DIA EDGE

TOOL NEWS

2023.7 Update
B053G

Threading

MMT Series

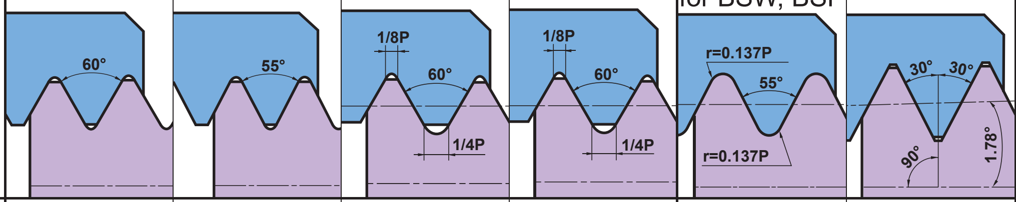
Inserts Expansion

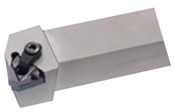
For high precision machining of a wide range of threading applications

MITSUBISHI MATERIALS CORPORATION

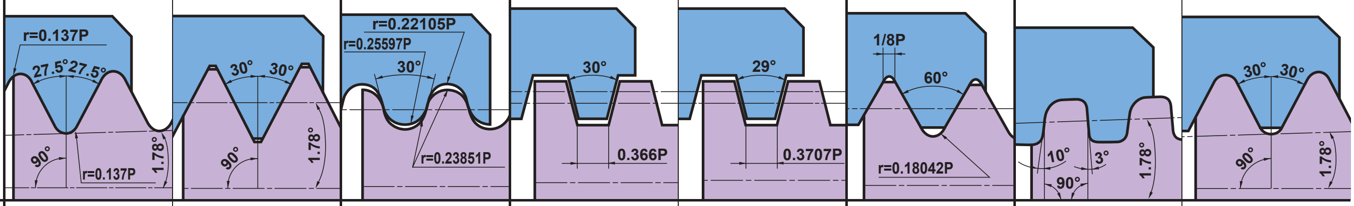
THREAD PITCH CROSS REFERENCE

Application		General machining				Pipe fittings and couplings for gas and water	
Type		Partial Profile 60°	Partial Profile 55°	ISO Metric	American UN	Parallel Pipe Thread Whitworth for BSW, BSP	American NPT
Symbol		M UNC UNF	W	M	UNC UNF	G(PF) Rp(PS) W	NPT
Holder / Pitch		mm (thread/inch)	thread/inch	mm	thread/inch	thread/inch	thread/inch
MMT Holder P.13	Full form	–	–	0.5–5.0	32–5	28–5	27, 18, 14 11.5, 8
	Partial form	0.5–5.0 (48–5)	48–5	0.5–5.0	48–5	–	–
MMT Boring Bars P.18	Full form	–	–	0.5–5.0	32–5	28–5	27, 18, 14 11.5, 8
	Partial form	0.5–5.0 (48–5)	48–5	0.5–5.0	48–5	–	–





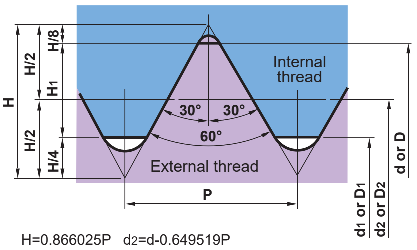
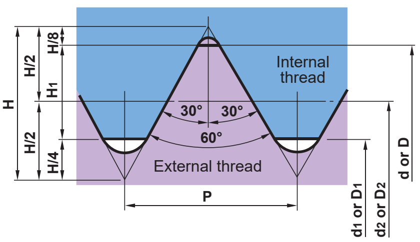
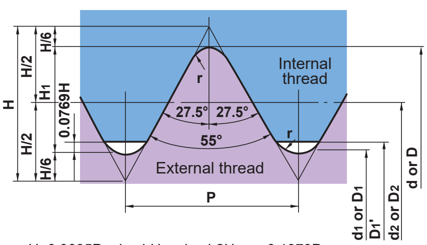
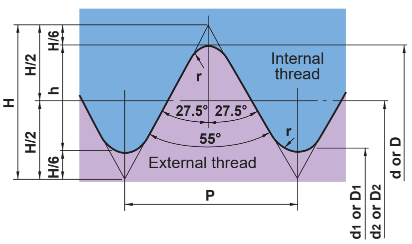
	Steam, gas and water line pipes		Pipe couplings for food and fire fighting industries	Motion transmissions		Aircraft and aerospace	Oil and gas	
	Taper Pipe Thread BSPT	American NPTF	Round DIN 405	ISO Trapezoidal 30°	American ACME	UNJ	API Buttress Casing	API Round Casing&Tubing



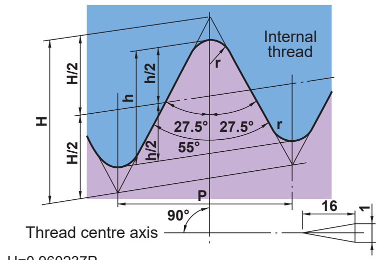
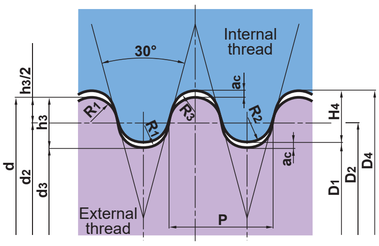
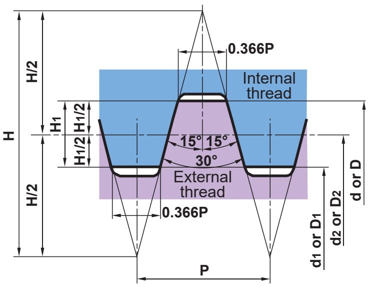
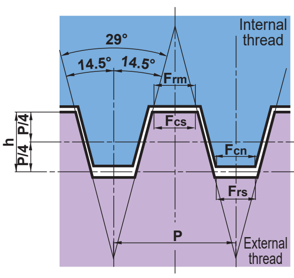
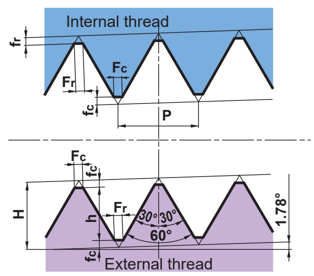
	R(PT) Rc(PT) Rp	NPTF	Rd	Tr (TM)	ACME (Tw)	UNJ	BCSG	CSG LCSG
	thread/inch	thread/inch	thread/inch	mm	thread/inch	thread/inch	thread/inch	thread/inch
	28, 19 14, 11	27, 18, 14 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	32—8	5	10, 8
	–	–	–	–	–	–	–	–
	19, 14, 11	14, 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	–	5	10, 8
	–	–	–	–	–	* –	–	–

* When machining an internal UNJ thread, drill an internal hole with the appropriate diameter. Then machine with 60° American UN. In this case, a full form type insert cannot be used.

STANDARD THREAD AND CORRESPONDING INSERT / HOLDER

Thread Name	Standard Thread Type	Type	Ext./Int.	Insert Number	Wiper/ General	Tool Holder	Page
ISO Metric	 $H=0.866025P$ $d_2=d-0.649519P$ $H_1=0.541266P$ $d_1=d-1.082532P$ $D=d$ $D_2=d_2$ $D_1=d_1$	M	Ext.	MMT○○ER○○○ISO	Wiper	MMTER○○○○○-C	P.13
				MMT○○ER○○○ISO-S	Wiper		
				MMT○○ER○○○60	General		
				MMT○○ER○○○60-S	General		
			Int.	MMT○○IR○○○ISO	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
				MMT○○IR○○○ISO-S	Wiper		
				MMT○○IR○○○60	General		
				MMT○○IR○○○60-S	General		
American UN	 $H=0.866025P$ $d_2=d-0.649519P$ $H_1=0.541266P$ $d_1=d-1.082532P$ $D=d$ $D_2=d_2$ $D_1=d_1$ $P=25.4/\text{thread}$	UNC UNF	Ext.	MMT○○ER○○○UN	Wiper	MMTER○○○○○-C	P.13
				MMT○○ER○○○UN-S	Wiper		
				MMT○○ER○○○60	General		
				MMT○○ER○○○60-S	General		
			Int.	MMT○○IR○○○UN	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
				MMT○○IR○○○UN-S	Wiper		
				MMT○○IR○○○60	General		
				MMT○○IR○○○60-S	General		
Whitworth for BSW, BSP	 $H=0.9605P$ $d_2=d-H_1$ $d_1=d-2H_1$ $r=0.1373P$ $H_1=0.6403P$ $D_1'=d_1+2\times0.0769H$ $D=d$ $D_2=d_2$ $D_1=d_1$ $P=25.4/\text{thread}$	W	Ext.	MMT○○ER○○○W	Wiper	MMTER○○○○○-C	P.13
				MMT○○ER○○○W-S	Wiper		
				MMT○○ER○○○55	General		
				MMT○○ER○○○55-S	General		
			Int.	MMT○○IR○○○W	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
				MMT○○IR○○○W-S	Wiper		
				MMT○○IR○○○55	General		
				MMT○○IR○○○55-S	General		
Parallel Pipe Thread	 $H=0.960491P$ $d_2=d-h$ $d_1=d-2h$ $r=0.137329P$ $h=0.640327P$ $D=d$ $D_2=d_2$ $D_1=d_1$ $P=25.4/\text{thread}$	PF G Rp	Ext.	MMT○○ER○○○W	Wiper	MMTER○○○○○-C	P.13
				MMT○○ER○○○W-S	Wiper		
			Int.	MMT○○IR○○○W	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
				MMT○○IR○○○W-S	Wiper		

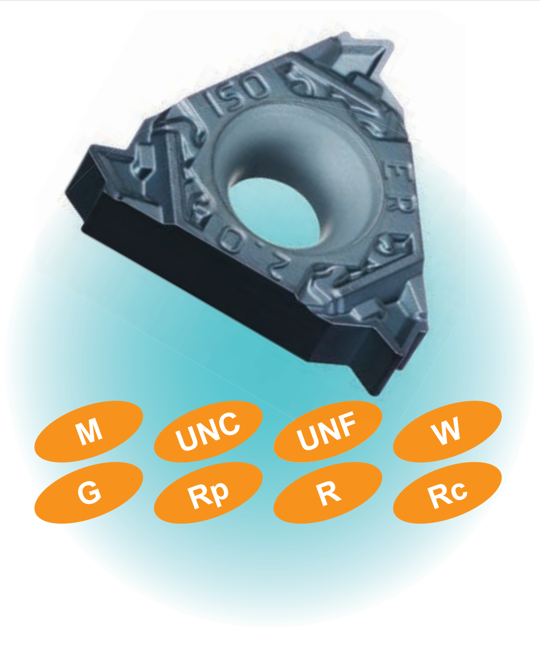
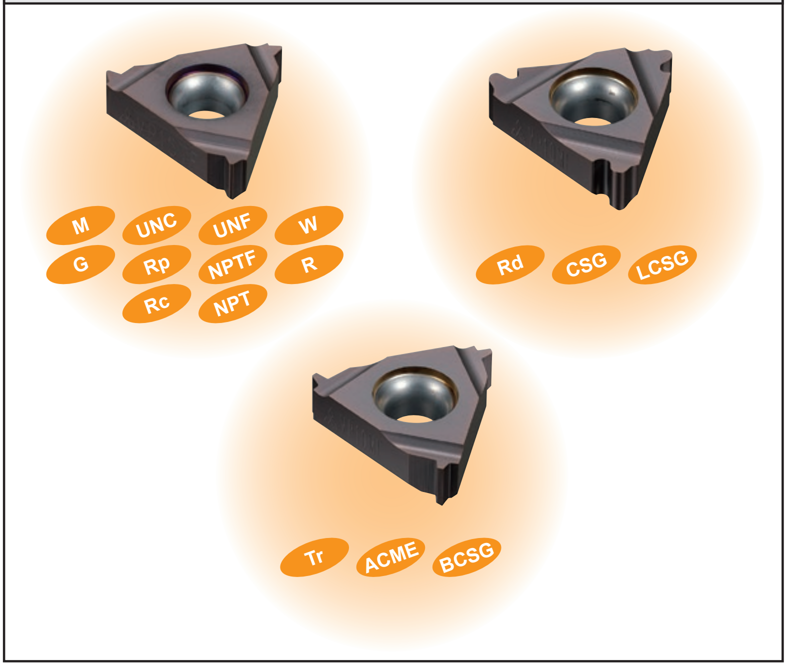
Wiper : Insert order number is determined by selected pitch.
General : An insert is applicable to several pitch types.

Thread Name	Standard Thread Type	Type	Ext./Int.	Insert Number	Wiper/ General	Tool Holder	Page
BSPT	 H=0.960237P h=0.640327P r=0.137278P P=25.4/thread	BSPT	Ext.	MMT○○ER○○○BSPT	Wiper	MMTER○○○○○-C	P.13
				MMT○○ER○○○BSPT-S	Wiper		
			Int.	MMT○○IR○○○BSPT	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
				MMT○○IR○○○BSPT-S	Wiper		
Round DIN 405	 ac=0.05P h3=H4=0.5P R1=0.238507P R2=0.255967P R3=0.221047P P=25.4/thread	Rd	Ext.	MMT○○ER○○○RD	Wiper	MMTER○○○○○-C	P.13
			Int.	MMT○○IR○○○RD	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
ISO Trapezoidal 30°	 H=1.866P d2=d-0.5P d1=d-P H1=0.5P D=d D2=d2 D1=d1	Tr	Ext.	MMT○○ER○○○TR	Wiper	MMTER○○○○○-C	P.13
			Int.	MMT○○IR○○○TR	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
American ACME		ACME	Ext.	MMT○○ER○○○ACME	Wiper	MMTER○○○○○-C	P.13
			Int.	MMT○○IR○○○TACME	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18
American NPT	 H=0.866025P h=0.800000p	NPT	Ext.	MMT○○ER○○○NPT	Wiper	MMTER○○○○○-C	P.13
			Int.	MMT○○IR○○○NPT	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	P.18

Wiper : Insert order number is determined by selected pitch.
General : An insert is applicable to several pitch types.

MMT SERIES FEATURES

■A WIDE VARIETY OF PRODUCTS

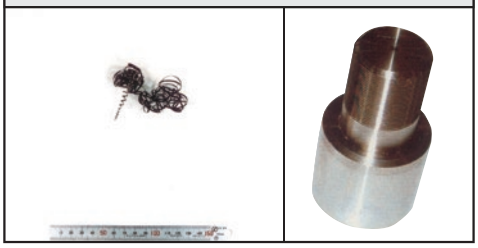
M-CLASS INSERTS WITH 3-D CHIP BREAKERS	G-CLASS GROUND INSERTS
	

■IDEAL CHIP CONTROL EVEN IN THE LATTER HALF OF PASSES WHEN CONTINUOUS CHIPS ARE USUALLY PRODUCED. (M-CLASS INSERTS WITH 3-D CHIP BREAKERS)

ISO metric external thread pitch 1.5mm Final pass (6th pass)

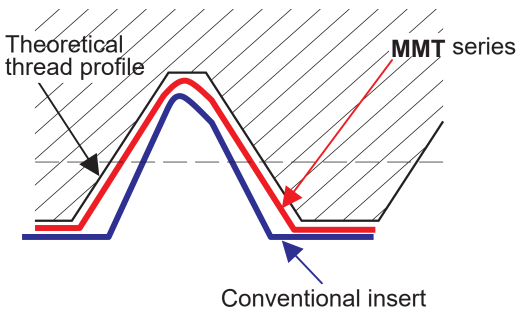
Conventional insert

MMT



<Cutting Conditions>
Workpiece : JIS SCM440
Insert : MMT16ER150ISO-S
Grade : VP15TF
Cutting speed : vc=120m/min
Cutting method : Radial Infeed
Depth of cut : Fixed cut area
Pass : 6 times
Coolant : Wet

■A HIGHER LEVEL OF PRECISION THAN CONVENTIONAL INSERTS (G-CLASS GROUND INSERTS)



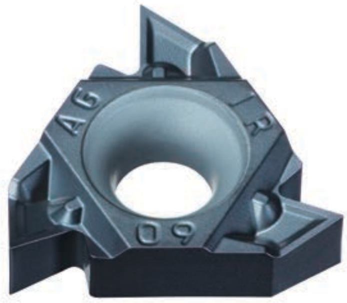
High precision threading can be achieved by using MMT inserts that feature a ground rake face and peripheral cutting edge.

Thread Type	Threading Tolerance
ISO Metric	6g / 6H
American UN	2A / 2B
Whitworth for BSW, BSP	Medium Class A
BSPT	Standard BSPT
Round DIN 405	7h / 7H
ISO Trapezoidal 30°	7e / 7H
American ACME	3G
UNJ	3A
API Buttress Casing	Standard API
API Rounded Casing & Tubing	Standard API RD
American NPT	Standard NPT
American NPTF	Class2

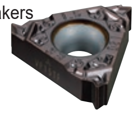
NEW

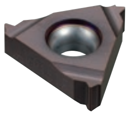
AG type is added to the accurate M-class type 3D chipbreaker

For general purpose 60° and 55° inner/outer diameter threading, the AG type has been added to the precision M-class 3D chip breaker range, which is applicable to 48-8 threads and a pitch of 0.5-3.0mm to meet a wide range of needs.
The M-class precision 3D chipbreaker improves chip control and contributes to tool cost reduction.



■CHOOSING M-CLASS INSERTS WITH 3-D CHIP BREAKERS OR G-CLASS INSERTS

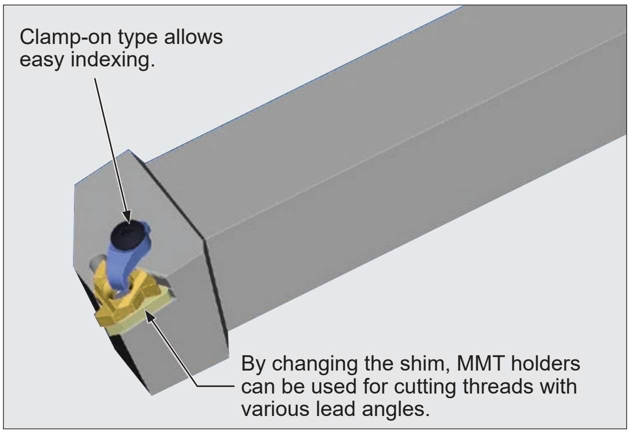
Insert	Chip control	Precision of thread
M-class inserts with 3-D chip breakers 	◎	○

Insert	Chip control	Precision of thread
G-class inserts 	○	◎

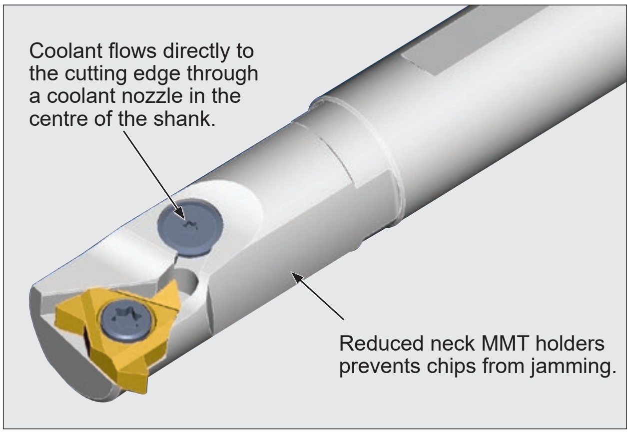
- For ideal chip control and a high cost performance ratio, M-class inserts with 3-D chip breakers are recommended.
- G-class inserts are recommended where higher precision is required.

■HOLDER (Use of special surface treatment)

External

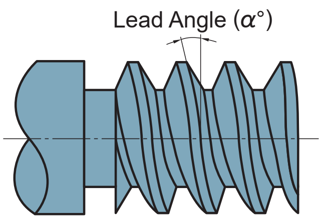


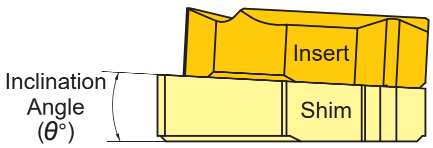
Internal



* Order number of coolant guide screw: TFS03006
(Except MMTIR1316/MMTIR1516)

■SUITABLE FOR THREADS WITH A LARGE LEAD ANGLE





By changing only the shim, MMT holders can be used for turning left hand threads and threads with various lead angles.

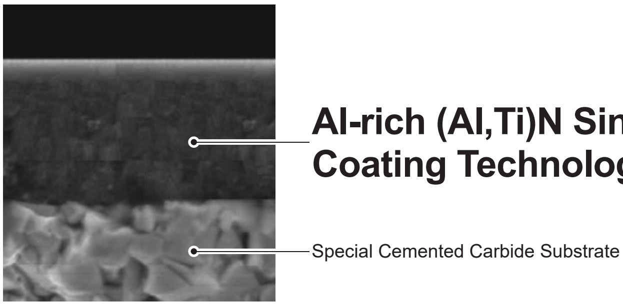
Lead Angle (α°)	Inclination Angle (θ°)
−1.5°	−3°
−0.5°	−2°
0.5°	−1°
1.5°	0°
2.5°	1°
3.5°	2°
4.5°	3°

□ Standard shim delivered with the holder.

PVD coated carbide grade for stable threading

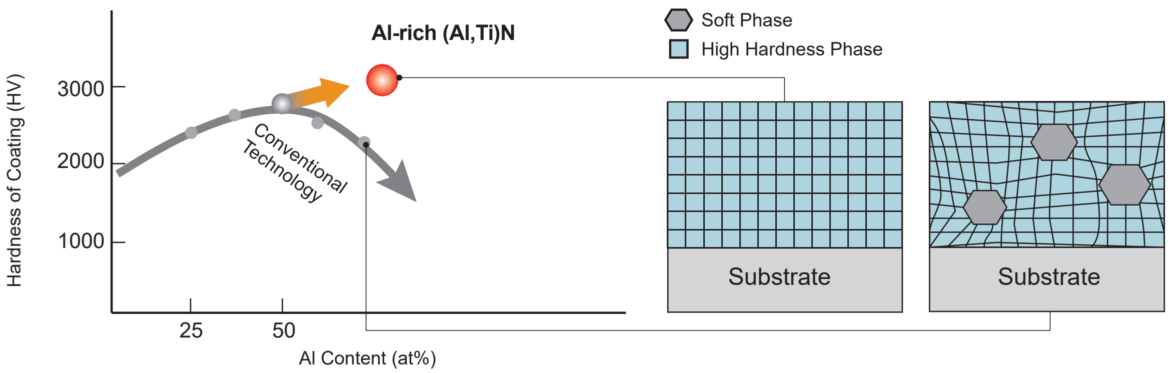
MP9025 Tough grade with an emphasis on cutting edge stability.

Demonstrates excellent fracture resistance when machining at low cutting speeds, internal machining, and even on small corner R sizes.
With excellent adhesion resistance, it is effective in machining heat resistant alloys and precipitation hardening stainless steel.



Al-rich and Conventional Coating Comparison

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



VP10MF

High wear and plastic deformation resistance for threading when maintaining an accurate thread form.
Suitable for continuous high precision machining with extensive tool life.
Effective in combination with G-class inserts for high precision threading.

VP15TF

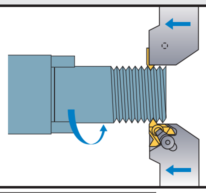
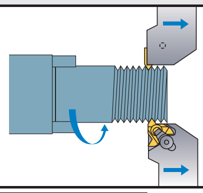
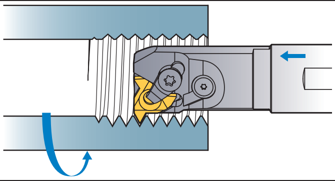
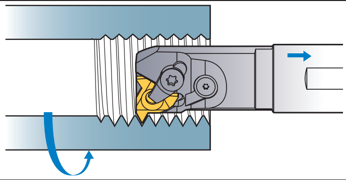
High fracture resistance during low rigidity applications such as bar feed machining. Able to withstand harsh conditions for long periods where conventional inserts would be liable to breakage.
Effective combination of high cost performance M-class inserts with 3-D chip breakers.

VP20RT

Suitable for stainless steel boring and unstable machining where inserts are vulnerable to fracturing.
Effective combination of high cost performance M-class inserts with 3-D chip breakers.

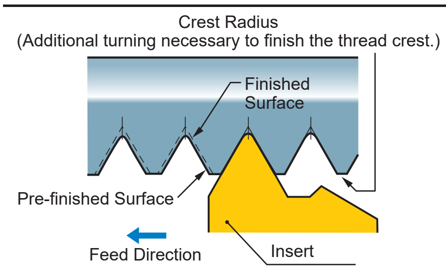
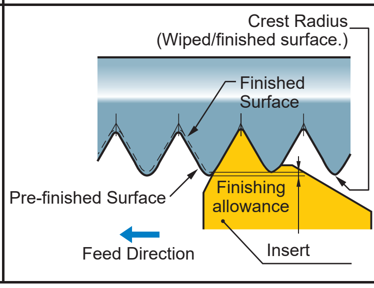
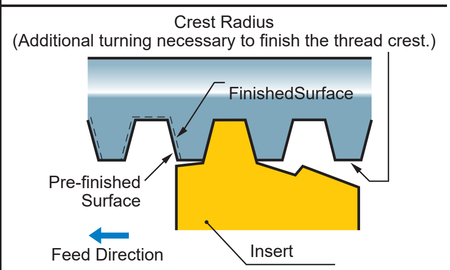
THREADING METHODS

THREADING METHODS

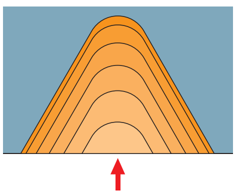
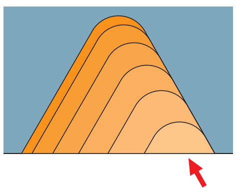
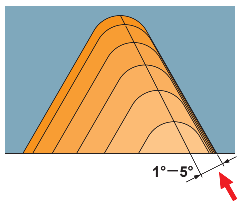
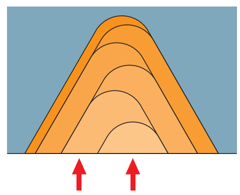
	Right Hand Thread	Left Hand Thread
EXTERNAL	 Holder Reversed	 Holder Reversed
INTERNAL		

- Usually, threads are cut with the feed towards the chuck.
- When machining left hand threads, note that clamping rigidity is lowered due the application of back turning.
- When machining left hand threads, the lead angle is negative. Ensure an appropriate lead angle by changing the shim.

INSERT TYPES

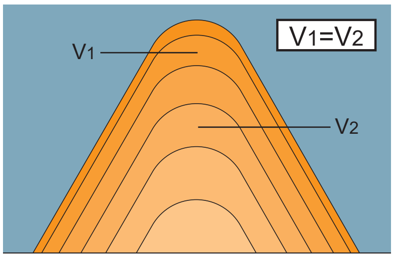
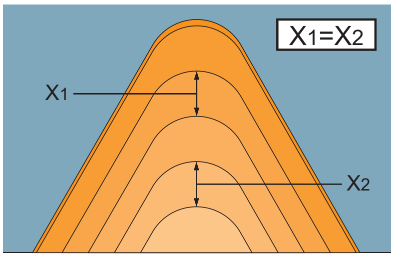
Partial form	Full form	Semi-full form (Trapezoidal threads only)
● The same insert can be used for a range of pitches. ● Shorter tool life because the corner radius of the insert is smaller than that of the full form insert. ● Finishing with another operation is necessary.	● No deburring needed after threading. ● Requires different threading inserts.	● No deburring needed after threading. ● Requires different threading inserts. ● Finishing with another operation is necessary.
		

INFEED METHODS

		Radial Infeed	Flank Infeed	Modified Flank Infeed	Incremental Infeed
					
Features	Advantages	● Easiest to use. (Standard programme for threading) ● Wide application. (Cutting conditions easy to change.) ● Uniform wear of the right and left sides of the cutting edge.	● Relatively easy to use. (Semi-standard programme for threading.) ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Preventing flank wear on the right side of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Uniform flank wear of the right and left sides of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily.
	Disadvantages	● Difficult chip control. ● Subject to vibration in the later in stages of cutting. ● Ineffective for large pitch threading. ● Heavy load on the corner radius.	● Large flank wear on the right side of the cutting edge. ● Relatively difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary) ● Difficult chip control.

THREADING METHODS

THREADING DEPTH

	Features: Advantages	Features: Disadvantages
 Fixed cut area	● Easy to use. (Standard programme for threading.) ● Superior resistance to vibration. (Constant cutting force.)	● Long chips generated during the final pass. ● Complex calculation of cutting depth when changing the number of passes.
 Fixed cutting depth	● Reduced load on corner radius during the first half of the passes. ● Easy chip control. (Optional setting of chip thickness) ● Easy to calculate cutting depth when changing the number of passes. ● Good chip control.	● Subject to vibration in the later stages of cutting. (Increased cutting force) ● In some cases, changing the NC programme is necessary.

Note 1) It is recommended to set the depth of cut of the final pass to 0.05mm−0.025mm.
Large cutting depths can cause vibration, leading to a poor surface finish.

■ FORMULAE

● Formulae to calculate infeed for each pass in a reduced series.

$$\triangle ap_n = \frac{ap}{\sqrt{n_{ap}-1}} \times \sqrt{b}$$

- $\triangle ap_n$: Depth of cut
- **n** : Actual pass
- **ap** : Total depth of cut
- n_{ap} : Number of passes
- **b** : 1st pass 0.3
  - 2nd pass 2−1 = 1
  - 3rd pass 3−1 = 2
  - •
  - •
  - nth pass n−1

(Example)
External threading (ISO Metric)
Pitch : 1.0mm
ap : 0.6mm
n_{ap} : 5 passes

1st Pass $\triangle ap_1 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{0.3} = 0.16 \rightarrow$ **0.16** ($\triangle ap_1$)

2st Pass $\triangle ap_2 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{2-1} = 0.3 \rightarrow$ **0.14** ($\triangle ap_2 - \triangle ap_1$)

3st Pass $\triangle ap_3 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{3-1} = 0.42 \rightarrow$ **0.12** ($\triangle ap_3 - \triangle ap_2$)

4st Pass $\triangle ap_4 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{4-1} = 0.52 \rightarrow$ **0.1** ($\triangle ap_4 - \triangle ap_3$)

5st Pass $\triangle ap_5 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{5-1} = 0.6 \rightarrow$ **0.08** ($\triangle ap_5 - \triangle ap_4$)

■ NC PROGRAMME FOR MODIFIED FLANK INFEED

● Example) M12×1.0 5 passes modified 5°

External Threading	Internal Threading
G00 Z = 5.0 X = 14.0 G92 U−4.34 Z−13.0 F1.0 G00 W−0.07 G92 U−4.64 Z−13.0 F1.0 G00 W−0.06 G92 U−4.88 Z−13.0 F1.0 G00 W−0.05 G92 U−5.08 Z−13.0 F1.0 G00 W−0.03 G92 U−5.20 Z−13.0 F1.0 G00	G00 Z = 5.0 X = 10.0 G92 U4.34 Z−13.0 F1.0 G00 W−0.07 G92 U4.64 Z−13.0 F1.0 G00 W−0.05 G92 U4.84 Z−13.0 F1.0 G00 W−0.04 G92 U5.02 Z−13.0 F1.0 G00 W−0.03 G92 U5.14 Z−13.0 F1.0 G00

SELECTING CUTTING CONDITIONS

		Priority					
		Tool Life	Cutting Force	Surface Finish	Precision of Thread	Chip Discharge	Efficiency (Reduced Passes)
Threading Methods	Radial	○		○	○		○
	Flank	(△ : Modified)	○	(△ : Modified)		○	
Cutting Depth	Fixed Cutting Depth					○	
	Fixed Cut Area	○	○	○	○		○

Note 1) Tool life and surface finish accuracy can be increased by changing the threading method from flank infeed to modified flank infeed.
Chip control can be improved by increasing the cutting depth in the later half of passes.

CUTTING DEPTH AND THE NUMBER OF PASSES

● Selection of the appropriate cutting depth and the right number of passes is vital for threading.

- For most threading, use a "threading cycle programme," which has originally been installed on machines, and specify "total cutting depth" and "cutting depth in the first or final pass."
- Cutting depth and the number of passes are easy to change for the radial infeed method, thus making it easy to determine the appropriate cutting conditions.

How to effectively use MMT series.

- Insert grades with high wear and plastic deformation resistance, specially produced for threading tools, ensure highly efficient cutting by enabling high-speed machining and a reduced number of passes.

Machining Cost Reduction

ADVICE ON IMPROVED THREADING

● Increasing tool life

- To prevent damage to the corner radius -
  Recommended method - Modified flank infeed
- To have uniform flank wear on both sides of a cutting edge -
  Recommended method - Radial infeed
- To prevent crater wear -
  Recommended method - Flank infeed

● Preventing chip problems

- Change to flank or modified infeed.
- During radial infeed cutting, use an inverted holder and change the coolant supply to a downward direction.
- When using the radial infeed method, set the minimum cutting depth at around 0.2mm to make the chips thicker.

● To achieve highly efficient machining

- Increase cutting speed. (Dependant on the maximum revolution and rigidity of the machine.)
- Reduce the number of passes. (Reduce by 30-40%.)
- A reduced number of passes can improve chip discharge because of the thicker chips generated.

● Preventing vibration

- Change to flank or modified infeed.
- When using radial infeed, reduce cutting depth in the later half of passes and lower the cutting speed.

● Increased surface finish accuracy

- A final wiping pass should be performed at the same depth of cut as the last regular pass.
- When using the flank infeed method, change to radial infeed only during the final pass.

THREADING METHODS

Pipe Threads and Tool Selection

■Parallel Pipe Thread G(PF)

min	Thread	Number of Threads	Standard Internal Diameter
—	G 1/16	28	6.561
1min	G 1/8		8.556
2min	G 1/4	19	11.445
3min	G 3/8		14.950
4min	G 1/2	14	18.631
5min	G 5/8		20.587
6min	G 3/4		24.117
7min	G 7/8		27.877
8min	G 1	11	30.291
9min	G 1 1/8		34.939
10min	G 1 1/4		38.952

Note 1) Same as PF.

■Taper Pipe Thread R, Rc(PT)

min	Thread	Number of Threads	Standard Internal Diameter
—	R 1/16	28	6.561
1min	R 1/8		8.556
2min	R 1/4	19	11.445
3min	R 3/8		14.950
4min	R 1/2	14	18.631
5min	—	—	—
6min	R 3/4	14	24.117
7min	—	—	—
8min	R 1	11	30.291
9min	—	—	—
10min	R 1 1/4	11	38.952

Note 1) Same as Rc, PT.

• Please note that as part of industry practice, pipe screws are sometimes referred to as "minutes" in inch conversion units.
• One "minute" equals 1/8 inch (1 inch= 25.4mm)
• 1 1/4 inches are sometimes referred to as "inch 2 minutes" (1/4= 2/8= 2 minutes).
• The pitch is pre-determined for each nominal diameter. Note the minimum machining diameter especially when internal threading.

MMT SERIES ORDER NUMBER

HOLDERS

EXTERNAL

MMT E R 12 12 H 16 – C

Designation: MMT

Application

E	External

Hand of Tool

R	Right

Tool Size (mm) (Height and Width)

12	12
16	16
20	20
25	25
32	32

Tool Length (mm)

H	100
K	125
M	150
P	170

Insert Size (mm)

16	9.525
22	12.7

Method of Holding

C	Clamp-on

INTERNAL

MMT I R 13 16 A K 11 – S P15

Designation: MMT

Application

I	Internal

Hand of Tool

R	Right

Min.Cutting Diameter (mm): 13

Shank Diameter (mm): 16

Shank Material

A	Steel Shank with Coolant Hole

Tool Length (mm)

K	125	R	200
M	150	S	250
Q	180	T	300

Insert Size (mm)

11	6.35
16	9.525
22	12.7

Method of Holding

S	Screw-on
C	Clamp-on

Lead Angle

P15	1.5°
P25	2.5°
P35	3.5°

INSERTS

M-CLASS

MMT 16 E R 100 ISO – S

S	M-class inserts with 3-D chip breakers

Designation: MMT

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

100	1.0mm	A	0.5—1.5mm or 48—16 thread/inch
125	1.25mm		
150	1.5mm	G	1.75—3.0mm or 14—8 thread/inch
175	1.75mm		
200	2.0mm		
250	2.5mm	AG	0.5—3.0mm or 48—8 thread/inch
300	3.0mm		

Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN

G-CLASS

MMT 16 E R 050 ISO

Designation: MMT

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525
22	12.7

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

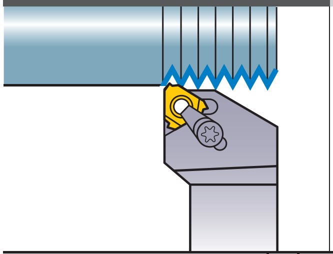
050	0.5mm	A	0.5—1.5mm or 48—16 thread/inch
075	0.75mm		
100	1.0mm		
125	1.25mm	G	1.75—3.0mm or 14—8 thread/inch
150	1.5mm		
175	1.75mm		
200	2.0mm	AG	0.5—3.0mm or 48—8 thread/inch
250	2.5mm		
300	3.0mm		
350	3.5mm	N	3.5—5.0mm or 7—5 thread/inch
400	4.0mm		
450	4.5mm		
500	5.0mm		

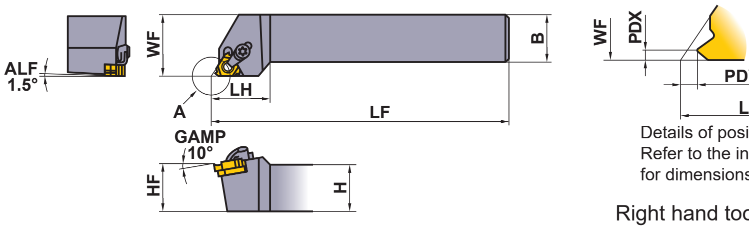
Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN
RD	Round DIN 405
TR	ISO Trapezoidal 30°
ACME	American ACME
UNJ	UNJ
APBU	API Buttress Casing
APRD	API Round Casing&Tubing
NPT	NPT
NPTF	NPTF

MMTE HOLDER

MMTE External threading





Details of position A
Refer to the insert standards for dimensions PDX and PDY.

Right hand tool holder only.

Order Number	Stock R	Insert Number	H	B	LF	LH	HF	WF	Clamp Bridge	Clamp Screw *	Stop Ring	Shim Screw *	Shim	Wrench
MMTER1212H16-C	●	MMT16ER	12	12	100	25	12	16	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER1616H16-C	●		16	16	100	25	16	20	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER2020K16-C	●		20	20	125	26	20	25	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER2525M16-C	●		25	25	150	28	25	32	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER3232P16-C	●		32	32	170	32	32	40	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER2525M22-C	●	MMT22ER	25	25	150	32	25	32	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R
MMTER3232P22-C	●		32	32	170	32	32	40	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R

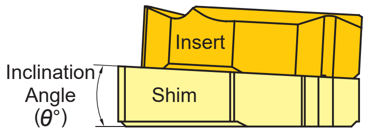
Note 1) Select and use a shim as shown below (sold separately), dependant on the lead angle.
* Clamp Torque (N • m) : SETS51=3.5, SETS61=5.0, HFC03008=1.5, HFC04010=2.2

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTE32TN15**	●	−3°	MMTER 16-C
−0.5°	**CTE32TN05**	●	−2°	
0.5°	**CTE32TP05**	●	−1°	
1.5°	**CTE32TP15**	●	0°	
2.5°	**CTE32TP25**	●	1°	
3.5°	**CTE32TP35**	●	2°	
4.5°	**CTE32TP45**	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTE43TN15**	●	−3°	MMTER 22-C
−0.5°	**CTE43TN05**	●	−2°	
0.5°	**CTE43TP05**	●	−1°	
1.5°	**CTE43TP15**	●	0°	
2.5°	**CTE43TP25**	●	1°	
3.5°	**CTE43TP35**	●	2°	
4.5°	**CTE43TP45**	●	3°	

Standard shim delivered with the holder.



RECOMMENDED CUTTING CONDITIONS

	Workpiece Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**MP9025**	80 (60–100)
			VP10MF	150 (70–230)
			VP15TF	100 (60–140)
			VP20RT	80 (60–100)
	Carbon Steel Alloy Steel	180–280HB	**MP9025**	80 (60-100)
			VP10MF	140 (80–200)
			VP15TF	100 (60–140)
			VP20RT	80 (60–100)
M	Stainless Steel	≤200HB	**MP9025**	80 (40–120)
			VP15TF	80 (40–120)
			VP20RT	
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP10MF**	140 (80–200)
			VP15TF	90 (60–120)

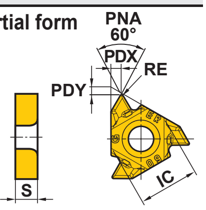
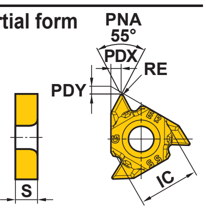
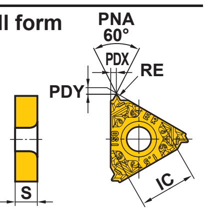
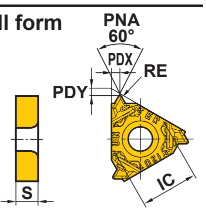
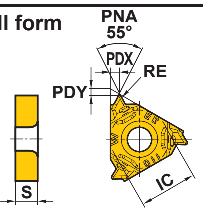
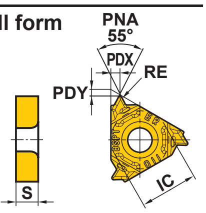
	Workpiece Material	Hardness	Grade	Cutting Speed (m/min)
S	Heat Resistant Alloy	–	**MP9025**	30 (20–40)
			VP10MF	45 (15–70)
			VP15TF	30 (20–40)
			VP20RT	
	Titanium Alloy	–	**MP9025**	45 (25–65)
			VP10MF	60 (40–80)
			VP15TF	45 (25–65)
			VP20RT	
H	Heat-Treated Alloy	45–55HRC	**VP10MF**	50 (30–70)
			VP15TF	40 (20–60)

● : Inventory maintained in Japan.
(Contains 5 inserts per case.)

HOW TO SELECT A SHIM ➤ P.23

MMT M-CLASS INSERTS WITH 3-D CHIP BREAKERS

INSERTS

Type	Order Number	Coated: MP9025 (NEW)	Coated: VP15TF	Coated: VP20RT	Pitch: mm	Pitch: thread/inch	Dimensions (mm): IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	MMT16ERAG60-S	●	●	●	0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.08	—	Partial form 
	MMT16ERA60-S	●	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.06	—	
	MMT16ERG60-S	●	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.23	—	
Partial Profile 55°	MMT16ERAG55-S	●	●	●		48—8	9.525	3.44	1.2	1.7	0.07	—	Partial form 
	MMT16ERA55-S	●	●	●		48—16	9.525	3.44	0.8	0.9	0.07	—	
	MMT16ERG55-S	●	●	●		14—8	9.525	3.44	1.2	1.7	0.23	—	
ISO Metric	MMT16ER100ISO-S	●	●	●	1.0		9.525	3.44	0.7	0.7	0.13	0.61	Full form 
	MMT16ER125ISO-S	●	●	●	1.25		9.525	3.44	0.8	0.9	0.16	0.77	
	MMT16ER150ISO-S	●	●	●	1.5		9.525	3.44	0.8	1.0	0.20	0.92	
	MMT16ER175ISO-S	●	●	●	1.75		9.525	3.44	0.9	1.2	0.22	1.07	
	MMT16ER200ISO-S	●	●	●	2.0		9.525	3.44	1.0	1.3	0.26	1.23	
	MMT16ER250ISO-S	●	●	●	2.5		9.525	3.44	1.1	1.5	0.33	1.53	
	MMT16ER300ISO-S	●	●	●	3.0		9.525	3.44	1.2	1.6	0.40	1.84	
American UN	MMT16ER160UN-S	●	●	●		16	9.525	3.44	0.9	1.1	0.23	0.97	Full form 
	MMT16ER140UN-S	●	●	●		14	9.525	3.44	1.0	1.2	0.26	1.11	
	MMT16ER120UN-S	●	●	●		12	9.525	3.44	1.1	1.4	0.30	1.30	
Whitworth for BSW, BSP	MMT16ER190W-S	●	●	●		19	9.525	3.44	0.8	1.0	0.18	0.86	Full form 
	MMT16ER140W-S	●	●	●		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110W-S	●	●	●		11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	MMT16ER190BSPT-S	●	●	●		19	9.525	3.44	0.8	0.9	0.18	0.86	Full form 
	MMT16ER140BSPT-S	●	●	●		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110BSPT-S	●	●	●		11	9.525	3.44	1.1	1.5	0.32	1.48	

● = NEW

IDENTIFICATION

MMT 16 E R 100 ISO – S

S	M-class inserts with 3-D chip breakers

Designation: MMT

Diameter of Inscribed Circle (mm)	
11	6.35
16	9.525

Application	
E	External
I	Internal

Hand of Tool	
R	Right

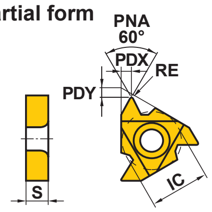
Pitch			
100	1.0mm	A	0.5—1.5mm or 48—16 thread/inch
125	1.25mm		
150	1.5mm	G	1.75—3.0mm or 14—8 thread/inch
175	1.75mm		
200	2.0mm		
250	2.5mm	AG	0.5—3.0mm or 48—8 thread/inch
300	3.0mm		

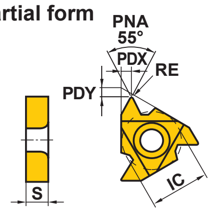
Threading Type	
60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN

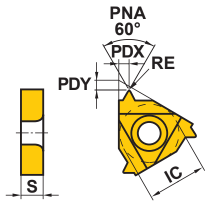
MMT G-CLASS GROUND INSERTS

INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	MMT16ERAG60	●		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.08	—	Partial form
		MMT16ERA60	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16ERG60	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.27	—	
		MMT22ERN60	●		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.53	—	
Partial Profile 55°	—	MMT16ERAG55	●			48—8	9.525	3.44	1.2	1.7	0.07	—	Partial form
		MMT16ERA55	●	●		48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16ERG55	●	●		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT22ERN55	●			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6g	MMT16ER050ISO	●		0.5		9.525	3.44	0.6	0.4	0.06	0.31	Full form
		MMT16ER075ISO	●		0.75		9.525	3.44	0.6	0.6	0.10	0.46	
		MMT16ER100ISO	●	●	1.0		9.525	3.44	0.7	0.7	0.16	0.61	
		MMT16ER125ISO	●	●	1.25		9.525	3.44	0.8	0.9	0.19	0.77	
		MMT16ER150ISO	●	●	1.5		9.525	3.44	0.8	1.0	0.23	0.92	
		MMT16ER175ISO	●	●	1.75		9.525	3.44	0.9	1.2	0.21	1.07	
		MMT16ER200ISO	●	●	2.0		9.525	3.44	1.0	1.3	0.31	1.23	
		MMT16ER250ISO	●	●	2.5		9.525	3.44	1.1	1.5	0.32	1.53	
		MMT16ER300ISO	●	●	3.0		9.525	3.44	1.2	1.6	0.46	1.84	
		MMT22ER350ISO	●		3.5		12.7	4.64	1.6	2.3	0.45	2.15	
		MMT22ER400ISO	●		4.0		12.7	4.64	1.6	2.3	0.52	2.45	
		MMT22ER450ISO	●		4.5		12.7	4.64	1.7	2.4	0.58	2.76	
		MMT22ER500ISO	●		5.0		12.7	4.64	1.7	2.5	0.63	3.07	







IDENTIFICATION

MMT 16 E R 050 ISO

Designation — MMT

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525
22	12.7

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

050	0.5mm	A	0.5—1.5mm or 48—16 thread/inch
075	0.75mm		
100	1.0mm		
125	1.25mm	G	1.75—3.0mm or 14—8 thread/inch
150	1.5mm		
175	1.75mm		
200	2.0mm	AG	0.5—3.0mm or 48—8 thread/inch
250	2.5mm		
300	3.0mm		
350	3.5mm	N	3.5—5.0mm or 7—5 thread/inch
400	4.0mm		
450	4.5mm		
500	5.0mm		

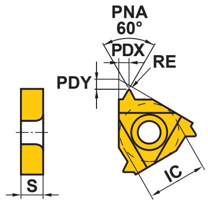
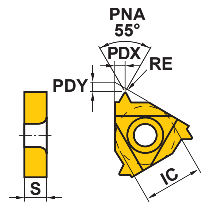
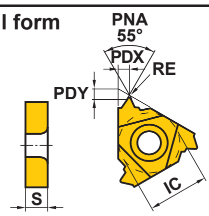
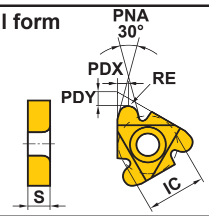
Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN
RD	Round DIN 405
TR	ISO Trapezoidal 30°
ACME	American ACME
UNJ	UNJ
APBU	API Buttress Casing
APRD	API Round Casing&Tubing
NPT	NPT
NPTF	NPTF

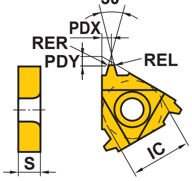
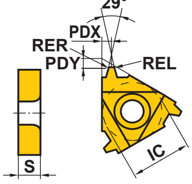
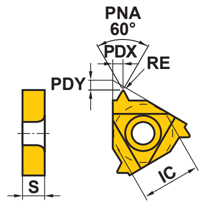
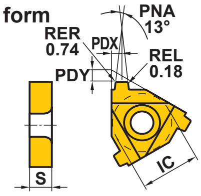
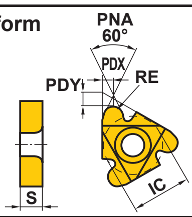
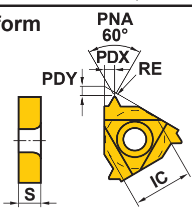
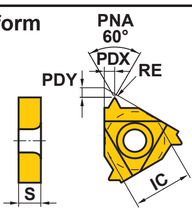
● : Inventory maintained in Japan.
(Contains 5 inserts per case.)

CUTTING DEPTH GUIDE ➤P.25

INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2A	MMT16ER320UN	●			32	9.525	3.44	0.6	0.6	0.09	0.49	Full form 
		MMT16ER280UN	●			28	9.525	3.44	0.6	0.7	0.10	0.56	
		MMT16ER240UN	●			24	9.525	3.44	0.7	0.8	0.16	0.65	
		MMT16ER200UN	●			20	9.525	3.44	0.8	0.9	0.19	0.78	
		MMT16ER180UN	●			18	9.525	3.44	0.8	1.0	0.21	0.87	
		MMT16ER160UN	●	●		16	9.525	3.44	0.9	1.1	0.24	0.97	
		MMT16ER140UN	●	●		14	9.525	3.44	1.0	1.2	0.22	1.11	
		MMT16ER130UN	●			13	9.525	3.44	1.0	1.3	0.24	1.20	
		MMT16ER120UN	●	●		12	9.525	3.44	1.1	1.4	0.32	1.30	
		MMT16ER110UN	●			11	9.525	3.44	1.1	1.5	0.29	1.42	
		MMT16ER100UN	●			10	9.525	3.44	1.1	1.5	0.32	1.56	
		MMT16ER090UN	●			9	9.525	3.44	1.2	1.7	0.35	1.73	
		MMT16ER080UN	●			8	9.525	3.44	1.2	1.6	0.48	1.95	
		MMT22ER070UN	●			7	12.7	4.64	1.6	2.3	0.47	2.22	
		MMT22ER060UN	●			6	12.7	4.64	1.6	2.3	0.53	2.60	
		MMT22ER050UN	●			5	12.7	4.64	1.7	2.5	0.64	3.12	
Whitworth for BSW, BSP	Medium Class A	MMT16ER280W	●			28	9.525	3.44	0.6	0.7	0.09	0.58	Full form 
		MMT16ER260W	●			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT16ER200W	●			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT16ER190W	●	●		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT16ER180W	●			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT16ER160W	●			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT16ER140W	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER120W	●			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT16ER110W	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT16ER100W	●			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT16ER090W	●			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT16ER080W	●			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT22ER070W	●			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT22ER060W	●			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT22ER050W	●			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	MMT16ER280BSPT	●			28	9.525	3.44	0.6	0.6	0.09	0.58	Full form 
		MMT16ER190BSPT	●	●		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT16ER140BSPT	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER110BSPT	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7h	MMT16ER100RD	●			10	9.525	3.44	1.1	1.2	0.60	1.27	Full form 
		MMT16ER080RD	●			8	9.525	3.44	1.4	1.3	0.75	1.59	
		MMT16ER060RD	●			6	9.525	3.44	1.5	1.7	1.00	2.12	
		MMT22ER040RD	●			4	12.7	4.64	2.2	2.3	1.51	3.18	

MMT G-CLASS GROUND INSERTS

Type	Thread Tolerance	Order Number	Coated	Pitch		Dimensions (mm)					Total Cutting Depth (mm)	Geometry
			VP10MF	mm	thread/inch	IC	S	PDY	PDX	RE RER/L		
ISO Trapezoidal 30°	7e	MMT16ER150TR	●	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form 
		MMT16ER200TR	●	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16ER300TR	●	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22ER400TR	●	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22ER500TR	●	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	MMT16ER120ACME	●		12	9.525	3.44	1.1	1.2	0.08	1.19	Semi-full form 
		MMT16ER100ACME	●		10	9.525	3.44	1.3	1.4	0.08	1.52	
		MMT16ER080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22ER060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22ER050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ	3A	MMT16ER320UNJ	●		32	9.525	3.44	0.6	0.7	0.13	0.46	Full form 
		MMT16ER280UNJ	●		28	9.525	3.44	0.7	0.7	0.14	0.52	
		MMT16ER240UNJ	●		24	9.525	3.44	0.7	0.8	0.17	0.61	
		MMT16ER200UNJ	●		20	9.525	3.44	0.8	0.9	0.20	0.73	
		MMT16ER180UNJ	●		18	9.525	3.44	0.8	1.0	0.22	0.81	
		MMT16ER160UNJ	●		16	9.525	3.44	0.9	1.1	0.25	0.92	
		MMT16ER140UNJ	●		14	9.525	3.44	1.0	1.2	0.29	1.05	
		MMT16ER120UNJ	●		12	9.525	3.44	1.1	1.3	0.33	1.22	
		MMT16ER100UNJ	●		10	9.525	3.44	1.2	1.5	0.40	1.47	
		MMT16ER080UNJ	●		8	9.525	3.44	1.2	1.6	0.51	1.83	
API Buttress Casing	Standard API	MMT22ER050APBU	●		5	12.7	4.64	3.1	1.9	0.74/0.18	1.55	Full form 
API Round Casing&Tubing	Standard API RD	MMT16ER100APRD	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form 
		MMT16ER080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	MMT16ER270NPT	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form 
		MMT16ER180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16ER140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16ER115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16ER080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	MMT16ER270NPTF	●		27	9.525	3.44	0.7	0.8	0.04	0.64	Full form 
		MMT16ER180NPTF	●		18	9.525	3.44	0.8	1.0	0.04	1.00	
		MMT16ER140NPTF	●		14	9.525	3.44	0.9	1.2	0.04	1.35	
		MMT16ER115NPTF	●		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16ER080NPTF	●		8	9.525	3.44	1.3	1.8	0.04	2.38	

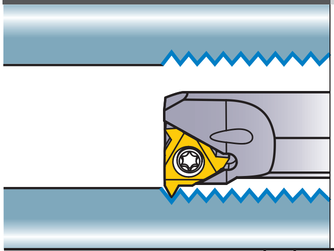
● : Inventory maintained in Japan.
(Contains 5 inserts per case.)

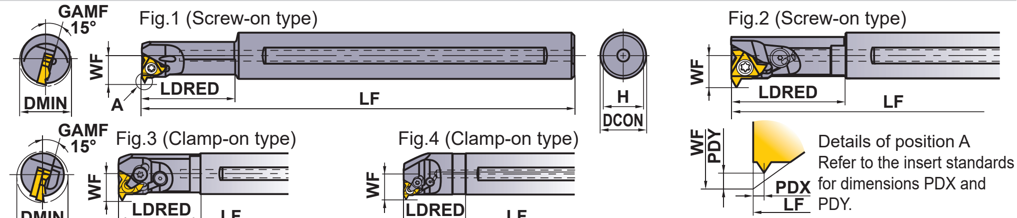
CUTTING DEPTH GUIDE ➤ P.25

MMTI TYPE BORING BARS

MMTI

Internal threading





Right hand tool holder only.

Order Number	Stock R	Insert Number	Lead Angle	DCON	LF	LDRED	WF	H	DMIN	Clamp Bridge	Clamp Screw *	Stop Ring	①Shim Screw ②Embedded Shim Screw *	Shim	Wrench	Fig
MMTIR1316AK11-SP15	●	MMT11IR○○○○○	1.5°	16	125	25	8.7	15	**13**	—	TS25	—	—	—	①TKY08F	1
MMTIR1316AK11-SP25	●		2.5°	16	125	25	8.7	15	**13**	—	TS25	—	—	—	①TKY08F	1
MMTIR1316AK11-SP35	●		3.5°	16	125	25	8.7	15	**13**	—	TS25	—	—	—	①TKY08F	1
MMTIR1516AM11-SP15	●		1.5°	16	150	32	9.7	15	**15**	—	TS25	—	—	—	①TKY08F	1
MMTIR1516AM11-SP25	●		2.5°	16	150	32	9.7	15	**15**	—	TS25	—	—	—	①TKY08F	1
MMTIR1516AM11-SP35	●		3.5°	16	150	32	9.7	15	**15**	—	TS25	—	—	—	①TKY08F	1
MMTIR1916AM16-SP15	●	MMT16IR○○○○○	1.5°	16	150	40	12.2	15	**19**	—	CS350860T	—	—	—	①TKY15F	2
MMTIR1916AM16-SP25	●		2.5°	16	150	40	12.2	15	**19**	—	CS350860T	—	—	—	①TKY15F	2
MMTIR1916AM16-SP35	●		3.5°	16	150	40	12.2	15	**19**	—	CS350860T	—	—	—	①TKY15F	2
MMTIR2420AQ16-C	●		1.5°	20	180	40	14.2	19	**24**	SETK51	SETS51	CR4	①HFC03006 ②TFS03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR2925AS16-C	●		1.5°	25	250	60	16.7	23.4	**29**	SETK51	SETS51	CR4	①HFC03006 ②TFS03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR3732AS16-C	●		1.5°	32	250	48	20.5	30.4	**37**	SETK51	SETS51	CR4	①HFC03006 ②TFS03006	CTI32TP15	①TKY15F ②HKY20R	4
MMTIR2420AQ22-SP15	●	MMT22IR○○○○○	1.5°	20	180	50	15.5	19	**24**	—	TS43	—	—	—	①TKY15F	2
MMTIR2420AQ22-SP25	●		2.5°	20	180	50	15.5	19	**24**	—	TS43	—	—	—	①TKY15F	2
MMTIR2420AQ22-SP35	●		3.5°	20	180	50	15.5	19	**24**	—	TS43	—	—	—	①TKY15F	2
MMTIR3025AR22-C	●		1.5°	25	200	38	17.8	23.4	**30**	SETK61	SETS61	CR5	①HFC04008 ②TFS03006	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR3832AS22-C	●		1.5°	32	250	48	21.8	30.4	**38**	SETK61	SETS61	CR5	①HFC04008 ②TFS03006	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR4640AT22-C	●		1.5°	40	300	60	26.2	38	**46**	SETK61	SETS61	CR5	①HFC04008 ②TFS03006	CTI43TP15	①TKY20F ②HKY25R	4

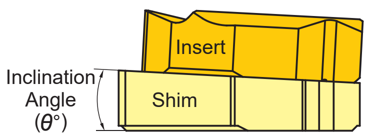
Note 1) Select and use a shim as shown below (sold separately), dependant on the lead angle.
- A screw-on tool holder uses no shim. (The holder body has a lead angle.) Use a tool holder with the appropriate lead angle.
- Min. cutting diameter (DMIN) shows the internal hole diameter, not the thread diameter.

* Clamp Torque (N • m) : TS25=1.0, CS350860T=3.5, SETS51=3.5, TS43=3.5, SETS61=5.0, HFC03006=1.5, HFC04008=2.2

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTI32TN15**	●	−3°	MMTIR○○○○○○16-C
−0.5°	**CTI32TN05**	●	−2°	
0.5°	**CTI32TP05**	●	−1°	
1.5°	**CTI32TP15**	●	0°	
2.5°	**CTI32TP25**	●	1°	
3.5°	**CTI32TP35**	●	2°	
4.5°	**CTI32TP45**	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTI43TN15**	●	−3°	MMTIR○○○○○○22-C
−0.5°	**CTI43TN05**	●	−2°	
0.5°	**CTI43TP05**	●	−1°	
1.5°	**CTI43TP15**	●	0°	
2.5°	**CTI43TP25**	●	1°	
3.5°	**CTI43TP35**	●	2°	
4.5°	**CTI43TP45**	●	3°	



Standard shim delivered with the holder.

RECOMMENDED CUTTING CONDITIONS

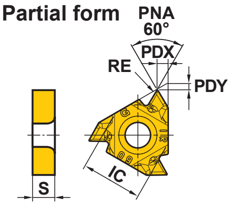
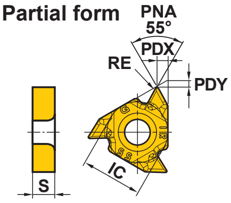
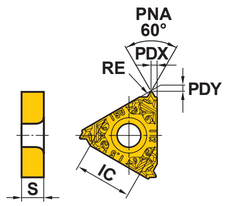
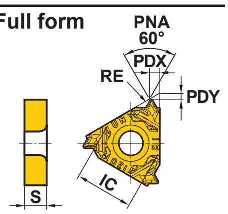
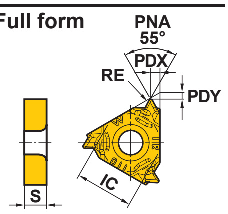
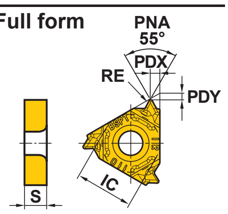
	Workpiece Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**MP9025**	80 (60—100)
			VP10MF	150 (70—230)
			VP15TF	100 (60—140)
			VP20RT	80 (60—100)
	Carbon Steel Alloy Steel	180—280HB	**MP9025**	80 (60—100)
			VP10MF	140 (80—200)
			VP15TF	100 (60—140)
			VP20RT	80 (60—100)
M	Stainless Steel	≤200HB	**MP9025**	80 (40—120)
			VP15TF	80 (40—120)
			VP20RT	
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP10MF**	140 (80—200)
			VP15TF	90 (60—120)

	Workpiece Material	Hardness	Grade	Cutting Speed (m/min)
S	Heat Resistant Alloy	–	**MP9025**	30 (20—40)
			VP10MF	45 (15—70)
			VP15TF	30 (20—40)
			VP20RT	
	Titanium Alloy	–	**MP9025**	45 (25—65)
			VP10MF	60 (40—80)
			VP15TF	45 (25—65)
			VP20RT	
H	Heat-Treated Alloy	45—55HRC	**VP10MF**	50 (30—70)
			VP15TF	40 (20—60)

HOW TO SELECT A SHIM ➤P.23
MMT SERIES ORDER NUMBER ➤P.12

MMT M-CLASS INSERTS WITH 3-D CHIP BREAKERS

INSERTS

Type	Order Number	Coated NEW MP9025	Coated VP15TF	Coated VP20RT	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	MMT11IRA60-S	●	●	●	0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.03	—	Partial form 
	MMT16IRAG60-S	●	●	●	0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.05	—	
	MMT16IRA60-S	●	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.03	—	
	MMT16IRG60-S	●	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.11	—	
Partial Profile 55°	MMT11IRA55-S	●	●	●		48—16	6.35	3.04	0.8	0.9	0.07	—	Partial form 
	MMT16IRAG55-S	●	●	●		48—8	9.525	3.44	1.2	1.7	0.07	—	
	MMT16IRA55-S	●	●	●		48—16	9.525	3.44	0.8	0.9	0.07	—	
	MMT16IRG55-S	●	●	●		14—8	9.525	3.44	1.2	1.7	0.21	—	
ISO Metric	MMT11IR100ISO-S	●	●	●	1.0		6.35	3.04	0.6	0.7	0.06	0.58	Full form 
	MMT11IR125ISO-S	●	●	●	1.25		6.35	3.04	0.8	0.9	0.08	0.72	
	MMT11IR150ISO-S	●	●	●	1.5		6.35	3.04	0.8	1.0	0.10	0.87	
	MMT16IR100ISO-S	●	●	●	1.0		9.525	3.44	0.6	0.7	0.06	0.58	
	MMT16IR125ISO-S	●	●	●	1.25		9.525	3.44	0.8	0.9	0.08	0.72	
	MMT16IR150ISO-S	●	●	●	1.5		9.525	3.44	0.8	1.0	0.10	0.87	
	MMT16IR175ISO-S	●	●	●	1.75		9.525	3.44	0.9	1.2	0.11	1.01	
	MMT16IR200ISO-S	●	●	●	2.0		9.525	3.44	1.0	1.3	0.13	1.15	
	MMT16IR250ISO-S	●	●	●	2.5		9.525	3.44	1.1	1.5	0.17	1.44	
	MMT16IR300ISO-S	●	●	●	3.0		9.525	3.44	1.1	1.5	0.20	1.73	
American UN	MMT16IR160UN-S	●	●	●		16	9.525	3.44	0.9	1.1	0.11	0.92	Full form 
	MMT16IR140UN-S	●	●	●		14	9.525	3.44	0.9	1.2	0.12	1.05	
	MMT16IR120UN-S	●	●	●		12	9.525	3.44	1.1	1.4	0.14	1.22	
Whitworth for BSW, BSP	MMT16IR190W-S	●	●	●		19	9.525	3.44	0.8	1.0	0.18	0.86	Full form 
	MMT16IR140W-S	●	●	●		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16IR110W-S	●	●	●		11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	MMT16IR190BSPT-S	●	●	●		19	9.525	3.44	0.8	0.9	0.18	0.86	Full form 
	MMT16IR140BSPT-S	●	●	●		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16IR110BSPT-S	●	●	●		11	9.525	3.44	1.1	1.5	0.32	1.48	

● = NEW

IDENTIFICATION

MMT 16 I R 100 ISO – S

Designation: MMT

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

100	1.0mm	A	0.5—1.5mm or 48—16 thread/inch
125	1.25mm		
150	1.5mm	G	1.75—3.0mm or 14—8 thread/inch
175	1.75mm		
200	2.0mm		
250	2.5mm	AG	0.5—3.0mm or 48—8 thread/inch
300	3.0mm		

Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN

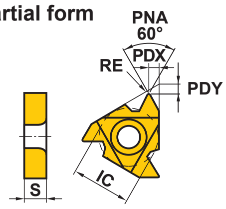
S	M-class inserts with 3-D chip breakers

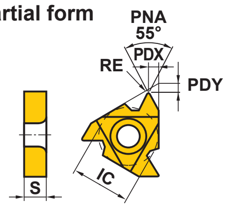
CUTTING DEPTH GUIDE ➤ P.27

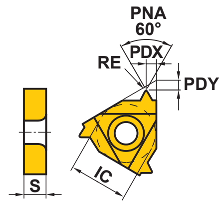
MMT G-CLASS GROUND INSERTS

INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	MMT11IRA60	●	●	0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form
		MMT16IRAG60	●		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.05	—	
		MMT16IRA60	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16IRG60	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.16	—	
		MMT22IRN60	●		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.30	—	
Partial Profile 55°	—	MMT11IRA55	●	●		48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form
		MMT16IRAG55	●			48—8	9.525	3.44	1.2	1.7	0.07	—	
		MMT16IRA55	●	●		48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16IRG55	●	●		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT22IRN55	●			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6H	MMT11IR050ISO	●		0.5		6.35	3.04	0.6	0.4	0.03	0.29	Full form
		MMT11IR075ISO	●		0.75		6.35	3.04	0.6	0.6	0.04	0.43	
		MMT11IR100ISO	●	●	1.0		6.35	3.04	0.6	0.7	0.10	0.58	
		MMT11IR125ISO	●	●	1.25		6.35	3.04	0.8	0.9	0.12	0.72	
		MMT11IR150ISO	●	●	1.5		6.35	3.04	0.8	1.0	0.14	0.87	
		MMT11IR175ISO	●		1.75		6.35	3.04	0.9	1.1	0.10	1.01	
		MMT11IR200ISO	●		2.0		6.35	3.04	0.9	1.1	0.18	1.15	
		MMT16IR050ISO	●		0.5		9.525	3.44	0.6	0.4	0.03	0.29	
		MMT16IR075ISO	●		0.75		9.525	3.44	0.6	0.6	0.04	0.43	
		MMT16IR100ISO	●	●	1.0		9.525	3.44	0.6	0.7	0.10	0.58	
		MMT16IR125ISO	●	●	1.25		9.525	3.44	0.8	0.9	0.12	0.72	
		MMT16IR150ISO	●	●	1.5		9.525	3.44	0.8	1.0	0.14	0.87	
		MMT16IR175ISO	●	●	1.75		9.525	3.44	0.9	1.2	0.10	1.01	
		MMT16IR200ISO	●	●	2.0		9.525	3.44	1.0	1.3	0.18	1.15	
		MMT16IR250ISO	●	●	2.5		9.525	3.44	1.1	1.5	0.15	1.44	
		MMT16IR300ISO	●	●	3.0		9.525	3.44	1.1	1.5	0.26	1.73	
		MMT22IR350ISO	●		3.5		12.7	4.64	1.6	2.3	0.22	2.02	
		MMT22IR400ISO	●		4.0		12.7	4.64	1.6	2.3	0.25	2.31	
		MMT22IR450ISO	●		4.5		12.7	4.64	1.6	2.4	0.28	2.60	
		MMT22IR500ISO	●		5.0		12.7	4.64	1.6	2.3	0.32	2.89	







IDENTIFICATION

MMT 16 I R 050 ISO

Designation — MMT

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525
22	12.7

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

050	0.5mm	A	0.5—1.5mm or 48—16 thread/inch
075	0.75mm		
100	1.0mm		
125	1.25mm	G	1.75—3.0mm or 14—8 thread/inch
150	1.5mm		
175	1.75mm		
200	2.0mm	AG	0.5—3.0mm or 48—8 thread/inch
250	2.5mm		
300	3.0mm		
350	3.5mm	N	3.5—5.0mm or 7—5 thread/inch
400	4.0mm		
450	4.5mm		
500	5.0mm		

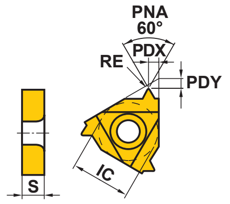
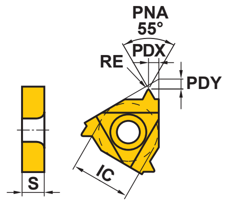
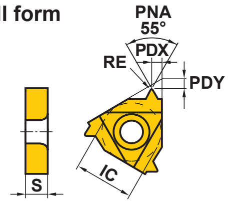
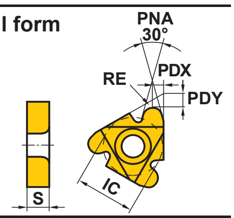
Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN
RD	Round DIN 405
TR	ISO Trapezoidal 30°
ACME	American ACME
UNJ	UNJ
APBU	API Buttress Casing
APRD	API Round Casing&Tubing
NPT	NPT
NPTF	NPTF

● : Inventory maintained in Japan.
(Contains 5 inserts per case.)

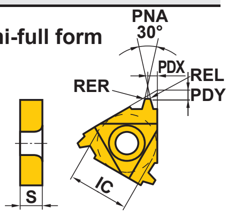
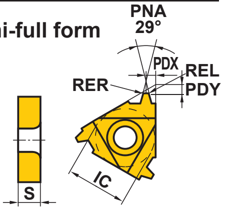
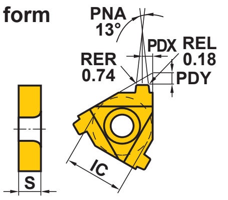
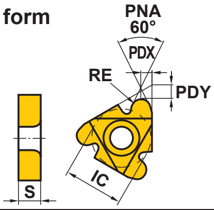
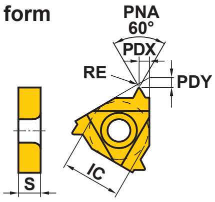
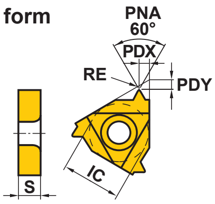
MMT G-CLASS GROUND INSERTS

INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2B	MMT11IR320UN	●			32	6.35	3.04	0.6	0.6	0.04	0.46	Full form
		MMT11IR280UN	●			28	6.35	3.04	0.6	0.7	0.05	0.52	
		MMT11IR240UN	●			24	6.35	3.04	0.7	0.8	0.09	0.61	
		MMT11IR200UN	●			20	6.35	3.04	0.8	0.9	0.11	0.73	
		MMT11IR180UN	●			18	6.35	3.04	0.8	1.0	0.12	0.81	
		MMT11IR160UN	●			16	6.35	3.04	0.9	1.1	0.14	0.92	
		MMT11IR140UN	●			14	6.35	3.04	0.9	1.1	0.11	1.05	
		MMT16IR320UN	●			32	9.525	3.44	0.6	0.6	0.04	0.46	
		MMT16IR280UN	●			28	9.525	3.44	0.6	0.7	0.05	0.52	
		MMT16IR240UN	●			24	9.525	3.44	0.7	0.8	0.09	0.61	
		MMT16IR200UN	●			20	9.525	3.44	0.8	0.9	0.11	0.73	
		MMT16IR180UN	●			18	9.525	3.44	0.8	1.0	0.12	0.81	
		MMT16IR160UN	●	●		16	9.525	3.44	0.9	1.1	0.14	0.92	
		MMT16IR140UN	●	●		14	9.525	3.44	0.9	1.2	0.11	1.05	
		MMT16IR130UN	●			13	9.525	3.44	1.0	1.3	0.10	1.13	
		MMT16IR120UN	●	●		12	9.525	3.44	1.1	1.4	0.18	1.22	
		MMT16IR110UN	●			11	9.525	3.44	1.1	1.5	0.13	1.33	
		MMT16IR100UN	●			10	9.525	3.44	1.1	1.5	0.15	1.47	
		MMT16IR090UN	●			9	9.525	3.44	1.2	1.7	0.17	1.63	
		MMT16IR080UN	●			8	9.525	3.44	1.1	1.5	0.27	1.83	
		MMT22IR070UN	●			7	12.7	4.64	1.6	2.3	0.23	2.09	
		MMT22IR060UN	●			6	12.7	4.64	1.6	2.3	0.26	2.44	
		MMT22IR050UN	●			5	12.7	4.64	1.6	2.3	0.32	2.93	
Whitworth for BSW, BSP	Medium Class A	MMT11IR190W	●			19	6.35	3.04	0.8	1.0	0.19	0.86	Full form
		MMT11IR140W	●			14	6.35	3.04	0.9	1.1	0.26	1.16	
		MMT16IR280W	●			28	9.525	3.44	0.6	0.7	0.09	0.58	
		MMT16IR260W	●			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT16IR200W	●			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT16IR190W	●	●		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT16IR180W	●			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT16IR160W	●			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT16IR140W	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16IR120W	●			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT16IR110W	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT16IR100W	●			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT16IR090W	●			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT16IR080W	●			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT22IR070W	●			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT22IR060W	●			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT22IR050W	●			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	MMT11IR190BSPT	●			19	6.35	3.04	0.8	0.9	0.14	0.86	Full form 
		MMT11IR140BSPT	●			14	6.35	3.04	0.9	1.0	0.26	1.16	
		MMT16IR190BSPT	●	●		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT16IR140BSPT	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16IR110BSPT	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7H	MMT16IR100RD	●			10	9.525	3.44	1.1	1.2	0.55	1.27	Full form 
		MMT16IR080RD	●			8	9.525	3.44	1.4	1.4	0.70	1.59	
		MMT16IR060RD	●			6	9.525	3.44	1.4	1.5	0.93	2.12	
		MMT22IR040RD	●			4	12.7	4.64	2.2	2.3	1.40	3.18	

● : Inventory maintained in Japan.
(Contains 5 inserts per case.)

CUTTING DEPTH GUIDE ➤ P.27

Type	Thread Tolerance	Order Number	Coated VP10MF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE RER/L	Total Cutting Depth (mm)	Geometry
ISO Trapezoidal 30°	7H	MMT16IR150TR	●	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form 
		MMT16IR200TR	●	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16IR300TR	●	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22IR400TR	●	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22IR500TR	●	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	MMT16IR120ACME	●		12	9.525	3.44	1.2	1.3	0.05	1.19	Semi-full form 
		MMT16IR100ACME	●		10	9.525	3.44	1.2	1.3	0.08	1.52	
		MMT16IR080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22IR060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22IR050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ		When machining an internal UNJ thread, cut an internal hole with the appropriate diameter. Then machine with 60° American UN. In this case, a full form type insert cannot be used.										
API Buttress Casing	Standard API	MMT22IR050APBU	●		5	12.7	4.64	2.8	1.9	0.74/0.18	1.55	Full form 
API Round Casing&Tubing	Standard API RD	MMT16IR100APRD	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form 
		MMT16IR080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	MMT16IR270NPT	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form 
		MMT16IR180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16IR140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16IR115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16IR080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	MMT16IR140NPTF	●		14	9.525	3.44	0.9	1.2	0.04	1.35	Full form 
		MMT16IR115NPTF	●		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16IR080NPTF	●		8	9.525	3.44	1.3	1.8	0.04	2.38	

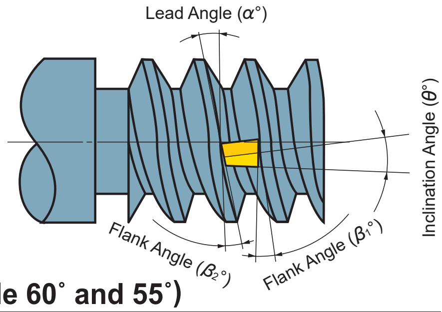
CUTTING DEPTH GUIDE ➤ P.27

CUTTING CONDITIONS OF MMT SERIES

SELECTING A SHIM FOR THE MMT SERIES

■FLANK ANGLE AND LEAD ANGLE

Lead angle (α) depends on a combination of thread diameter and pitch. Select a shim so that the lead angle of the thread can coincide with the flank angles of the thread and insert (β_1, β_2). No need to change a shim for general threading with an MMT holder. When threading with a small diameter or large pitch, change the shim depending on the lead angle, referring to the table and graph below. When threading left hand threads, change to a shim with a negative inclination angle.



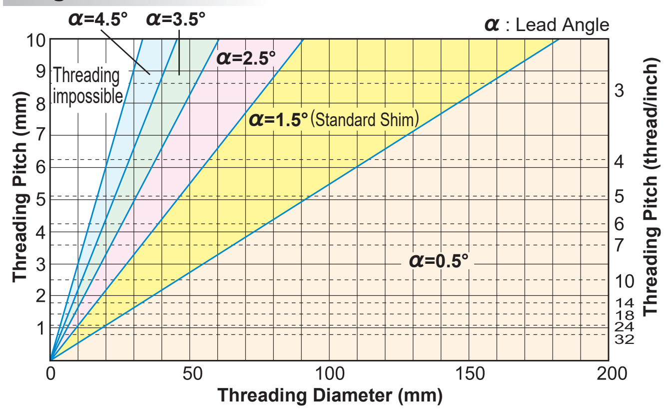
■SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 60° and 55°)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm) *		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤φ1.7	φ1.7 − φ2.3	φ2.3 − φ3.0	φ3.0 − φ4.6	φ4.6 − φ9.1	≥φ9.1	≤φ3.6	φ3.6 − φ9.1	≥φ9.1
0.75	≤φ2.5	φ2.5 − φ3.4	φ3.4 − φ4.6	φ4.6 − φ6.8	φ6.8 − φ13.7	≥φ13.7	≤φ5.5	φ5.5 − φ13.7	≥φ13.7
1	≤φ3.3	φ3.3 − φ4.6	φ4.6 − φ6.1	φ6.1 − φ9.1	φ9.1 − φ18.2	≥φ18.2	≤φ7.3	φ7.3 − φ18.2	≥φ18.2
1.25	≤φ4.1	φ4.1 − φ5.7	φ5.7 − φ7.6	φ7.6 − φ11.4	φ11.4 − φ22.8	≥φ22.8	≤φ9.1	φ9.1 − φ22.8	≥φ22.8
1.5	≤φ5.0	φ5.0 − φ6.8	φ6.8 − φ9.1	φ9.1 − φ13.7	φ13.7 − φ27.4	≥φ27.4	≤φ10.9	φ10.9 − φ27.4	≥φ27.4
1.75	≤φ5.8	φ5.8 − φ8.0	φ8.0 − φ10.6	φ10.6 − φ16.0	φ16.0 − φ31.9	≥φ31.9	≤φ12.8	φ12.8 − φ31.9	≥φ31.9
2	≤φ6.6	φ6.6 − φ9.1	φ9.1 − φ12.1	φ12.1 − φ18.2	φ18.2 − φ36.5	≥φ36.5	≤φ14.6	φ14.6 − φ36.5	≥φ36.5
2.5	≤φ8.3	φ8.3 − φ11.4	φ11.4 − φ15.2	φ15.2 − φ22.8	φ22.8 − φ45.6	≥φ45.6	≤φ18.2	φ18.2 − φ45.6	≥φ45.6
3	≤φ9.9	φ9.9 − φ13.7	φ13.7 − φ18.2	φ18.2 − φ27.3	φ27.3 − φ54.7	≥φ54.7	≤φ21.9	φ21.9 − φ54.7	≥φ54.7
3.5	≤φ11.6	φ11.6 − φ15.9	φ15.9 − φ21.3	φ21.3 − φ31.9	φ31.9 − φ63.8	≥φ63.8	≤φ25.5	φ25.5 − φ63.8	≥φ63.8
4	≤φ13.2	φ13.2 − φ18.2	φ18.2 − φ24.3	φ24.3 − φ36.5	φ36.5 − φ72.9	≥φ72.9	≤φ29.2	φ29.2 − φ72.9	≥φ72.9
4.5	≤φ14.9	φ14.9 − φ20.5	φ20.5 − φ27.3	φ27.3 − φ41.0	φ41.0 − φ82.1	≥φ82.1	≤φ32.8	φ32.8 − φ82.1	≥φ82.1
5	≤φ16.5	φ16.5 − φ22.8	φ22.8 − φ30.4	φ30.4 − φ45.6	φ45.6 − φ91.2	≥φ91.2	≤φ36.5	φ36.5 − φ91.2	≥φ91.2

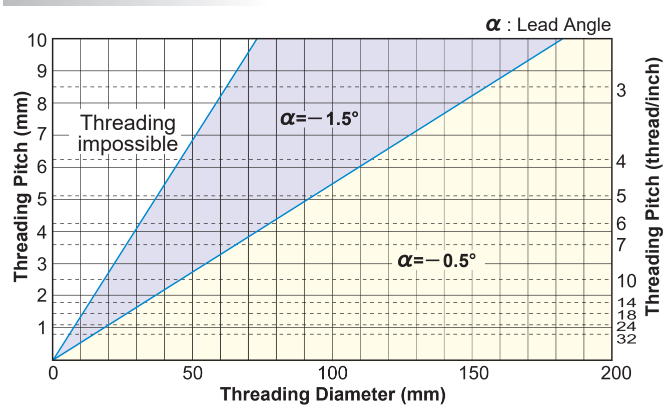
* Back turning in the case of left hand threads.

■SHIM REFERENCE GRAPH (Thread angle 60° and 55°)

Right Hand Thread



Left Hand Thread



Note 1) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table on page G013 for the calculation of thread lead angle and tool flank angle.)

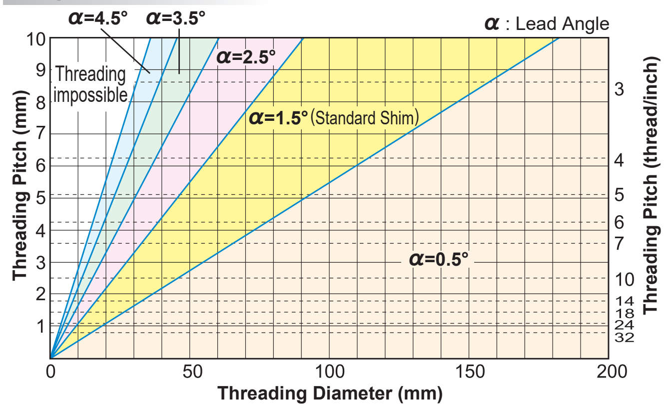
■SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 30° and 29°)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm) *		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤φ1.8	φ1.8 − φ2.3	φ2.3 − φ3.0	φ3.0 − φ4.6	φ4.6 − φ9.1	≥φ9.1	≤φ4.6	φ4.6 − φ9.1	≥φ9.1
0.75	≤φ2.7	φ2.7 − φ3.4	φ3.4 − φ4.6	φ4.6 − φ6.8	φ6.8 − φ13.7	≥φ13.7	≤φ6.8	φ6.8 − φ13.7	≥φ13.7
1	≤φ3.6	φ3.6 − φ4.6	φ4.6 − φ6.1	φ6.1 − φ9.1	φ9.1 − φ18.2	≥φ18.2	≤φ9.1	φ9.1 − φ18.2	≥φ18.2
1.25	≤φ4.5	φ4.5 − φ5.7	φ5.7 − φ7.6	φ7.6 − φ11.4	φ11.4 − φ22.8	≥φ22.8	≤φ11.4	φ11.4 − φ22.8	≥φ22.8
1.5	≤φ5.5	φ5.5 − φ6.8	φ6.8 − φ9.1	φ9.1 − φ13.7	φ13.7 − φ27.4	≥φ27.4	≤φ13.7	φ13.7 − φ27.4	≥φ27.4
1.75	≤φ6.4	φ6.4 − φ8.0	φ8.0 − φ10.6	φ10.6 − φ16.0	φ16.0 − φ31.9	≥φ31.9	≤φ16.0	φ16.0 − φ31.9	≥φ31.9
2	≤φ7.3	φ7.3 − φ9.1	φ9.1 − φ12.1	φ12.1 − φ18.2	φ18.2 − φ36.5	≥φ36.5	≤φ18.2	φ18.2 − φ36.5	≥φ36.5
2.5	≤φ9.1	φ9.1 − φ11.4	φ11.4 − φ15.2	φ15.2 − φ22.8	φ22.8 − φ45.6	≥φ45.6	≤φ22.8	φ22.8 − φ45.6	≥φ45.6
3	≤φ10.9	φ10.9 − φ13.7	φ13.7 − φ18.2	φ18.2 − φ27.3	φ27.3 − φ54.7	≥φ54.7	≤φ27.3	φ27.3 − φ54.7	≥φ54.7
3.5	≤φ12.7	φ12.7 − φ15.9	φ15.9 − φ21.3	φ21.3 − φ31.9	φ31.9 − φ63.8	≥φ63.8	≤φ31.9	φ31.9 − φ63.8	≥φ63.8
4	≤φ14.6	φ14.6 − φ18.2	φ18.2 − φ24.3	φ24.3 − φ36.5	φ36.5 − φ72.9	≥φ72.9	≤φ36.5	φ36.5 − φ72.9	≥φ72.9
4.5	≤φ16.4	φ16.4 − φ20.5	φ20.5 − φ27.3	φ27.3 − φ41.0	φ41.0 − φ82.1	≥φ82.1	≤φ41.0	φ41.0 − φ82.1	≥φ82.1
5	≤φ18.2	φ18.2 − φ22.8	φ22.8 − φ30.4	φ30.4 − φ45.6	φ45.6 − φ91.2	≥φ91.2	≤φ45.6	φ45.6 − φ91.2	≥φ91.2

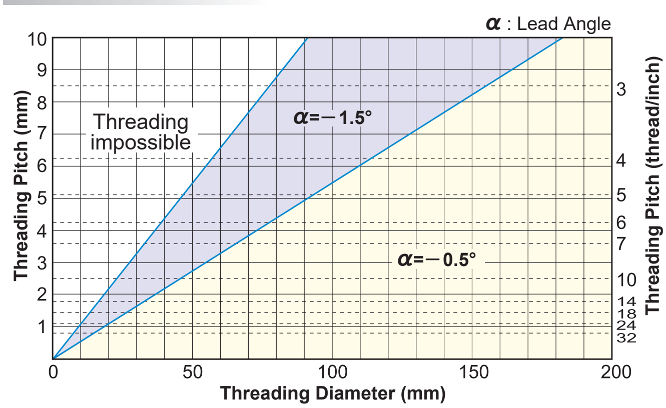
* Back turning in the case of left hand threads.

■SHIM REFERENCE GRAPH (Thread angle 30˚ and 29˚)

Right Hand Thread



Left Hand Thread



Note 1) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table below for the calculation of thread lead angle and tool flank angle.)

■ Selection table

Lead Angle	Opening angle 60°/55° Right Hand Thread		Opening angle 60°/55° * Left Hand Thread		Opening angle 30°/29° Right Hand Thread		Opening angle 30°/29° * Left Hand Thread	
0	P05	P05	N05	N05	P05	P05	N05	N05
0.5	P05	P05	N05	N05	P05	P05	N05	N05
1	P15	P15	N15	N15	P15	P15	N15	N15
1.5	P15	P15	N15	N15	P15	P15	N15	N15
2	P25	P25	N15	N15	P25	P25	Compatible	Compatible
2.5	P25	P25	Compatible	Compatible	P25	P25	Compatible	Compatible
3	P35	P35	Compatible	Compatible	P35	P35	Compatible	Compatible
3.5	P35	P35	Compatible	Compatible	P35	P35	Compatible	Compatible
4	P45	P45	Compatible	Compatible	P45	P45	Compatible	Compatible
4.5	P45	P45	Compatible	Compatible	P45	P45	Compatible	Compatible
5	P45	P45	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
5.5	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible

* Back turning in the case of left hand threads.

When replacing a shim, check if the difference between the thread lead angle and shim inclination angle is within:
2.5°—0.5° where thread helix angle is 60° (55°)
2°—1° where thread helix angle is 30° (29°)
*** Inclination angle of a standard shim is 0°.**
*** The holder has a 1.5° lead angle.**

■CALCULATION OF THREAD LEAD ANGLE

$$\tan\alpha = \frac{l}{\pi d} = \frac{nP}{\pi d}$$

α: Lead angle
l : Lead
n : Number of threads
P : Pitch
d : Effective diameter of thread

■EXAMPLE OF SELECTING A SHIM

• When the thread lead angle is 2.2°

①In the case when the thread helix angle is 60°
(2.2° lead angle) — (2.5—0.5°) = -0.3°—1.7° shim inclination angle is appropriate.
Threading with a standard shim (0° inclination angle) is possible. But, replacing with a shim with a 1° inclination angle is recommended, refer to Standard Shim List on pages 13 and 18.

②In the case when the thread helix angle is 30°
(2.2° lead angle) — (2—1°) = -0.2°—1.2° shim inclination angle is appropriate.
Replacing with a shim with a 1° inclination angle is recommended, referring to Standard Shim List on pages 13 and 18.

■RELIEF ANGLE OF AN INSERT SET ON A HOLDER

Thread Helix Angle	Internal Relief Angle	External Relief Angle
60°	8.8°	5.8°
55°	7.9°	5.2°
30°	4.1°	2.7°
29°	4°	2.6°

• Relief angles (β_2, β_1) of an insert become small when the thread helix angle of a trapezoidal, round, or other thread is small. Take care when selecting a shim.

*** Please refer to the "Calculation of Thread Lead Angle" on the website from given QR Code.**

https://www.mitsubishicarbide.com/index.php?cID=2884

MMT STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

■ ISO Metric

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
0.5	0.31	0.10	0.08	0.07	0.06											MMT16ER050ISO	—
0.75	0.46	0.16	0.14	0.10	0.06											MMT16ER075ISO	—
1.0	0.61	0.18	0.15	0.12	0.10	0.06										MMT16ER100ISO	MMT16ER100ISO-S
1.25	0.77	0.19	0.17	0.14	0.11	0.10	0.06									MMT16ER125ISO	MMT16ER125ISO-S
1.5	0.92	0.22	0.21	0.17	0.14	0.12	0.06									MMT16ER150ISO	MMT16ER150ISO-S
1.75	1.07	0.22	0.21	0.16	0.13	0.11	0.09	0.09	0.06							MMT16ER175ISO	MMT16ER175ISO-S
2.0	1.23	0.24	0.23	0.17	0.16	0.14	0.12	0.11	0.06							MMT16ER200ISO	MMT16ER200ISO-S
2.5	1.53	0.26	0.23	0.19	0.17	0.15	0.13	0.12	0.11	0.11	0.06					MMT16ER250ISO	MMT16ER250ISO-S
3.0	1.84	0.27	0.25	0.20	0.18	0.16	0.14	0.13	0.12	0.12	0.11	0.10	0.06			MMT16ER300ISO	MMT16ER300ISO-S
3.5	2.15	0.33	0.30	0.24	0.21	0.18	0.17	0.15	0.14	0.14	0.12	0.11	0.06			MMT22ER350ISO	—
4.0	2.45	0.34	0.31	0.24	0.22	0.19	0.17	0.16	0.14	0.14	0.13	0.12	0.12	0.11	0.06	MMT22ER400ISO	—
4.5	2.76	0.38	0.34	0.28	0.24	0.22	0.20	0.18	0.16	0.16	0.15	0.14	0.13	0.12	0.06	MMT22ER450ISO	—
5.0	3.07	0.42	0.38	0.32	0.27	0.24	0.22	0.20	0.18	0.18	0.17	0.16	0.15	0.12	0.06	MMT22ER500ISO	—

■ American UN

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
32	0.49	0.17	0.15	0.11	0.06											MMT16ER320UN	—
28	0.56	0.17	0.14	0.10	0.09	0.06										MMT16ER280UN	—
24	0.65	0.18	0.16	0.14	0.11	0.06										MMT16ER240UN	—
20	0.78	0.20	0.18	0.13	0.11	0.10	0.06									MMT16ER200UN	—
18	0.87	0.22	0.20	0.15	0.13	0.11	0.06									MMT16ER180UN	—
16	0.97	0.22	0.20	0.15	0.12	0.11	0.11	0.06								MMT16ER160UN	MMT16ER160UN-S
14	1.11	0.23	0.21	0.16	0.13	0.11	0.11	0.10	0.06							MMT16ER140UN	MMT16ER140UN-S
13	1.20	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.06							MMT16ER130UN	—
12	1.30	0.28	0.23	0.18	0.16	0.14	0.13	0.12	0.06							MMT16ER120UN	MMT16ER120UN-S
11	1.42	0.28	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.06						MMT16ER110UN	—
10	1.56	0.28	0.24	0.19	0.16	0.14	0.13	0.13	0.12	0.11	0.06					MMT16ER100UN	—
9	1.73	0.34	0.29	0.22	0.17	0.15	0.14	0.13	0.12	0.11	0.06					MMT16ER090UN	—
8	1.95	0.35	0.30	0.24	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06				MMT16ER080UN	—
7	2.22	0.37	0.33	0.28	0.24	0.20	0.17	0.16	0.15	0.14	0.12	0.06				MMT22ER070UN	—
6	2.60	0.42	0.35	0.29	0.25	0.21	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.06		MMT22ER060UN	—
5	3.12	0.43	0.39	0.31	0.27	0.24	0.22	0.20	0.19	0.19	0.18	0.17	0.15	0.12	0.06	MMT22ER050UN	—

■ Whitworth for BSW, BSP

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										MMT16ER280W	—
26	0.63	0.18	0.15	0.13	0.11	0.06										MMT16ER260W	—
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									MMT16ER200W	—
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									MMT16ER190W	MMT16ER190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									MMT16ER180W	—
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							MMT16ER160W	—
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							MMT16ER140W	MMT16ER140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							MMT16ER120W	—
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						MMT16ER110W	MMT16ER110W-S
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06					MMT16ER100W	—
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06				MMT16ER090W	—
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06			MMT16ER080W	—
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06			MMT22ER070W	—
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06	MMT22ER060W	—
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06	MMT22ER050W	—

■ BSPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9						G-class ground inserts	M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										MMT16ER280BSPT	—
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06									MMT16ER190BSPT	MMT16ER190BSPT-S
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06							MMT16ER140BSPT	MMT16ER140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06						MMT16ER110BSPT	MMT16ER110BSPT-S

Note 1) • Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
• Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
• Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

MMT STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

■ Round DIN 405

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		
10	1.27	0.23	0.21	0.20	0.19	0.16	0.12	0.10	0.06								MMT16ER100RD
8	1.59	0.23	0.21	0.20	0.19	0.18	0.16	0.14	0.12	0.10	0.06						MMT16ER080RD
6	2.12	0.26	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.06				MMT16ER060RD
4	3.18	0.34	0.33	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.15	0.12	0.06		MMT22ER040RD

■ ISO Trapezoidal 30°

Pitch (mm)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06										MMT16ER150TR
2.0	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06									MMT16ER200TR
3.0	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06							MMT16ER300TR
4.0	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06				MMT22ER400TR
5.0	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06		MMT22ER500TR

■ American ACME

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		
12	1.19	0.27	0.23	0.20	0.17	0.14	0.12	0.06									MMT16ER120ACME
10	1.52	0.29	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.06							MMT16ER100ACME
8	1.84	0.30	0.26	0.22	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06					MMT16ER080ACME
6	2.37	0.34	0.30	0.27	0.24	0.21	0.19	0.16	0.14	0.12	0.12	0.11	0.11	0.06			MMT22ER060ACME
5	2.79	0.36	0.33	0.30	0.26	0.23	0.20	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.06		MMT22ER050ACME

■ UNJ

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11					
32	0.46	0.16	0.14	0.10	0.06												MMT16ER320UNJ
28	0.52	0.16	0.12	0.09	0.09	0.06											MMT16ER280UNJ
24	0.61	0.17	0.14	0.14	0.10	0.06											MMT16ER240UNJ
20	0.73	0.19	0.16	0.13	0.10	0.09	0.06										MMT16ER200UNJ
18	0.81	0.23	0.18	0.14	0.10	0.10	0.06										MMT16ER180UNJ
16	0.92	0.26	0.21	0.14	0.12	0.10	0.09										MMT16ER160UNJ
14	1.05	0.26	0.23	0.17	0.12	0.11	0.10	0.06									MMT16ER140UNJ
12	1.22	0.28	0.27	0.20	0.17	0.13	0.11	0.06									MMT16ER120UNJ
10	1.47	0.30	0.29	0.21	0.15	0.13	0.12	0.11	0.10	0.06							MMT16ER100UNJ
8	1.83	0.31	0.30	0.23	0.18	0.15	0.14	0.13	0.12	0.11	0.10	0.06					MMT16ER080UNJ

■ API Buttress Casing

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11					
5	1.55	0.25	0.23	0.17	0.15	0.13	0.12	0.12	0.11	0.11	0.10	0.06					MMT22ER050APBU

■ API Round Casing&Tubing

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12				
10	1.41	0.25	0.23	0.16	0.14	0.12	0.12	0.12	0.11	0.10	0.06						MMT16ER100APRD
8	1.81	0.25	0.24	0.19	0.16	0.14	0.14	0.13	0.13	0.13	0.13	0.11	0.06				MMT16ER080APRD

■ American NPT

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06										MMT16ER270NPT
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16ER180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16ER140NPT
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06				MMT16ER115NPT
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16ER080NPT

■ American NPTF

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
27	0.64	0.16	0.14	0.11	0.09	0.08	0.06										MMT16ER270NPTF
18	1.00	0.19	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16ER180NPTF
14	1.35	0.23	0.21	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16ER140NPTF
11.5	1.63	0.24	0.23	0.19	0.15	0.13	0.11	0.11	0.11	0.10	0.10	0.10	0.06				MMT16ER115NPTF
8	2.38	0.32	0.27	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16ER080NPTF

Note 1)
- Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
- Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
- Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

MMT STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

■ISO Metric

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers	
0.5	0.29	0.09	0.07	0.07	0.06											MMT11IR050ISO	MMT16IR050ISO	—	—
0.75	0.43	0.15	0.13	0.09	0.06											MMT11IR075ISO	MMT16IR075ISO	—	—
1.0	0.58	0.17	0.15	0.11	0.09	0.06										MMT11IR100ISO	MMT16IR100ISO	MMT11IR100ISO-S	MMT16IR100ISO-S
1.25	0.72	0.18	0.16	0.12	0.11	0.09	0.06									MMT11IR125ISO	MMT16IR125ISO	MMT11IR125ISO-S	MMT16IR125ISO-S
1.5	0.87	0.21	0.20	0.16	0.13	0.11	0.06									MMT11IR150ISO	MMT16IR150ISO	MMT11IR150ISO-S	MMT16IR150ISO-S
1.75	1.01	0.21	0.20	0.15	0.12	0.10	0.09	0.08	0.06							MMT11IR175ISO	MMT16IR175ISO	—	MMT16IR175ISO-S
2.0	1.15	0.24	0.22	0.18	0.14	0.12	0.10	0.09	0.06							MMT11IR200ISO	MMT16IR200ISO	—	MMT16IR200ISO-S
2.5	1.44	0.25	0.24	0.21	0.15	0.13	0.12	0.10	0.09	0.09	0.06					—	MMT16IR250ISO	—	MMT16IR250ISO-S
3.0	1.73	0.26	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.06			—	MMT16IR300ISO	—	MMT16IR300ISO-S
3.5	2.02	0.32	0.30	0.23	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.06			—	MMT22IR350ISO	—	—
4.0	2.31	0.33	0.31	0.24	0.22	0.18	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.10	0.06	—	MMT22IR400ISO	—	—
4.5	2.60	0.36	0.33	0.28	0.24	0.21	0.19	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.06	—	MMT22IR450ISO	—	—
5.0	2.89	0.41	0.38	0.32	0.27	0.24	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06	—	MMT22IR500ISO	—	—

■American UN

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
32	0.46	0.16	0.14	0.10	0.06											MMT11IR320UN	MMT16IR320UN	—
28	0.52	0.16	0.13	0.09	0.08	0.06										MMT11IR280UN	MMT16IR280UN	—
24	0.61	0.17	0.15	0.13	0.10	0.06										MMT11IR240UN	MMT16IR240UN	—
20	0.73	0.18	0.15	0.13	0.11	0.10	0.06									MMT11IR200UN	MMT16IR200UN	—
18	0.81	0.20	0.18	0.14	0.12	0.11	0.06									MMT11IR180UN	MMT16IR180UN	—
16	0.92	0.20	0.18	0.15	0.12	0.11	0.10	0.06								MMT11IR160UN	MMT16IR160UN	MMT16IR160UN-S
14	1.05	0.21	0.18	0.15	0.13	0.11	0.11	0.10	0.06							MMT11IR140UN	MMT16IR140UN	MMT16IR140UN-S
13	1.13	0.22	0.19	0.16	0.14	0.13	0.12	0.11	0.06							—	MMT16IR130UN	—
12	1.22	0.24	0.22	0.18	0.16	0.13	0.12	0.11	0.06							—	MMT16IR120UN	MMT16IR120UN-S
11	1.33	0.24	0.22	0.20	0.15	0.12	0.12	0.11	0.11	0.06						—	MMT16IR110UN	—
10	1.47	0.25	0.22	0.21	0.14	0.13	0.12	0.12	0.11	0.11	0.06					—	MMT16IR100UN	—
9	1.63	0.31	0.23	0.21	0.17	0.15	0.14	0.13	0.12	0.11	0.06					—	MMT16IR090UN	—
8	1.83	0.31	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.11	0.06				—	MMT16IR080UN	—
7	2.09	0.36	0.30	0.24	0.21	0.18	0.17	0.16	0.15	0.14	0.12	0.06				—	MMT22IR070UN	—
6	2.44	0.40	0.33	0.25	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.06		—	MMT22IR060UN	—
5	2.93	0.41	0.35	0.31	0.26	0.23	0.21	0.20	0.19	0.17	0.15	0.14	0.13	0.12	0.06	—	MMT22IR050UN	—

■Whitworth for BSW, BSP

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										—	MMT16IR280W	—
26	0.63	0.18	0.15	0.13	0.11	0.06										—	MMT16IR260W	—
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									—	MMT16IR200W	—
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									MMT11IR190W	MMT16IR190W	MMT16IR190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									—	MMT16IR180W	—
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							—	MMT16IR160W	—
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							MMT11IR140W	MMT16IR140W	MMT16IR140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							—	MMT16IR120W	MMT16IR120W-S
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						—	MMT16IR110W	—
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06					—	MMT16IR100W	—
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06				—	MMT16IR090W	—
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06			—	MMT16IR080W	—
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06			—	MMT22IR070W	—
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06	—	MMT22IR060W	—
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06	—	MMT22IR050W	—

Note 1)
- Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
- Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
- Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

MMT STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

■BSPT

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes									Insert Type		
		1	2	3	4	5	6	7	8	9	G-class ground inserts		M-class inserts with 3-D chip breakers
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06				MMT11IR190BSPT	MMT16IR190BSPT	MMT16IR190BSPT-S
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06		MMT11IR140BSPT	MMT16IR140BSPT	MMT16IR140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06	—	MMT16IR110BSPT	MMT16IR110BSPT-S

■Round DIN 405

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
10	1.27	0.23	0.21	0.20	0.19	0.16	0.12	0.10	0.06							MMT16IR100RD
8	1.59	0.23	0.21	0.20	0.19	0.18	0.16	0.14	0.12	0.10	0.06					MMT16IR080RD
6	2.12	0.26	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.06			MMT16IR060RD
4	3.18	0.34	0.33	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.15	0.12	0.06	MMT22IR040RD

■ISO Trapezoidal 30°

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06									MMT16IR150TR
2	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06								MMT16IR200TR
3	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06						MMT16IR300TR
4	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06			MMT22IR400TR
5	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06	MMT22IR500TR

■American ACME

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
12	1.19	0.27	0.23	0.20	0.17	0.14	0.12	0.06								MMT16IR120ACME
10	1.52	0.29	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.06						MMT16IR100ACME
8	1.84	0.30	0.26	0.22	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06				MMT16IR080ACME
6	2.37	0.34	0.30	0.27	0.24	0.21	0.19	0.16	0.14	0.12	0.12	0.11	0.11	0.06		MMT22IR060ACME
5	2.79	0.36	0.33	0.30	0.26	0.23	0.20	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.06	MMT22IR050ACME

■API Buttress Casing

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes											Insert Type
		1	2	3	4	5	6	7	8	9	10	11	
5	1.55	0.25	0.23	0.17	0.15	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT22IR050APBU

■API Round Casing&Tubing

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes												Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	
10	1.41	0.25	0.23	0.16	0.14	0.12	0.12	0.12	0.11	0.10	0.06			MMT16IR100APRD
8	1.81	0.25	0.24	0.19	0.16	0.14	0.14	0.13	0.13	0.13	0.13	0.11	0.06	MMT16IR080APRD

■American NPT

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06										MMT16IR270NPT
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16IR180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16IR140NPT
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06				MMT16IR115NPT
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16IR080NPT

■American NPTF

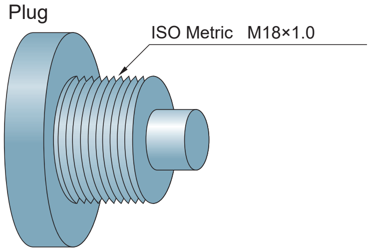
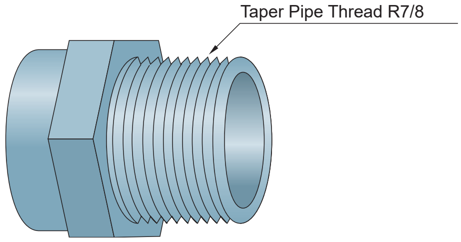
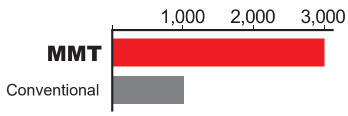
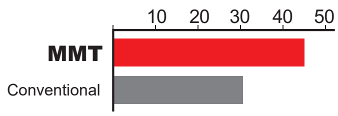
Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
14	1.35	0.23	0.21	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16IR140NPTF
11.5	1.63	0.24	0.23	0.19	0.15	0.13	0.11	0.11	0.11	0.10	0.10	0.10	0.06				MMT16IR115NPTF
8	2.38	0.32	0.27	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16IR080NPTF

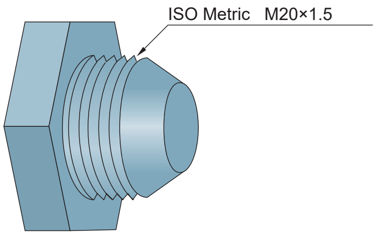
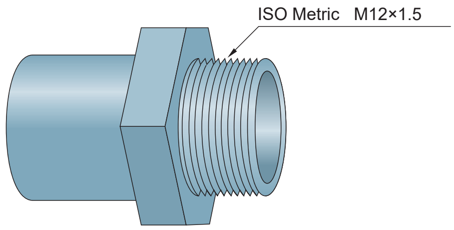
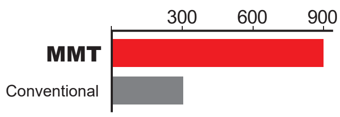
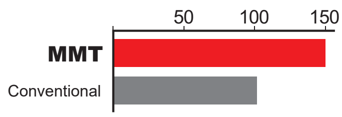
Note 1) • Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
• Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
• Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

TROUBLE SHOOTING

Problems	Observation	Causes	Solutions
Low thread precision.	Threads do not mesh with each other.	Incorrect tool installation.	Set the insert centre height at 0mm.
			Check holder inclination (Lateral).
	Shallow thread.	Incorrect depth of cut.	Modify the depth of cut.
		Lack of insert wear or plastic deformation resistance.	Refer to "Quickly generated flank wear." and "Large plastic deformation." below.
Poor surface finish.	Surface damage.	Chips wrap around or clog the work pieces.	Change to flank infeed and control the chip discharge direction.
			Change to an M-class insert with a 3-D chip breaker.
		The side of the insert cutting edge interferes with the workpiece.	Check the lead angle and select an appropriate shim.
	Surface tears.	Built-up edge (Welding).	Increase cutting speed.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Decrease depth of cut per pass.
	Surface vibrations.	Cutting speed too high.	Decrease the cutting speed.
		Insufficient work piece or tool clamping.	Re-check work piece and tool clamping. (Chuck pressure, clamping allowance)
		Incorrect tool installation.	Set the insert centre height at 0mm.
Short tool life.	Flank wear quickly generated.	Cutting speed too high.	Decrease the cutting speed.
		Too many passes causes abrasive wear.	Reduce the number of passes.
		Small depth of cut for the finishing pass.	Do not re-cut at 0mm depth of cut, larger than 0.05mm depth of cut is recommended.
	Non-uniform wear of the right and left sides of the cutting edge.	The work piece lead angle and the tool lead angle do not match.	Check the work piece lead angle and select an appropriate shim.
	Chipping and fracture.	Cutting speed too low.	Increase cutting speed.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.
		Unstable clamping.	Check work piece deflection.
			Shorten tool overhang.
			Recheck work piece and tool clamping. (Chuck pressure, clamping allowance)
		Chip packing.	Increase coolant pressure to blow away chips.
			Change the tool pass to control chips. (Lengthen each pass to allow the coolant to clear the chips.
			Change from standard internal cutting to back turning to prevent chip jamming.
		Non-chamfered work pieces causes high resistance at the start of each pass.	Chamfer the workpiece entry and exit faces.
	Large plastic deformation.	High cutting speed and large heat generation.	Decrease the cutting speed.
		Lack of coolant supply.	Check coolant is supply is sufficient.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.

Application Examples

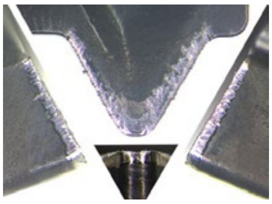
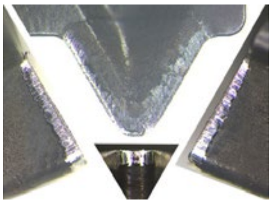
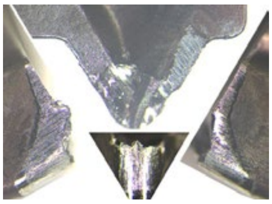
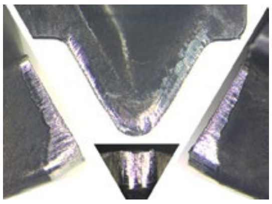
Insert (Grade)		MMT16ER100ISO (VP10MF)	MMT16ER110BSPT (VP15TF)
Workpiece		JIS SCM35 Plug 	JIS SUS316 Bolt 
Cutting Conditions	Cutting Speed **vc** (m/min)	120	100
	Pass	5	20
	Cutting Method	Radial Infeed	Radial Infeed
	Depth of Cut (mm)	Fixed Cut Area	Fixed Cut Area
Coolant		Wet Cutting	Wet Cutting
Results		piece/corner  MMT inserts had less wear than conventional products. Tool life increased 3 fold.	piece/corner  MMT inserts suitable for unstable machining without sudden fracturing. Tool life extended by 1.5 times.

Insert (Grade)		MMT16ER150ISO-S (VP15TF)	MMT16ER150ISO-S (VP15TF)
Workpiece		JIS S45C Bolt 	JIS SCM435 Bolt 
Cutting Conditions	Cutting Speed **vc** (m/min)	140	80
	Pass	6	10
	Cutting Method	Radial Infeed	Radial Infeed
	Depth of Cut (mm)	Fixed Cut Area	Fixed Cut Area
Coolant		Wet Cutting	Wet Cutting
Results		piece/corner  MMT inserts had better chip control and produced smaller burrs on incomplete threads compared to conventional products. 3 times longer tool life was possible.	piece/corner  Better chip control from the MMT inserts prevented chips wrapping around the workpiece. Tool life lengthened x 1.5

Cutting Performance

Inconel 718 Comparison of wear by machining length

When threading heat resistant alloys, it suppresses compound damage such as wear and plastic deformation and achieves excellent wear resistance.

Cutting Length	MP9025	Conventional A	Conventional B	Conventional C
20m				
25m				Not machinable
35m		<Cutting Conditions> Workpiece Material : Inconel 718 Insert : ISO Metric 60° Cutting Speed : vc = 30 m/min Pitch : 1.5 mm Depth of Cut : Total 12 passes, total depth of cut 0.92 mm ap = 0.1mmx3 passes, 0.08mmx4 passes, 0.06mmx5 passes Cutting Mode : Wet Cutting		

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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