.007	.017
			1.890	.433	.005	.035	2.362	.551	.006	.043
			2.283	.630	.004	.056	2.835	.787	.006	.069
H Hardened Steel	1	40-55HRC	1.496	.236	.006	.013	1.890	.315	.007	.017
			1.890	.433	.006	.035	2.362	.551	.006	.043
			2.283	.630	.005	.056	2.835	.787	.006	.069

Helical grooving is strongly recommended for machining of tempered steel.

(Note 1) When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.
 (Note 2) For more information on "No.", please refer to page 11 for cutting speed.



● How to calculate the theoretical center of the cutter path.

$$\phi_{dc} = \phi_{DH} - DC$$

Theoretical center of the tool Desired hole diameter Cutting edge diameter

● Depth of cut for a pass.

$$P = \pi \times dc \times \tan \alpha^{\circ}$$

* $\alpha^{\circ} \leq 3^{\circ}$

● Min. machined hole diameter at helical cutting : 1.2DC
 Max. machined hole diameter at helical cutting : 1.8DC

● For chip discharge, please always apply air blow.
 (When aluminum cutting, please use coolant.)

● When helical cutting, it is recommended to reduce the feed rate by 40%.

● When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.

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FOR YOUR SAFETY

- Don't handle inserts and chips without gloves.
- Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage.
- Please use safety covers and wear safety glasses.
- When using compounded cutting oils, please take fire precautions.
- When attaching inserts or spare parts, please use only the correct wrench or driver.
- When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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Tools specifications subject to change without notice.

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