MITSUBISHI
MITSUBISHI CARBIDE

TOOLS NEWS 2005.6. Update B053G

New Threading Tools

MMT series

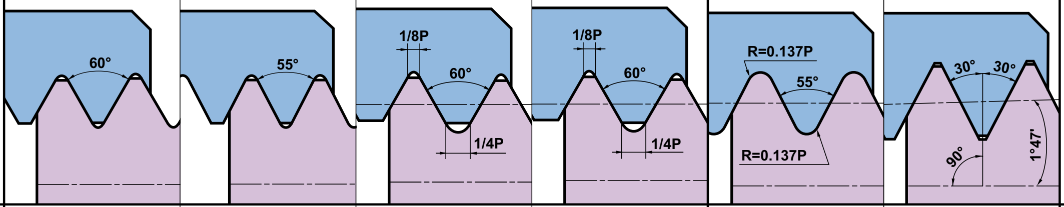
Expanded Insert

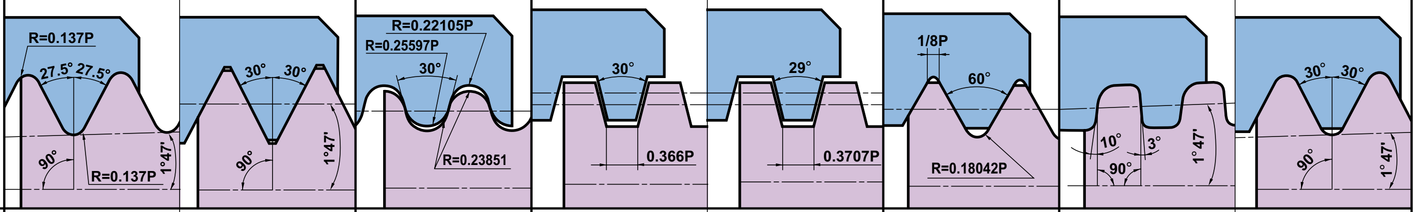
MMT series for precise and efficient threading

- Series expanded, additional M-class inserts with 3-D chip breakers
- Tough new grade, ***VP15TF*** for G-class inserts

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)* W	NPT
Pitch / Holder		mm (thread/inch)	thread/inch	mm	thread/inch	thread/inch	thread/inch
MMT Holder	Full form	–	–	0.5 2.5 0.75 3.0 1.0 3.5 1.25 4.0 1.5 4.5 1.75 5.0 2.0	32 12 28 11 24 10 20 9 18 8 16 7 14 6 13 5	28 11 26 10 20 9 19 8 18 7 16 6 14 5 12	27 18 14 11.5 8
		–	–	MMT16ER○○○ISO-S ➡ P11 MMT○○ER○○○ISO ➡ P13	MMT16ER○○○UN-S ➡ P11 MMT○○ER○○○UN ➡ P15	MMT16ER○○○W-S ➡ P11 MMT○○ER○○○W ➡ P15	MMT○○ER○○○NPT ➡ P17
	Partial form	0.5 –1.5(48–16) 1.75–3.0(14– 8) 0.5 –3.0(48– 8) 3.5 –5.0(7– 5)	48–16 14– 8 48– 8 7– 5	0.5 –1.5 1.75–3.0 0.5 –3.0 3.5 –5.0	48–16 14– 8 48– 8 7– 5	–	–
MMTER○○○○○○-C ➡ P9		MMT16ER○60-S ➡ P11 MMT○○ER○60 ➡ P13	MMT16ER○55-S ➡ P11 MMT○○ER○55 ➡ P13	MMT○○ER○○○60 ➡ P13	MMT○○ER○○○60 ➡ P13	–	–
MMT Boring Bars	Full form	–	–	0.5 2.5 0.75 3.0 1.0 3.5 1.25 4.0 1.5 4.5 1.75 5.0 2.0	32 12 28 11 24 10 20 9 18 8 16 7 14 6 13 5	28 11 26 10 20 9 19 8 18 7 16 6 14 5 12	27 18 14 11.5 8
		–	–	MMT○○IR○○○ISO-S ➡ P12 MMT○○IR○○○ISO ➡ P14	MMT16IR○○○UN-S ➡ P12 MMT○○IR○○○UN ➡ P16	MMT16IR○○○W-S ➡ P12 MMT○○IR○○○W ➡ P16	MMT○○IR○○○NPT ➡ P18
	Partial form	0.5 –1.5(48–16) 1.75–3.0(14– 8) 0.5 –3.0(48– 8) 3.5 –5.0(7– 5)	48–16 14– 8 48– 8 7– 5	0.5 –1.5 1.75–3.0 0.5 –3.0 3.5 –5.0	48–16 14– 8 48– 8 7– 5	–	–
MMTIR○○A○○○-SP○ MMTIR○○A○16-C ➡ P10		MMT16IR○60-S ➡ P12 MMT○○IR○60 ➡ P14	MMT16IR○55-S ➡ P12 MMT○○IR○55 ➡ P14	MMT○○IR○○○60 ➡ P14	MMT○○IR○○○60 ➡ P14	–	–





	Steam, gas and water 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.Rc(PT) Rp(PS)	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 2.0 3.0 4.0 5.0	12 10 8 6 5	32 16 28 14 24 12 20 10 18 8	5	10 8
	MMT16ER○○○BSPT-S ➡ P11 MMT○○ER○○○BSPT ➡ P15	MMT○○ER○○○NPTF ➡ P17	MMT○○ER○○○RD ➡ P15	MMT○○ER○○○TR ➡ P17	MMT○○ER○○○ACME ➡ P17	MMT○○ER○○○UNJ ➡ P17	MMT22ER050APBU ➡ P17	MMT16ER○○○APRD ➡ P17
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	19 14 11	14 11.5 8	10 8 6 4	1.5 2.0 3.0 4.0 5.0	12 10 8 6 5	* –	5	10 8
	MMT16IR○○○BSPT-S ➡ P12 MMT○○IR○○○BSPT ➡ P16	MMT○○IR○○○NPTF ➡ P18	MMT○○IR○○○RD ➡ P16	MMT○○IR○○○TR ➡ P18	MMT○○IR○○○ACME ➡ P18	–	MMT22IR050APBU ➡ P18	MMT16IR○○○APRD ➡ P18
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–

Note) 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.

Note) For Pipe Threads, the list above contains both new and old symbols. Symbols in brackets are the old type.
R: Male Taper Thread, Rc: Female Taper Thread, Rp: Female Parallel Thread
Female Parallel Thread defined with Rp(PS) is used for Male Taper Pipe Thread.
It is different from Female Parallel Pipe Thread defined with G(PF).

M-class inserts with 3-D chip breakers

Features

- **Excellent chip control**
- **Prevents burrs and vibration**
- **With moulded identification markings for easy thread recognition**

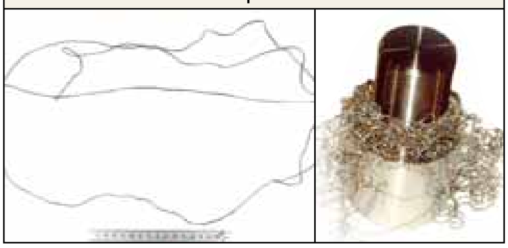
Cutting Performance

Chip control comparison

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

Ideal chip control even in the latter half of passes when continuous chips are usually produced.

Competitor



MMT

<Cutting conditions>

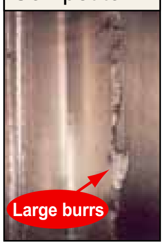
Workpiece	: JIS SCM440
Insert	: MMT16ER150ISO-S
Grade	: VP15TF
Cutting speed	: 120m/min
Cutting method	: Radial infeed
Depth of cut	: Fixed cut area
Pass	: 6 times
Coolant	: WET

Burr comparison

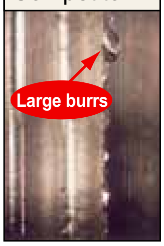
ISO metric external thread pitch 1.5mm
(Enlarged views of incomplete threads at the initial stages of cutting)

MMT

Competitor A



Competitor B



Use of Mitsubishi's unique M-class sharp edge technology. The sharp edge eliminates burrs on incomplete threads.

<Cutting conditions>

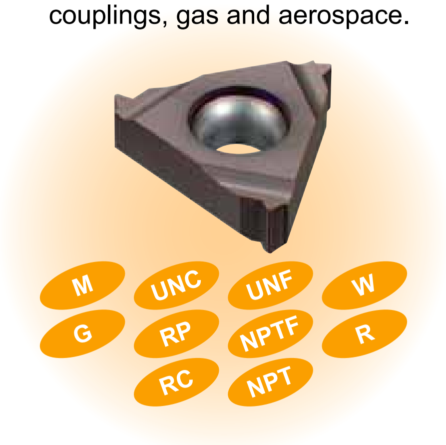
Workpiece	: JIS SUS316
Insert	: MMT16ER150ISO-S
Grade	: VP15TF
Cutting speed	: 100m/min
Cutting method	: Radial infeed
Depth of cut	: Fixed cut area
Pass	: 6 times
Coolant	: WET

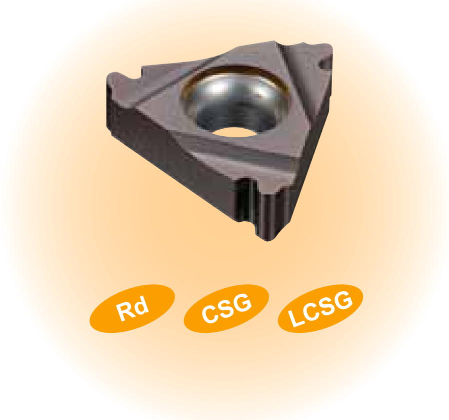
G-class ground insert

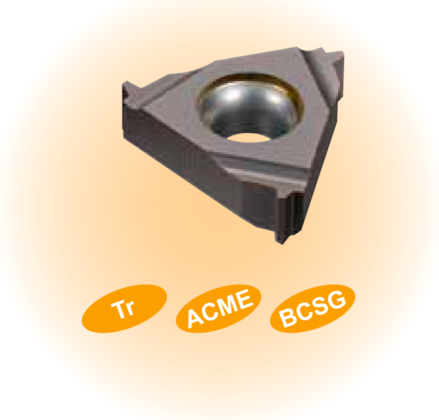
Features

A Wide Variety of Products

- Mitsubishi Miracle Threading (MMT) series.193 inserts and 26 holders
- The MMT series allows the threading of a wide range of threads, from standard metric to threads for pipe couplings, gas and aerospace.







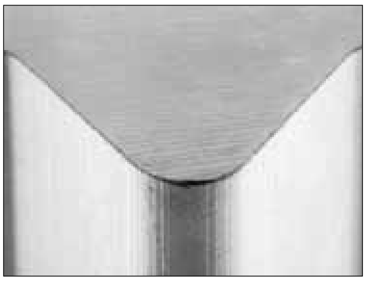
A higher level of precision than conventional inserts.

- The following tolerances can be achieved with the MMT series.

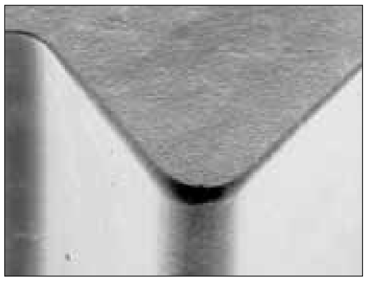
Thread Type	Threading Tolerance
ISO Metric	6g / 6H
American UN	2A / 2B
Whitworth for BSW, BSP	Medium Class A
BSPT	Standard BSPT
Round DIN 405	7h / 7H
ISO Trapezoidal 30°	7e / 7H
American ACME	3G
UNJ	3A
API Buttress Casing	Standard API
API Rounded Casing & Tubing	Standard API RD
American NPT	Standard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

Long Tool Life with "Sharp" Cutting Edge

- A "sharp" cutting edge lengthens tool life.
- A "sharp" cutting edge can be achieved with a small and uniform honing along the entire cutting edge.



MMT series insert ("Sharp" cutting edge)



Competitor's insert

Insert Selection

Choosing M-class inserts with 3-D chip breakers or G-class inserts

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

- 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.

Features of *VP10MF* (G-class ground insert only)

Superior wear and plastic deformation resistance

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

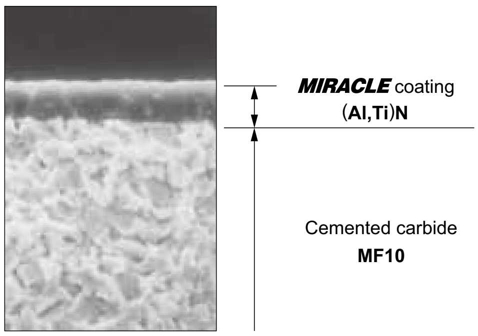
Features of *VP15TF*
(G-class ground insert , M-class inserts with 3-D chip breakers)

Wide versatility

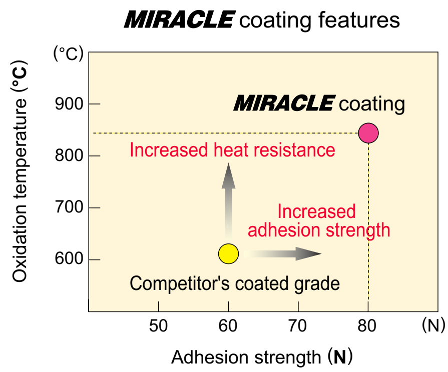
- High fracture resistance during low rigidity applications such as bar feed machining. Able to withstand harsh conditions for long periods where conventional inserts would be liable to breakage.
- Effective combination of high cost performance M-class inserts with 3-D chip breakers.

Features of *MIRACLE* coating

MIRACLE coating



Micro-Structure of
VP10MF

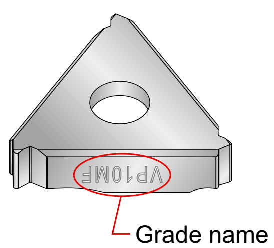
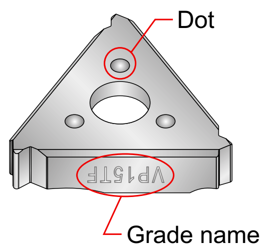


MIRACLE coating
VP10MF and ***VP15TF*** displays high welding resistance, making it suitable for cutting mild steels, carbon steels, alloy steels, stainless steels and cast iron.

Longer tool life achieved with a combination of a reliable coating and a carbide substrate best suited for threading.

Grade markings on G-class inserts

An identifying mark printed on the side of the insert

G-class grinding inserts		
Grade	***VP10MF***	***VP15TF***
Insert underside		

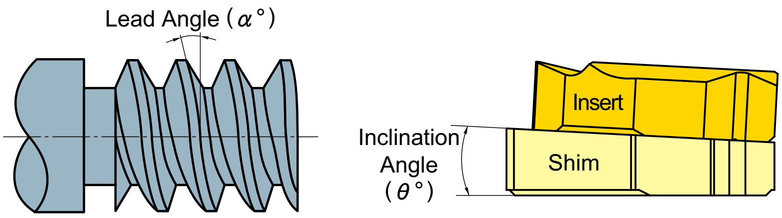
- ***VP15TF***, G-class inserts have three dots embossed on the underside. (On the side "***VP15TF***" is printed.)
- ***VP15TF***, G-class inserts have the grade name "***VP15TF***" printed on the side.

Note) M-class inserts with 3-D chip breakers have no dots, only the grade name marking.

Features of the new holders

Suitable for threading with a large lead angle.

- By changing only the shim, MMT holders can be used for turning of threads with various lead angles as well as the turning of left hand threads.
- Insert interference with the thread can be prevented to achieve a good surface finish.

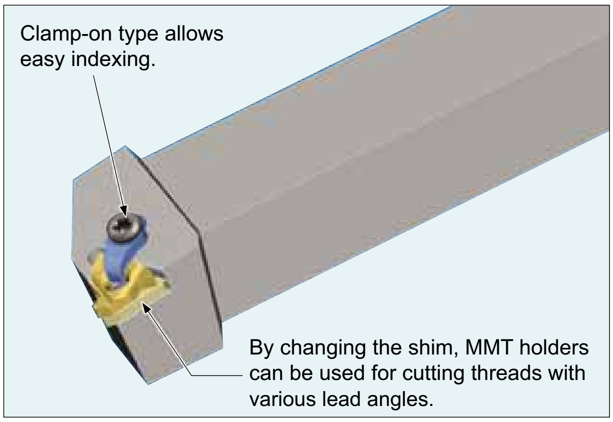


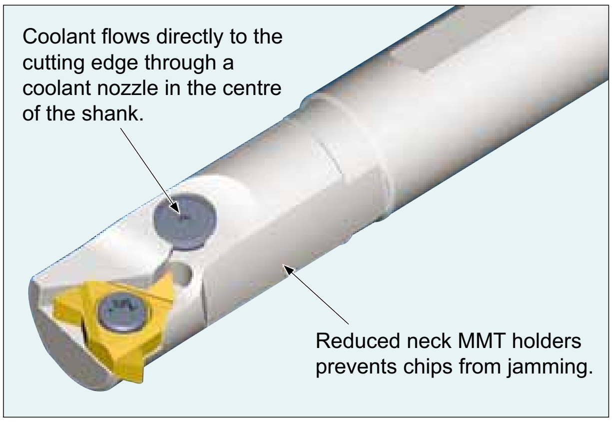
Lead Angle (α°)	Inclination Angle (θ°)
−1.5°	−3°
−0.5°	−2°
0.5°	−1°
1.5°	0°
2.5°	1°
3.5°	2°
4.5°	3°

Delivered with the holder.

Internal threading holder with through coolant

- Efficient coolant supply to the cutting point lengthens the life of an insert.
- Smooth chip discharge, the key to efficient internal threading can be achieved.



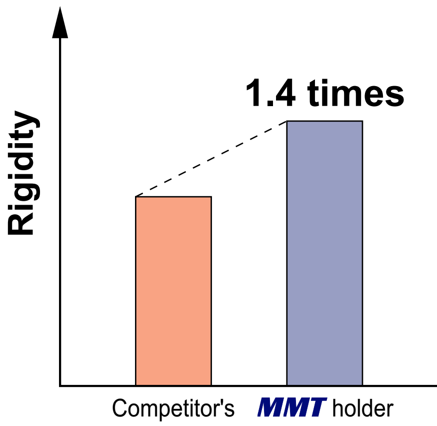


Use of special surface treatment

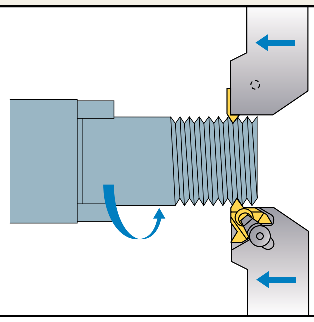
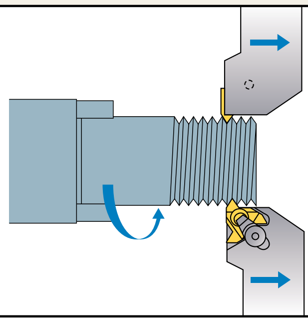
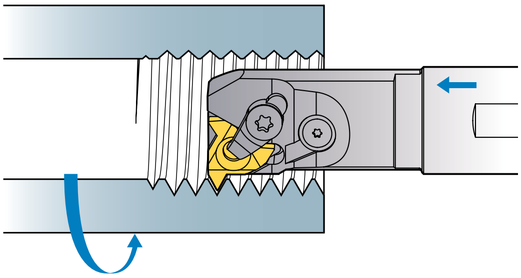
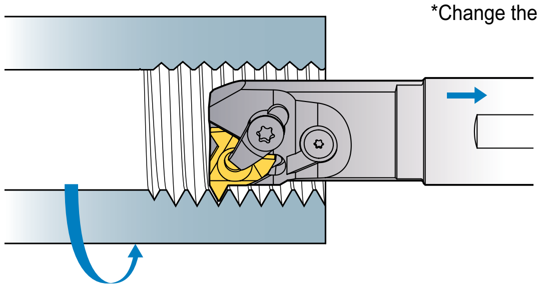
- Higher corrosion and friction resistance and longer tool life than conventional products.

Greatly increased rigidity

- Small diameter internal threading holder achieved approximately 1.4 times higher rigidity than a conventional product.

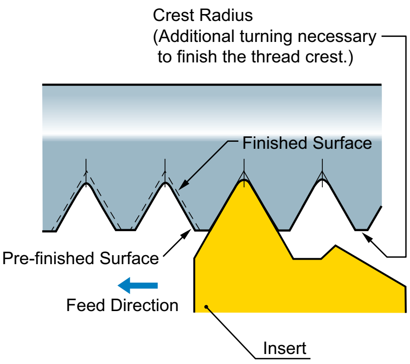
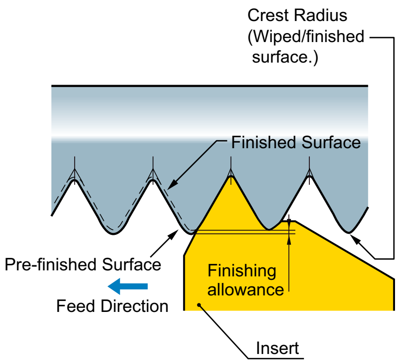
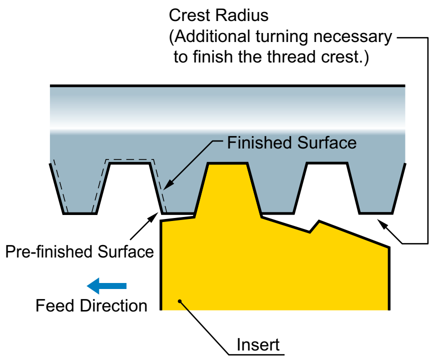


Threading Method

	Right Hand Thread	Left Hand Thread
External		*Change the shim 
Internal		*Change the shim 

· 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 Type

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 nose radius of the insert is smaller than that of the wiper insert. ● Finishing with another operation is necessary.	● No de-burring needed after threading. ● Requires different threading inserts.	● No de-burring needed after threading. ● Requires different threading inserts. ● Finishing with another operation is necessary.
		

Pipe threads and tool selection

Parallel Pipe Threads G (PF)

Thread Type	Number of threads	Standard internal diameter
G1/16	28	6.561
G1/8		8.556
G1/4	19	11.445
G3/8		14.950
G1/2	14	18.631
G5/8		20.587
G3/4		24.117
G7/8		27.877
G1	11	30.291
G1·1/8		34.939
G1·1/4		38.952

Note) Same as PF.

Taper Pipe Threads R, Rc (PT)

Thread Type	Number of threads	Standard internal diameter
R1/16	28	6.561
R1/8		8.556
R1/4	19	11.445
R3/8		14.950
R1/2	14	18.631
–	–	–
R3/4	14	24.117
–	–	–
R1	11	30.291
–	–	–
R1·1/4	11	38.952

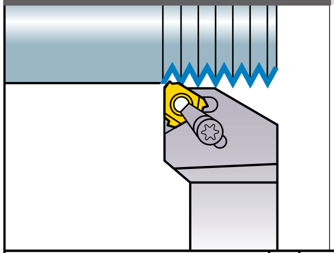
Note) Same as Rc and PT.

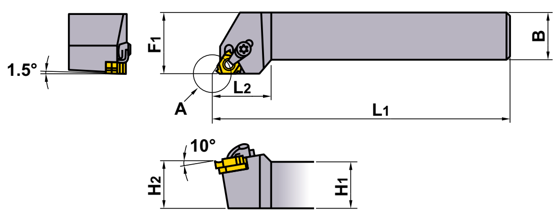
· The pitch is pre-determined for each nominal diameter. Note the minimum machining diameter especially when internal threading.

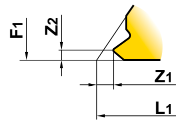
MMTE HOLDER

HOLDERS

MMTE (External threading)







Details of position A
(Refer to pages 11-18 for size Z1, Z2)

Right hand tool holder only.

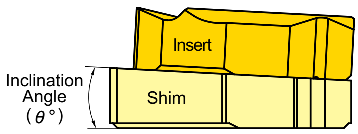
Order Number	Stock R	Insert Number	H1	B	L1	L2	H2	F1	Clamp Bridge	Clamp Screw	Stop Ring	Shim Screw	Shim *	Wrench
MMTER1212H16-C	●	MMT16ER○○○○○	12	12	100	25	12	16	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
1616H16-C	●		16	16	100	25	16	20	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
2020K16-C	●		20	20	125	26	20	25	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
2525M16-C	●		25	25	150	28	25	32	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
3232P16-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
3232P22-C	●		32	32	170	32	32	40	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R
4040R22-C	●		40	40	200	38	40	50	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R

* Select and use a shim as shown below (sold separately), dependant on the lead angle.

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	CTE32TN15	●	−3°	MMTER○○○○○16-C
−0.5°	N05	●	−2°	
0.5°	P05	●	−1°	
1.5°	P15	●	0°	
2.5°	P25	●	1°	
3.5°	P35	●	2°	
4.5°	P45	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	CTE43TN15	●	−3°	MMTER○○○○○22-C
−0.5°	N05	●	−2°	
0.5°	P05	●	−1°	
1.5°	P15	●	0°	
2.5°	P25	●	1°	
3.5°	P35	●	2°	
4.5°	P45	●	3°	



Standard shim delivered with the holder.

IDENTIFICATION

MMT E R 12 12 H 16 − C

Designation

Application	
E	External

Hand of Tool	
R	Right

Tool Size (mm) (Height and Width)	
12	12
16	16
20	20
25	25
32	32
40	40

Tool Length (mm)	
H	100
K	125
M	150
P	170
R	200

Insert Size (mm)	
16	9.525
22	12.7

Method of Holding	
C	Clamp-on

RECOMMENDED CUTTING CONDITIONS

	Workpiece	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	VP10MF	150 (70−230)
			VP15TF	100 (60−140)
	Carbon Steel / Alloy Steel	180−280HB	VP10MF	140 (80−200)
			VP15TF	100 (60−140)
M	Stainless Steel	≤200HB	VP10MF	130 (80−180)
			VP15TF	80 (40−120)
K	Cast Iron	Tensile Strength ≤350MPa	VP10MF	140 (80−200)
			VP15TF	90 (60−120)

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

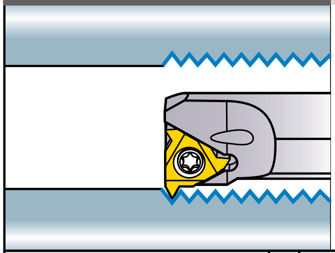
● : Inventory maintained.

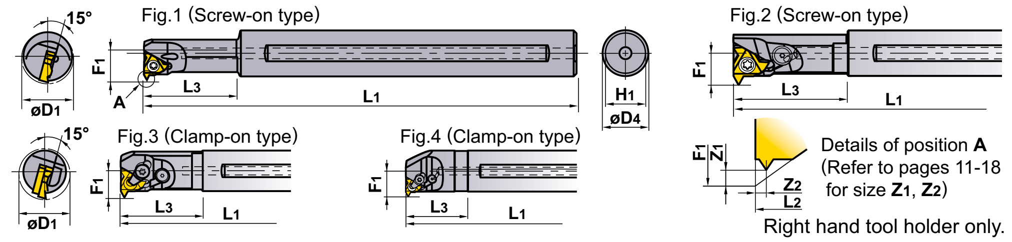
How to select a shim P22

MMTI TYPE BORING BARS

HOLDERS

MMTI (Internal threading)





Order Number	Stock R	Insert Number	Lead Angle	D4	L1	L3	F1	H1	Min. Cutting Diameter (mm) D1	Clamp Bridge	Clamp Screw	Stop Ring	Shim Screw	Shim *	Wrench	Fig.
MMTIR1316AK11-SP15	●	MMT11IR ○○○○○	1.5°	16	125	25	8.7	15	13	–	TS25	–	–	–	①TKY08F	1
1316AK11-SP25	●		2.5°	16	125	25	8.7	15	13	–	TS25	–	–	–	①TKY08F	1
1316AK11-SP35	●		3.5°	16	125	25	8.7	15	13	–	TS25	–	–	–	①TKY08F	1
1516AM11-SP15	●		1.5°	16	150	32	9.7	15	15	–	TS25	–	–	–	①TKY08F	1
1516AM11-SP25	●		2.5°	16	150	32	9.7	15	15	–	TS25	–	–	–	①TKY08F	1
1516AM11-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
1916AM16-SP25	●		2.5°	16	150	40	12.2	15	19	–	CS350860T	–	–	–	①TKY15F	2
1916AM16-SP35	●		3.5°	16	150	40	12.2	15	19	–	CS350860T	–	–	–	①TKY15F	2
2420AQ16-C	●		1.5°	20	180	40	14.2	19	24	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	3
2925AS16-C	●		1.5°	25	250	60	16.7	23.4	29	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	3
3732AS16-C	●		1.5°	32	250	48	20.5	30.4	37	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	4
MMTIR2420AQ22-SP15	●	MMT22IR ○○○○○	1.5°	20	180	50	15.5	19	24	–	TS43	–	–	–	①TKY15F	2
2420AQ22-SP25	●		2.5°	20	180	50	15.5	19	24	–	TS43	–	–	–	①TKY15F	2
2420AQ22-SP35	●		3.5°	20	180	50	15.5	19	24	–	TS43	–	–	–	①TKY15F	2
3025AR22-C	●		1.5°	25	200	38	17.8	23.4	30	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4
3832AS22-C	●		1.5°	32	250	48	21.8	30.4	38	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4
4640AT22-C	●		1.5°	40	300	60	26.2	38	46	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4

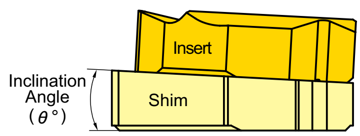
* Select and use a shim as shown below (sold separately), dependant on the lead angle.
* The screw-on type has no shim. The holder has an in-built lead angle. Please select a holder with the appropriate lead angle.
* The minimum cutting diameter indicates the prepared hole diameter, not the nominal thread diameter.

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	CTI32TN15	●	−3°	MMTIR ○○○○ ○○16-C
−0.5°	N05	●	−2°	
0.5°	P05	●	−1°	
1.5°	P15	●	0°	
2.5°	P25	●	1°	
3.5°	P35	●	2°	
4.5°	P45	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	CTI43TN15	●	−3°	MMTIR ○○○○ ○○22-C
−0.5°	N05	●	−2°	
0.5°	P05	●	−1°	
1.5°	P15	●	0°	
2.5°	P25	●	1°	
3.5°	P35	●	2°	
4.5°	P45	●	3°	

Standard shim delivered with the holder.



IDENTIFICATION

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°

RECOMMENDED CUTTING CONDITIONS

	Workpiece	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	VP10MF	150 (70−230)
			VP15TF	100 (60−140)
	Carbon Steel / Alloy Steel	180−280HB	VP10MF	140 (80−200)
			VP15TF	100 (60−140)
M	Stainless Steel	≤200HB	VP10MF	130 (80−180)
			VP15TF	80 (40−120)
K	Cast Iron	Tensile Strength ≤350MPa	VP10MF	140 (80−200)
			VP15TF	90 (60−120)

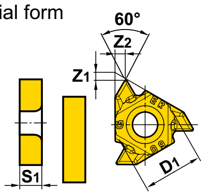
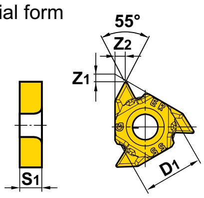
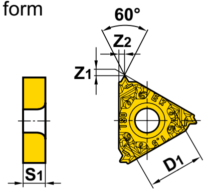
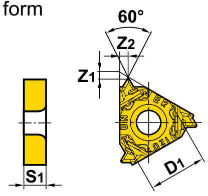
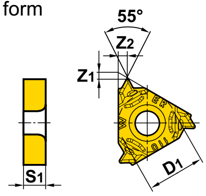
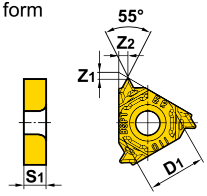
	Workpiece	Hardness	Grade	Cutting Speed (m/min)
S	Heat-Resistant Alloy	–	VP10MF	45 (15−70)
			VP15TF	30 (20−40)
	Titanium Alloy	–	VP10MF	60 (40−80)
			VP15TF	45 (25−65)
H	Heat-Treated Alloy	45−55HRC	VP10MF	50 (30−70)
			VP15TF	40 (20−60)

How to select a shim P22

MMT STANDARD FOR M-CLASS INSERTS WITH 3-D CHIP BREAKERS

NEW

EXTERNAL THREADING INSERTS

Type	Order Number	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) D1	S1	Z1	Z2	Total depth of cut (mm)	Geometry
Partial Profile 60°	MMT16ERA60-S	○	0.5−1.5	48−16	9.525	3.44	0.8	0.9	−	Partial form 
	16ERG60-S	○	1.75−3.0	14−8	9.525	3.44	1.2	1.7	−	
Partial Profile 55°	MMT16ERA55-S	○		48−16	9.525	3.44	0.8	0.9	−	Partial form 
	16ERG55-S	○		14−8	9.525	3.44	1.2	1.7	−	
ISO Metric	MMT16ER100ISO-S	●	1.0		9.525	3.44	0.7	0.7	0.61	Full form 
	16ER125ISO-S	●	1.25		9.525	3.44	0.8	0.9	0.77	
	16ER150ISO-S	●	1.5		9.525	3.44	0.8	1.0	0.92	
	16ER175ISO-S	●	1.75		9.525	3.44	0.9	1.2	1.07	
	16ER200ISO-S	●	2.0		9.525	3.44	1.0	1.3	1.23	
	16ER250ISO-S	●	2.5		9.525	3.44	1.1	1.5	1.53	
	16ER300ISO-S	●	3.0		9.525	3.44	1.2	1.6	1.84	
American UN	MMT16ER160UN-S	○		16	9.525	3.44	0.9	1.1	0.97	Full form 
	16ER140UN-S	○		14	9.525	3.44	1.0	1.2	1.11	
	16ER120UN-S	○		12	9.525	3.44	1.1	1.4	1.30	
Whitworth for BSW, BSP	MMT16ER190W-S	○		19	9.525	3.44	0.8	1.0	0.86	Full form 
	16ER140W-S	○		14	9.525	3.44	1.0	1.2	1.16	
	16ER110W-S	○		11	9.525	3.44	1.1	1.5	1.48	
BSPT	MMT16ER190BSPT-S	○		19	9.525	3.44	0.8	0.9	0.86	Full form 
	16ER140BSPT-S	○		14	9.525	3.44	1.0	1.2	1.16	
	16ER110BSPT-S	○		11	9.525	3.44	1.1	1.5	1.48	

IDENTIFICATION

MMT 16 E R 050 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

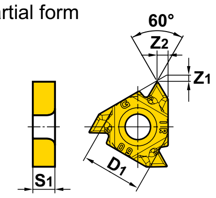
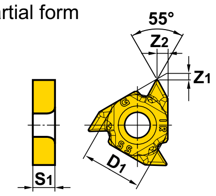
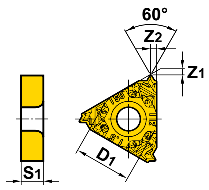
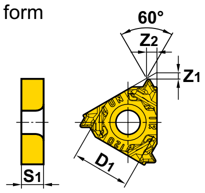
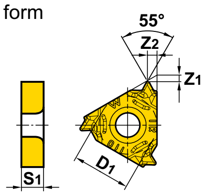
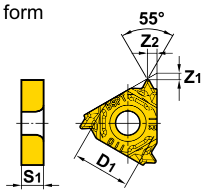
Pitch			
100	1.0mm	A	0.5−1.5mm or 48−16 thread/inch
125	1.25mm	A	
150	1.5mm	G	1.75−3.0mm or 14−8 thread/inch
175	1.75mm	G	
200	2.0mm		
250	2.5mm		
300	3.0mm		

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

● : Inventory maintained. (5 inserts in a case) ○ : 2005.09 Sale on

Cutting depth guide P23, P24

INTERNAL THREADING INSERTS

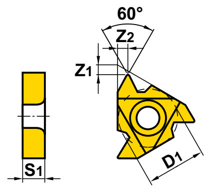
Type	Order Number	Coated	Pitch		Dimensions (mm)				Total depth of cut (mm)	Geometry
		VP15TF	mm	thread/inch	D_1	S_1	Z_1	Z_2		
Partial Profile 60°	MMT11IRA60-S	○	0.5−1.5	48−16	6.35	3.04	0.8	0.9	−	Partial form 
	16IRA60-S	○	0.5−1.5	48−16	9.525	3.44	0.8	0.9	−	
	16IRG60-S	○	1.75−3.0	14−8	9.525	3.44	1.2	1.7	−	
Partial Profile 55°	MMT11IRA55-S	○		48−16	6.35	3.04	0.8	0.9	−	Partial form 
	16IRA55-S	○		48−16	9.525	3.44	0.8	0.9	−	
	16IRG55-S	○		14−8	9.525	3.44	1.2	1.7	−	
ISO Metric	MMT11IR100ISO-S	○	1.0		6.35	3.04	0.6	0.7	0.58	Full form 
	11IR125ISO-S	○	1.25		6.35	3.04	0.8	0.9	0.72	
	11IR150ISO-S	○	1.5		6.35	3.04	0.8	1.0	0.87	
	16IR100ISO-S	●	1.0		9.525	3.44	0.6	0.7	0.58	
	16IR125ISO-S	●	1.25		9.525	3.44	0.8	0.9	0.72	
	16IR150ISO-S	●	1.5		9.525	3.44	0.8	1.0	0.87	
	16IR175ISO-S	●	1.75		9.525	3.44	0.9	1.2	1.01	
	16IR200ISO-S	●	2.0		9.525	3.44	1.0	1.3	1.15	
	16IR250ISO-S	●	2.5		9.525	3.44	1.1	1.5	1.44	
	16IR300ISO-S	●	3.0		9.525	3.44	1.1	1.5	1.73	
American UN	MMT16IR160UN-S	○		16	9.525	3.44	0.9	1.1	0.92	Full form 
	16IR140UN-S	○		14	9.525	3.44	0.9	1.2	1.05	
	16IR120UN-S	○		12	9.525	3.44	1.1	1.4	1.22	
Whitworth for BSW, BSP	MMT16IR190W-S	○		19	9.525	3.44	0.8	1.0	0.86	Full form 
	16IR140W-S	○		14	9.525	3.44	1.0	1.2	1.16	
	16IR110W-S	○		11	9.525	3.44	1.1	1.5	1.48	
BSPT	MMT16IR190BSPT-S	○		19	9.525	3.44	0.8	0.9	0.86	Full form 
	16IR140BSPT-S	○		14	9.525	3.44	1.0	1.2	1.16	
	16IR110BSPT-S	○		11	9.525	3.44	1.1	1.5	1.48	

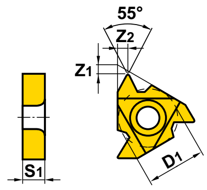
Cutting depth guide P23, P24

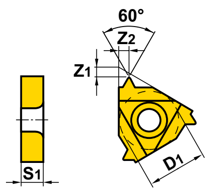
MMT STANDARDS FOR G-CLASS GROUND INSERTS

EXTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF (NEW)	Pitch mm	Pitch thread/inch	Dimensions (mm) D1	S1	Z1	Z2	Total depth of cut (mm)	Geometry
Partial Profile 60°	–	MMT16ERA60	●	●	0.5–1.5	48–16	9.525	3.44	0.8	0.9	–	Partial form
		16ERG60	●	●	1.75–3.0	14–8	9.525	3.44	1.2	1.7	–	
		16ERAG60	●		0.5–3.0	48–8	9.525	3.44	1.2	1.7	–	
		22ERN60	●		3.5–5.0	7–5	12.7	4.64	1.7	2.5	–	
Partial Profile 55°	–	MMT16ERA55	●	●		48–16	9.525	3.44	0.8	0.9	–	Partial form
		16ERG55	●	●		14–8	9.525	3.44	1.2	1.7	–	
		16ERAG55	●			48–8	9.525	3.44	1.2	1.7	–	
		22ERN55	●			7–5	12.7	4.64	1.7	2.5	–	
ISO Metric	6g	MMT16ER050ISO	●		0.5		9.525	3.44	0.6	0.4	0.31	Full form
		16ER075ISO	●		0.75		9.525	3.44	0.6	0.6	0.46	
		16ER100ISO	●	●	1.0		9.525	3.44	0.7	0.7	0.61	
		16ER125ISO	●	●	1.25		9.525	3.44	0.8	0.9	0.77	
		16ER150ISO	●	●	1.5		9.525	3.44	0.8	1.0	0.92	
		16ER175ISO	●	●	1.75		9.525	3.44	0.9	1.2	1.07	
		16ER200ISO	●	●	2.0		9.525	3.44	1.0	1.3	1.23	
		16ER250ISO	●	●	2.5		9.525	3.44	1.1	1.5	1.53	
		16ER300ISO	●	●	3.0		9.525	3.44	1.2	1.6	1.84	
		22ER350ISO	●		3.5		12.7	4.64	1.6	2.3	2.15	
		22ER400ISO	●		4.0		12.7	4.64	1.6	2.3	2.45	
		22ER450ISO	●		4.5		12.7	4.64	1.7	2.4	2.76	
		22ER500ISO	●		5.0		12.7	4.64	1.7	2.5	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		

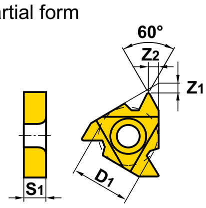
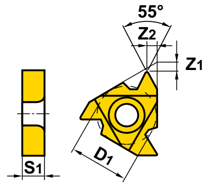
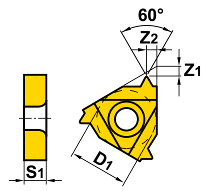
Threading Type

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. (5 inserts in a case)

Cutting depth guide P23

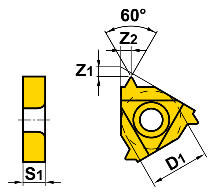
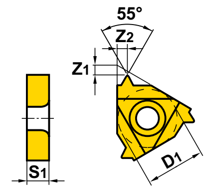
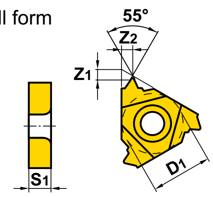
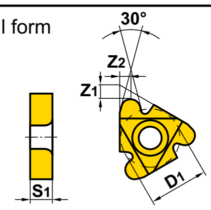
INTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF (NEW)	Pitch mm	Pitch thread/inch	Dimensions (mm) D1	S1	Z1	Z2	Total depth of cut (mm)	Geometry
Partial Profile 60°	–	MMT11IRA60	●	●	0.5–1.5	48–16	6.35	3.04	0.8	0.9	–	Partial form 
		16IRA60	●	●	0.5–1.5	48–16	9.525	3.44	0.8	0.9	–	
		16IRG60	●	●	1.75–3.0	14–8	9.525	3.44	1.2	1.7	–	
		16IRAG60	●		0.5–3.0	48–8	9.525	3.44	1.2	1.7	–	
		22IRN60	●		3.5–5.0	7–5	12.7	4.64	1.7	2.5	–	
Partial Profile 55°	–	MMT11IRA55	●	●		48–16	6.35	3.04	0.8	0.9	–	Partial form 
		16IRA55	●	●		48–16	9.525	3.44	0.8	0.9	–	
		16IRG55	●	●		14–8	9.525	3.44	1.2	1.7	–	
		16IRAG55	●			48–8	9.525	3.44	1.2	1.7	–	
		22IRN55	●			7–5	12.7	4.64	1.7	2.5	–	
ISO Metric	6H	MMT11IR050ISO	●		0.5		6.35	3.04	0.6	0.4	0.29	Full form 
		11IR075ISO	●		0.75		6.35	3.04	0.6	0.6	0.43	
		11IR100ISO	●	●	1.0		6.35	3.04	0.6	0.7	0.58	
		11IR125ISO	●	●	1.25		6.35	3.04	0.8	0.9	0.72	
		11IR150ISO	●	●	1.5		6.35	3.04	0.8	1.0	0.87	
		11IR175ISO	●		1.75		6.35	3.04	0.9	1.1	1.01	
		11IR200ISO	●		2.0		6.35	3.04	0.9	1.1	1.15	
		16IR050ISO	●		0.5		9.525	3.44	0.6	0.4	0.29	
		16IR075ISO	●		0.75		9.525	3.44	0.6	0.6	0.43	
		16IR100ISO	●	●	1.0		9.525	3.44	0.6	0.7	0.58	
		16IR125ISO	●	●	1.25		9.525	3.44	0.8	0.9	0.72	
		16IR150ISO	●	●	1.5		9.525	3.44	0.8	1.0	0.87	
		16IR175ISO	●	●	1.75		9.525	3.44	0.9	1.2	1.01	
		16IR200ISO	●	●	2.0		9.525	3.44	1.0	1.3	1.15	
		16IR250ISO	●	●	2.5		9.525	3.44	1.1	1.5	1.44	
		16IR300ISO	●	●	3.0		9.525	3.44	1.1	1.5	1.73	
		22IR350ISO	●		3.5		12.7	4.64	1.6	2.3	2.02	
		22IR400ISO	●		4.0		12.7	4.64	1.6	2.3	2.31	
		22IR450ISO	●		4.5		12.7	4.64	1.6	2.4	2.60	
		22IR500ISO	●		5.0		12.7	4.64	1.6	2.3	2.89	

Cutting depth guide P26

MMT STANDARDS FOR G-CLASS GROUND INSERTS

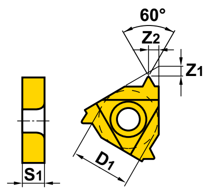
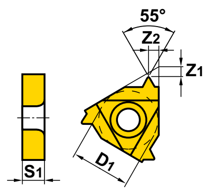
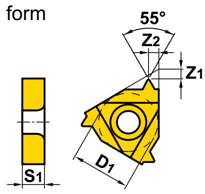
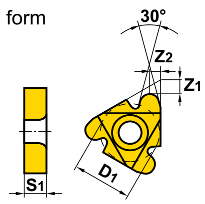
EXTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF (NEW)	Pitch mm	Pitch thread/inch	Dimensions (mm) D1	Dimensions (mm) S1	Dimensions (mm) Z1	Dimensions (mm) Z2	Total depth of cut (mm)	Geometry
American UN	2A	MMT16ER320UN	●			32	9.525	3.44	0.6	0.6	0.49	Full form 
		16ER280UN	●			28	9.525	3.44	0.6	0.7	0.56	
		16ER240UN	●			24	9.525	3.44	0.7	0.8	0.65	
		16ER200UN	●			20	9.525	3.44	0.8	0.9	0.78	
		16ER180UN	●			18	9.525	3.44	0.8	1.0	0.87	
		16ER160UN	●	●		16	9.525	3.44	0.9	1.1	0.97	
		16ER140UN	●	●		14	9.525	3.44	1.0	1.2	1.11	
		16ER130UN	●			13	9.525	3.44	1.0	1.3	1.20	
		16ER120UN	●	●		12	9.525	3.44	1.1	1.4	1.30	
		16ER110UN	●			11	9.525	3.44	1.1	1.5	1.42	
		16ER100UN	●			10	9.525	3.44	1.1	1.5	1.56	
		16ER090UN	●			9	9.525	3.44	1.2	1.7	1.73	
		16ER080UN	●			8	9.525	3.44	1.2	1.6	1.95	
		22ER070UN	●			7	12.7	4.64	1.6	2.3	2.22	
		22ER060UN	●			6	12.7	4.64	1.6	2.3	2.60	
		22ER050UN	●			5	12.7	4.64	1.7	2.5	3.12	
Whitworth for BSW, BSP	Medium Class A	MMT16ER280W	●			28	9.525	3.44	0.6	0.7	0.58	Full form 
		16ER260W	●			26	9.525	3.44	0.7	0.8	0.63	
		16ER200W	●			20	9.525	3.44	0.8	0.9	0.81	
		16ER190W	●	●		19	9.525	3.44	0.8	1.0	0.86	
		16ER180W	●			18	9.525	3.44	0.8	1.0	0.90	
		16ER160W	●			16	9.525	3.44	0.9	1.1	1.02	
		16ER140W	●	●		14	9.525	3.44	1.0	1.2	1.16	
		16ER120W	●			12	9.525	3.44	1.1	1.4	1.36	
		16ER110W	●	●		11	9.525	3.44	1.1	1.5	1.48	
		16ER100W	●			10	9.525	3.44	1.1	1.5	1.63	
		16ER090W	●			9	9.525	3.44	1.2	1.7	1.81	
		16ER080W	●			8	9.525	3.44	1.2	1.5	2.03	
		22ER070W	●			7	12.7	4.64	1.6	2.3	2.32	
		22ER060W	●			6	12.7	4.64	1.6	2.3	2.71	
		22ER050W	●			5	12.7	4.64	1.7	2.4	3.25	
BSPT	Standard BSPT	MMT16ER280BSPT	●			28	9.525	3.44	0.6	0.6	0.58	Full form 
		16ER190BSPT	●	●		19	9.525	3.44	0.8	0.9	0.86	
		16ER140BSPT	●	●		14	9.525	3.44	1.0	1.2	1.16	
		16ER110BSPT	●	●		11	9.525	3.44	1.1	1.5	1.48	
Round DIN405	7h	MMT16ER100RD	●			10	9.525	3.44	1.1	1.2	1.27	Full form 
		16ER080RD	●			8	9.525	3.44	1.4	1.3	1.59	
		16ER060RD	●			6	9.525	3.44	1.5	1.7	2.12	
		22ER040RD	●			4	9.525	3.44	2.2	2.3	3.18	

● : Inventory maintained. (5 inserts in a case)

Cutting depth guide P23, P24

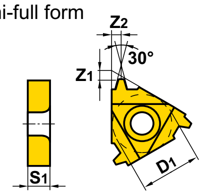
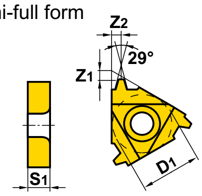
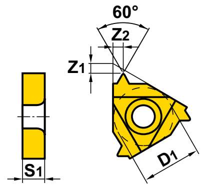
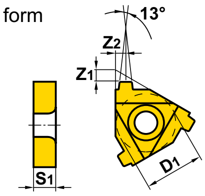
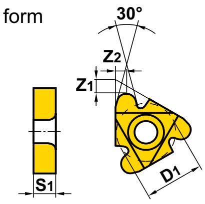
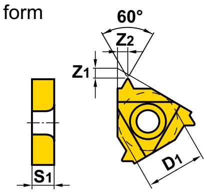
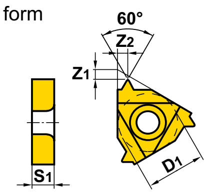
INTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF (NEW)	Pitch mm	Pitch thread/inch	Dimensions (mm) D1	S1	Z1	Z2	Total depth of cut (mm)	Geometry
American UN	2B	MMT11IR320UN	●			32	6.35	3.04	0.6	0.6	0.46	Full form 
		11IR280UN	●			28	6.35	3.04	0.6	0.7	0.52	
		11IR240UN	●			24	6.35	3.04	0.7	0.8	0.61	
		11IR200UN	●			20	6.35	3.04	0.8	0.9	0.73	
		11IR180UN	●			18	6.35	3.04	0.8	1.0	0.81	
		11IR160UN	●			16	6.35	3.04	0.9	1.1	0.92	
		11IR140UN	●			14	6.35	3.04	0.9	1.1	1.05	
		16IR320UN	●			32	9.525	3.44	0.6	0.6	0.46	
		16IR280UN	●			28	9.525	3.44	0.6	0.7	0.52	
		16IR240UN	●			24	9.525	3.44	0.7	0.8	0.61	
		16IR200UN	●			20	9.525	3.44	0.8	0.9	0.73	
		16IR180UN	●			18	9.525	3.44	0.8	1.0	0.81	
		16IR160UN	●	●		16	9.525	3.44	0.9	1.1	0.92	
		16IR140UN	●	●		14	9.525	3.44	0.9	1.2	1.05	
		16IR130UN	●			13	9.525	3.44	1.0	1.3	1.13	
		16IR120UN	●	●		12	9.525	3.44	1.1	1.4	1.22	
		16IR110UN	●			11	9.525	3.44	1.1	1.5	1.33	
		16IR100UN	●			10	9.525	3.44	1.1	1.5	1.47	
		16IR090UN	●			9	9.525	3.44	1.2	1.7	1.63	
		16IR080UN	●			8	9.525	3.44	1.1	1.5	1.83	
		22IR070UN	●			7	12.7	4.64	1.6	2.3	2.09	
		22IR060UN	●			6	12.7	4.64	1.6	2.3	2.44	
		22IR050UN	●			5	12.7	4.64	1.6	2.3	2.93	
Whitworth for BSW, BSP	Medium Class A	MMT11IR190W	●			19	6.35	3.04	0.8	1.0	0.86	Full form 
		11IR140W	●			14	6.35	3.04	0.9	1.1	1.16	
		16IR280W	●			28	9.525	3.44	0.6	0.7	0.58	
		16IR260W	●			26	9.525	3.44	0.7	0.8	0.63	
		16IR200W	●			20	9.525	3.44	0.8	0.9	0.81	
		16IR190W	●	●		19	9.525	3.44	0.8	1.0	0.86	
		16IR180W	●			18	9.525	3.44	0.8	1.0	0.90	
		16IR160W	●			16	9.525	3.44	0.9	1.1	1.02	
		16IR140W	●	●		14	9.525	3.44	1.0	1.2	1.16	
		16IR120W	●			12	9.525	3.44	1.1	1.4	1.36	
		16IR110W	●	●		11	9.525	3.44	1.1	1.5	1.48	
		16IR100W	●			10	9.525	3.44	1.1	1.5	1.63	
		16IR090W	●			9	9.525	3.44	1.2	1.7	1.81	
		16IR080W	●			8	9.525	3.44	1.2	1.5	2.03	
		22IR070W	●			7	12.7	4.64	1.6	2.3	2.32	
		22IR060W	●			6	12.7	4.64	1.6	2.3	2.71	
		22IR050W	●			5	12.7	4.64	1.7	2.4	3.25	
BSPT	Standard BSPT	MMT11IR190BSPT	●			19	6.35	3.04	0.8	0.9	0.86	Full form 
		11IR140BSPT	●			14	6.35	3.04	0.9	1.0	1.16	
		16IR190BSPT	●	●		19	9.525	3.44	0.8	0.9	0.86	
		16IR140BSPT	●	●		14	9.525	3.44	1.0	1.2	1.16	
		16IR110BSPT	●	●		11	9.525	3.44	1.1	1.5	1.48	
Round DIN405	7H	MMT16IR100RD	●			10	9.525	3.44	1.1	1.2	1.27	Full form 
		16IR080RD	●			8	9.525	3.44	1.4	1.4	1.59	
		16IR060RD	●			6	9.525	3.44	1.4	1.5	2.12	
		22IR040RD	●			4	12.7	4.64	2.2	2.3	3.18	

Cutting depth guide P26, P27

MMT STANDARDS FOR G-CLASS GROUND INSERTS

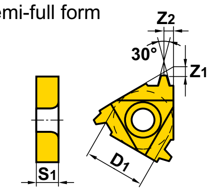
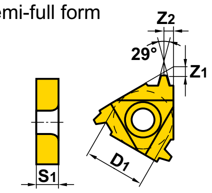
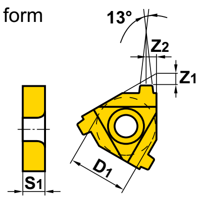
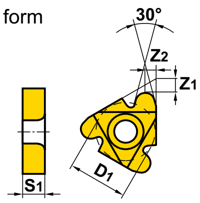
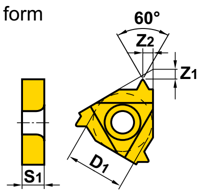
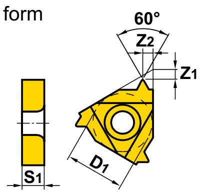
XTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF		Pitch mm	Pitch thread/inch	Dimensions (mm) D1	S1	Z1	Z2	Total depth of cut (mm)	Geometry
ISO Trapezoidal 30°	7e	MMT16ER150TR	●		1.5		9.525	3.44	1.0	1.1	0.90	Semi-full form 
		16ER200TR	●		2.0		9.525	3.44	1.1	1.3	1.25	
		16ER300TR	●		3.0		9.525	3.44	1.3	1.5	1.75	
		22ER400TR	●		4.0		12.7	4.64	1.7	1.9	2.25	
		22ER500TR	●		5.0		12.7	4.64	2.1	2.5	2.75	
American ACME	3G	MMT16ER120ACME	●			12	9.525	3.44	1.1	1.2	1.19	Semi-full form 
		16ER100ACME	●			10	9.525	3.44	1.3	1.4	1.52	
		16ER080ACME	●			8	9.525	3.44	1.4	1.5	1.84	
		22ER060ACME	●			6	12.7	4.64	1.8	2.1	2.37	
		22ER050ACME	●			5	12.7	4.64	2.0	2.3	2.79	
UNJ	3A	MMT16ER320UNJ	●			32	9.525	3.44	0.6	0.7	0.46	Full form 
		16ER280UNJ	●			28	9.525	3.44	0.7	0.7	0.52	
		16ER240UNJ	●			24	9.525	3.44	0.7	0.8	0.61	
		16ER200UNJ	●			20	9.525	3.44	0.8	0.9	0.73	
		16ER180UNJ	●			18	9.525	3.44	0.8	1.0	0.81	
		16ER160UNJ	●			16	9.525	3.44	0.9	1.1	0.92	
		16ER140UNJ	●			14	9.525	3.44	1.0	1.2	1.05	
		16ER120UNJ	●			12	9.525	3.44	1.1	1.3	1.22	
		16ER100UNJ	●			10	9.525	3.44	1.2	1.5	1.47	
		16ER080UNJ	●			8	9.525	3.44	1.2	1.6	1.83	
API Buttress Casing	Standard API	MMT22ER050APBU	●			5	12.7	4.64	3.1	1.9	1.55	Full form 
API Round Casing & Tubing	Standard API RD	MMT16ER100APRD	●			10	9.525	3.44	1.2	1.4	1.41	Full form 
		16ER080APRD	●			8	9.525	3.44	1.3	1.5	1.81	
American NPT	Standard NPT	MMT16ER270NPT	●			27	9.525	3.44	0.7	0.8	0.66	Full form 
		16ER180NPT	●			18	9.525	3.44	0.8	1.0	1.01	
		16ER140NPT	●			14	9.525	3.44	0.9	1.2	1.33	
		16ER115NPT	●			11.5	9.525	3.44	1.1	1.5	1.64	
		16ER080NPT	●			8	9.525	3.44	1.3	1.8	2.42	
American NPTF	Class 2	MMT16ER270NPTF	●			27	9.525	3.44	0.7	0.8	0.64	Full form 
		16ER180NPTF	●			18	9.525	3.44	0.8	1.0	1.00	
		16ER140NPTF	●			14	9.525	3.44	0.9	1.2	1.35	
		16ER115NPTF	●			11.5	9.525	3.44	1.1	1.5	1.63	
		16ER080NPTF	●			8	9.525	3.44	1.3	1.8	2.38	

● : Inventory maintained. (5 inserts in a case)

Cutting depth guide P24, P25

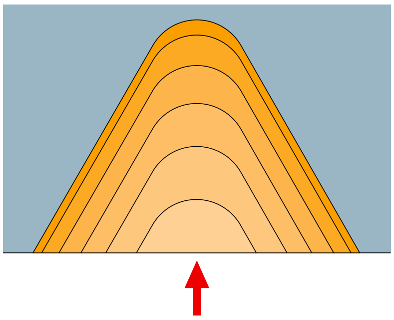
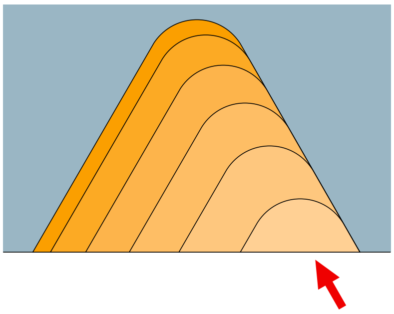
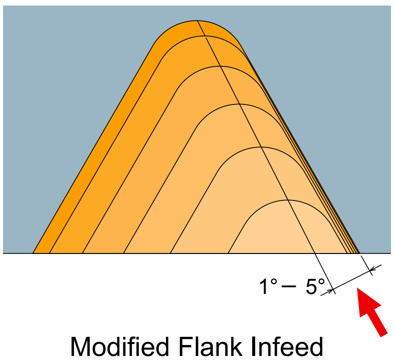
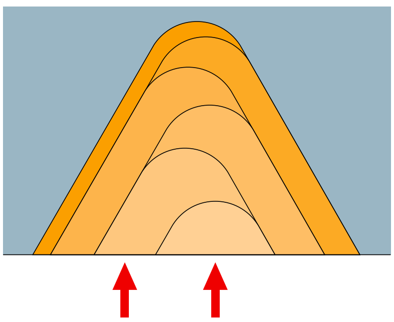
INTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF		Pitch mm	Pitch thread/inch	Dimensions (mm) D1	S1	Z1	Z2	Total depth of cut (mm)	Geometry
ISO Trapezoidal 30°	7H	**MMT16IR150TR**	●		1.5		9.525	3.44	1.0	1.1	0.90	Semi-full form 
		16IR200TR	●		2.0		9.525	3.44	1.1	1.3	1.25	
		16IR300TR	●		3.0		9.525	3.44	1.3	1.5	1.75	
		22IR400TR	●		4.0		12.7	4.64	1.7	1.9	2.25	
		22IR500TR	●		5.0		12.7	4.64	2.1	2.5	2.75	
American ACME	3G	**MMT16IR120ACME**	●			12	9.525	3.44	1.2	1.3	1.19	Semi-full form 
		16IR100ACME	●			10	9.525	3.44	1.2	1.3	1.52	
		16IR080ACME	●			8	9.525	3.44	1.4	1.5	1.84	
		22IR060ACME	●			6	12.7	4.64	1.8	2.1	2.37	
		22IR050ACME	●			5	12.7	4.64	2.0	2.3	2.79	
UNJ		When machining an internal UNJ thread, cut an internal hole with appropriate diameter. And then machine with 60° American UN. In this case, an full form type insert cannot be used.										
API Buttress Casing	Standard API	**MMT22IR050APBU**	●			5	12.7	4.64	2.8	1.9	1.55	Full form 
API Round Casing & Tubing	Standard API RD	**MMT16IR100APRD**	●			20	9.525	3.44	1.2	1.4	1.41	Full form 
		16IR080APRD	●			8	9.525	3.44	1.3	1.5	1.81	
American NPT	Standard NPT	**MMT16IR270NPT**	●			27	9.525	3.44	0.7	0.8	0.66	Full form 
		16IR180NPT	●			18	9.525	3.44	0.8	1.0	1.01	
		16IR140NPT	●			14	9.525	3.44	0.9	1.2	1.33	
		16IR115NPT	●			11.5	9.525	3.44	1.1	1.5	1.64	
		16IR080NPT	●			8	9.525	3.44	1.3	1.8	2.42	
American NPTF	Class 2	**MMT16IR140NPTF**	●			14	9.525	3.44	0.9	1.2	1.35	Full form 
		16IR115NPTF	●			11.5	9.525	3.44	1.1	1.5	1.63	
		16IR080NPTF	●			8	9.525	3.44	1.3	1.8	2.38	

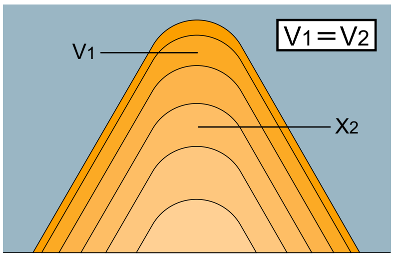
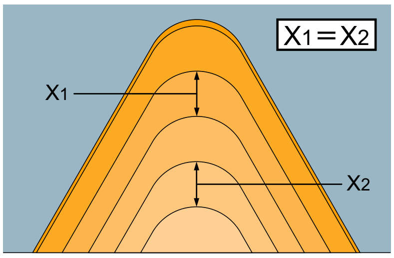
Cutting depth guide P27, P28

Recommended Cutting Methods and Conditions

Threading Methods

	Features	
	Advantages	Disadvantages
 Radial Infeed	· 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.	· Difficult chip control. · Subject to vibration in the later passes due to long cutting edge in contact with workpiece. · Ineffective for large pitch threading. · Heavy load on the nose radius.
 Flank Infeed	· Relatively easy to use. (Semi-standard program for threading.) · Reduced cutting force. · Suitable for large pitch threads or materials that peel easily. · Good chip discharge.	· Large flank wear of the right side of a cutting edge. · Relatively difficult to change cutting depth. (Re-programming necessary)
 Modified Flank Infeed	· Preventing flank wear on the right side of the cutting edge. · Reduced cutting force. · Good for large pitch or materials that peel easily. · Good chip discharge.	· Complex machining programming. · Difficult to change cutting depth. (NC programming necessary)
 Incremental Infeed	· Uniform wear of the right and left sides of the cutting edge. · Reduced cutting force. · Good for large pitch or materials that peel easily.	· Complex machining programming. · Difficult to change cutting depth. (Re-programming necessary) · Chips control is difficult.

Threading Depth

	Features	
	Advantages	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 nose 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.

* 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

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

2nd pass $\triangle ap_2 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{2-1} = 0.3 \rightarrow \mathbf{0.14}\ (\triangle ap_2 - \triangle ap_1)$

3rd pass $\triangle ap_3 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{3-1} = 0.42 \rightarrow \mathbf{0.12}\ (\triangle ap_3 - \triangle ap_2)$

4th pass $\triangle ap_4 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{4-1} = 0.52 \rightarrow \mathbf{0.1}\ (\triangle ap_4 - \triangle ap_3)$

5th pass $\triangle ap_5 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{5-1} = 0.6 \rightarrow \mathbf{0.08}\ (\triangle ap_5 - \triangle ap_4)$

NC Programme for Modified Flank Infeed

Example:- M12×1.0 5 passes modified 1°-3°

External Threading	Internal Treading
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

Recommended Cutting Methods and Conditions

Selecting Cutting Conditions

		Priority					
		Tool life	Cutting force	Surface finish	Precision of thread	Chips discharge	Efficiency (Reduced passes)
Threading methods	Radial	○		○	○		○
	Flank	(△ : Modified)	○	(△ : Modified)		○	
Cutting depth	Fixed cutting depth					○	
	Fixed cut area	○	○	○	○		○

* 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 program," 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.

Feature and benefits of Mitsubishi products

- Insert grades, 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 nose 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.
- Tangled chips during internal threading can damage the insert. In these cases, pause slightly away from the start point and clear the chips with coolant before every pass.
- Change to M-class inserts with a 3-D chip breaker.

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.

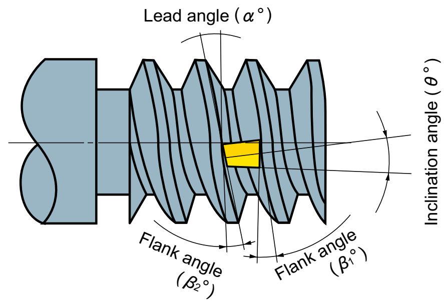
Increased surface finish accuracy

- 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.

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.



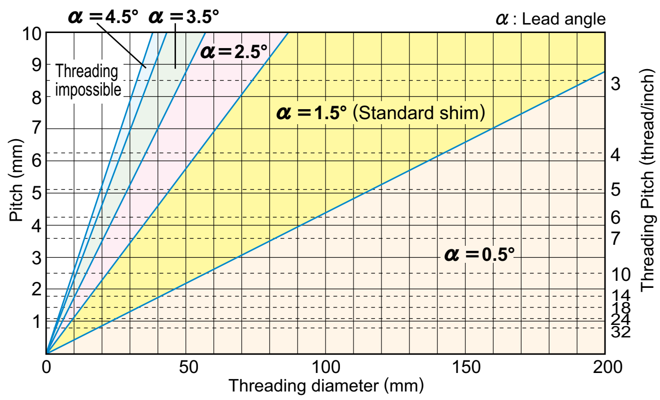
Shim reference table (Threading diameter)

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	≤ϕ1.9	ϕ1.9 − ϕ2.2	ϕ2.2 − ϕ2.8	ϕ2.8 − ϕ4.3	ϕ4.3 − ϕ11.4	≥ϕ11.4	≤ϕ4.3	ϕ4.3 − ϕ11.4	≥ϕ11.4
0.75	≤ϕ2.9	ϕ2.9 − ϕ3.2	ϕ3.2 − ϕ4.3	ϕ4.3 − ϕ6.5	ϕ6.5 − ϕ17.1	≥ϕ17.1	≤ϕ6.5	ϕ6.5 − ϕ17.1	≥ϕ17.1
1	≤ϕ3.8	ϕ3.8 − ϕ4.3	ϕ4.3 − ϕ5.7	ϕ5.7 − ϕ8.7	ϕ8.7 − ϕ22.8	≥ϕ22.8	≤ϕ8.7	ϕ8.7 − ϕ22.8	≥ϕ22.8
1.25	≤ϕ4.8	ϕ4.8 − ϕ5.4	ϕ5.4 − ϕ7.1	ϕ7.1 − ϕ10.9	ϕ10.9 − ϕ28.5	≥ϕ28.5	≤ϕ10.9	ϕ10.9 − ϕ28.5	≥ϕ28.5
1.5	≤ϕ5.7	ϕ5.7 − ϕ6.5	ϕ6.5 − ϕ8.5	ϕ8.5 − ϕ13.0	ϕ13.0 − ϕ34.2	≥ϕ34.2	≤ϕ13.0	ϕ13.0 − ϕ34.2	≥ϕ34.2
1.75	≤ϕ6.7	ϕ6.7 − ϕ7.6	ϕ7.6 − ϕ9.9	ϕ9.9 − ϕ15.2	ϕ15.2 − ϕ39.9	≥ϕ39.9	≤ϕ15.2	ϕ15.2 − ϕ39.9	≥ϕ39.9
2	≤ϕ7.6	ϕ7.6 − ϕ8.6	ϕ8.6 − ϕ11.4	ϕ11.4 − ϕ17.4	ϕ17.4 − ϕ45.6	≥ϕ45.6	≤ϕ17.4	ϕ17.4 − ϕ45.6	≥ϕ45.6
2.5	≤ϕ9.5	ϕ9.5 − ϕ10.8	ϕ10.8 − ϕ14.2	ϕ14.2 − ϕ21.7	ϕ21.7 − ϕ57.0	≥ϕ57.0	≤ϕ21.7	ϕ21.7 − ϕ57.0	≥ϕ57.0
3	≤ϕ11.4	ϕ11.4 − ϕ13.0	ϕ13.0 − ϕ17.0	ϕ17.0 − ϕ26.0	ϕ26.0 − ϕ68.4	≥ϕ68.4	≤ϕ26.0	ϕ26.0 − ϕ68.4	≥ϕ68.4
3.5	≤ϕ13.3	ϕ13.3 − ϕ15.1	ϕ15.1 − ϕ19.9	ϕ19.9 − ϕ30.4	ϕ30.4 − ϕ79.8	≥ϕ79.8	≤ϕ30.4	ϕ30.4 − ϕ79.8	≥ϕ79.8
4	≤ϕ15.2	ϕ15.2 − ϕ17.3	ϕ17.3 − ϕ22.7	ϕ22.7 − ϕ34.7	ϕ34.7 − ϕ91.2	≥ϕ91.2	≤ϕ34.7	ϕ34.7 − ϕ91.2	≥ϕ91.2
4.5	≤ϕ17.1	ϕ17.1 − ϕ19.4	ϕ19.4 − ϕ25.6	ϕ25.6 − ϕ39.1	ϕ39.1 − ϕ102.6	≥ϕ102.6	≤ϕ39.1	ϕ39.1 − ϕ102.6	≥ϕ102.6
5	≤ϕ19.0	ϕ19.0 − ϕ21.6	ϕ21.6 − ϕ28.4	ϕ28.4 − ϕ43.4	ϕ43.4 − ϕ114.0	≥ϕ114.0	≤ϕ43.4	ϕ43.4 − ϕ114.0	≥ϕ114.0

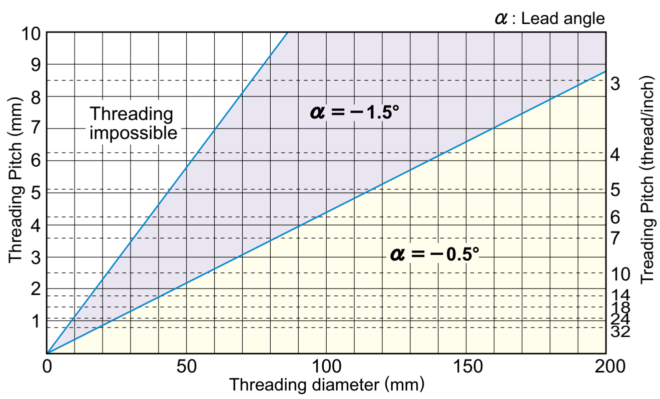
(Note) Back turning in the case of left hand threads.

Shim reference graph

Right Hand Thread



Left Hand Thread



Note) 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.)

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 9 and 10.

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 9 and 10.

Relief angle of an insert set on a holder

Thread helix angle	Internal relief angle	External relief angle
60°	8.5°	6°
55°	7°	7°
30°	4°	2.5°
29°	4°	2.5°

・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.

Standard of Depth of Cut (External Threading)

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 grinding 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											16ER075ISO	–
1.0	0.61	0.18	0.15	0.12	0.10	0.06										16ER100ISO	MMT16ER100ISO-S
1.25	0.77	0.19	0.17	0.14	0.11	0.10	0.06									16ER125ISO	16ER125ISO-S
1.5	0.92	0.22	0.21	0.17	0.14	0.12	0.06									16ER150ISO	16ER150ISO-S
1.75	1.07	0.22	0.21	0.16	0.13	0.11	0.09	0.09	0.06							16ER175ISO	16ER175ISO-S
2.0	1.23	0.24	0.23	0.17	0.16	0.14	0.12	0.11	0.06							16ER200ISO	16ER200ISO-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					16ER250ISO	16ER250ISO-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			16ER300ISO	16ER300ISO-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			22ER350ISO	–
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	22ER400ISO	–
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	22ER450ISO	–
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	22ER500ISO	–

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 grinding 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										16ER280UN	–
24	0.65	0.18	0.16	0.14	0.11	0.06										16ER240UN	–
20	0.78	0.20	0.18	0.13	0.11	0.10	0.06									16ER200UN	–
18	0.87	0.22	0.20	0.15	0.13	0.11	0.06									16ER180UN	–
16	0.97	0.22	0.20	0.15	0.12	0.11	0.11	0.06								16ER160UN	MMT16ER160UN-S
14	1.11	0.23	0.21	0.16	0.13	0.11	0.11	0.10	0.06							16ER140UN	16ER140UN-S
13	1.20	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.06							16ER130UN	–
12	1.30	0.28	0.23	0.18	0.16	0.14	0.13	0.12	0.06							16ER120UN	MMT16ER120UN-S
11	1.42	0.28	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.06						16ER110UN	–
10	1.56	0.28	0.24	0.19	0.16	0.14	0.13	0.13	0.12	0.11	0.06					16ER100UN	–
9	1.73	0.34	0.29	0.22	0.17	0.15	0.14	0.13	0.12	0.11	0.06					16ER090UN	–
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				16ER080UN	–
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				22ER070UN	–
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		22ER060UN	–
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	22ER050UN	–

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 grinding 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										16ER260W	–
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									16ER200W	–
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									16ER190W	MMT16ER190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									16ER180W	–
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							16ER160W	–
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							16ER140W	MMT16ER140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							16ER120W	–
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						16ER110W	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					16ER100W	–
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				16ER090W	–
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			16ER080W	–
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			22ER070W	–
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	22ER060W	–
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	22ER050W	–

(Note) · Set the finishing allowance on a diameter at approx. 0.1mm when using an insert with a wiper.
· Please note the cutting depth and the number of passes when a nose radius of an insert without a wiper or of an internal threading insert is small to prevent damage to the insert nose.
· 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.

BSPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes												Insert Type	
		1	2	3	4	5	6	7	8	9				G-class grinding 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							16ER190BSPT	MMT16ER190BSPT-S
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06					16ER140BSPT	16ER140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06				16ER110BSPT	16ER110BSPT-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		G-class grinding inserts
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						16ER080RD
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				16ER060RD
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		22ER040RD

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		G-class grinding inserts
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									16ER200TR
3.0	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06							16ER300TR
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	0.16				22ER400TR
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		22ER500TR

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		G-class grinding inserts
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							16ER100ACME
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					16ER080ACME
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			22ER060ACME
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		22ER050ACME

UNJ

Pitch (thread/inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11					G-class grinding inserts
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											16ER280UNJ
24	0.61	0.17	0.14	0.14	0.10	0.06											16ER240UNJ
20	0.73	0.19	0.16	0.13	0.10	0.09	0.06										16ER200UNJ
18	0.81	0.23	0.18	0.14	0.10	0.10	0.06										16ER180UNJ
16	0.92	0.26	0.21	0.14	0.12	0.10	0.09										16ER160UNJ
14	1.05	0.26	0.23	0.17	0.12	0.11	0.10	0.06									16ER140UNJ
12	1.22	0.28	0.27	0.20	0.17	0.13	0.11	0.06									16ER120UNJ
10	1.47	0.30	0.29	0.21	0.15	0.13	0.12	0.11	0.10	0.06							16ER100UNJ
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					16ER080UNJ

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					G-class grinding inserts
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

(Note) · Set the finishing allowance on a diameter at approx. 0.1mm when using an insert with a wiper.
· Please note the cutting depth and the number of passes when a nose radius of an insert without a wiper or of an internal threading insert is small to prevent damage to the insert nose.
· 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.

Standard of Depth of Cut (External Threading)

EXTERNAL (RADIAL INFEED)

API Round Casing & Tubing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12				Insert Type G-class grinding inserts
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				16ER080APRD

American NPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type G-class grinding inserts
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								16ER180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						16ER140NPT
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				16ER115NPT
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	16ER080NPT

American NPTF

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type G-class grinding inserts
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								16ER180NPTF
14	1.35	0.23	0.21	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						16ER140NPTF
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				16ER115NPTF
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	16ER080NPTF

(Note)
- Set the finishing allowance on a diameter at approx. 0.1mm when using an insert with a wiper.
- Please note the cutting depth and the number of passes when a nose radius of an insert without a wiper or of an internal threading insert is small to prevent damage to the insert nose.
- 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.

Standard of Depth of Cut (Internal Threading)

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 grinding 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											11IR075ISO	16IR075ISO	—	—
1.0	0.58	0.17	0.15	0.11	0.09	0.06										11IR100ISO	16IR100ISO	MMT11IR100ISO-S	MMT16IR100ISO-S
1.25	0.72	0.18	0.16	0.12	0.11	0.09	0.06									11IR125ISO	16IR125ISO	11IR125ISO-S	16IR125ISO-S
1.5	0.87	0.21	0.20	0.16	0.13	0.11	0.06									11IR150ISO	16IR150ISO	11IR150ISO-S	16IR150ISO-S
1.75	1.01	0.21	0.20	0.15	0.12	0.10	0.09	0.08	0.06							11IR175ISO	16IR175ISO	—	16IR175ISO-S
2.0	1.15	0.24	0.22	0.18	0.14	0.12	0.10	0.09	0.06							11IR200ISO	16IR200ISO	—	16IR200ISO-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					—	16IR250ISO	—	16IR250ISO-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			—	16IR300ISO	—	16IR300ISO-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			—	22IR350ISO	—	—
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	—	22IR400ISO	—	—
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	—	22IR450ISO	—	—
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	—	22IR500ISO	—	—

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 grinding 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										11IR280UN	16IR280UN	—
24	0.61	0.17	0.15	0.13	0.10	0.06										11IR240UN	16IR240UN	—
20	0.73	0.18	0.15	0.13	0.11	0.10	0.06									11IR200UN	16IR200UN	—
18	0.81	0.20	0.18	0.14	0.12	0.11	0.06									11IR180UN	16IR180UN	—
16	0.92	0.20	0.18	0.15	0.12	0.11	0.10	0.06								11IR160UN	16IR160UN	MMT16IR160UN-S
14	1.05	0.21	0.18	0.15	0.13	0.11	0.11	0.10	0.06							11IR140UN	16IR140UN	16IR140UN-S
13	1.13	0.22	0.19	0.16	0.14	0.13	0.12	0.11	0.06							—	16IR130UN	—
12	1.22	0.24	0.22	0.18	0.16	0.13	0.12	0.11	0.06							—	16IR120UN	MMT16IR120UN-S
11	1.33	0.24	0.22	0.20	0.15	0.12	0.12	0.11	0.11	0.06						—	16IR110UN	—
10	1.47	0.25	0.22	0.21	0.14	0.13	0.12	0.12	0.11	0.11	0.06					—	16IR100UN	—
9	1.63	0.31	0.23	0.21	0.17	0.15	0.14	0.13	0.12	0.11	0.06					—	16IR090UN	—
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				—	16IR080UN	—
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				—	22IR070UN	—
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		—	22IR060UN	—
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	—	22IR050UN	—

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 grinding 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										—	16IR260W	—
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									—	16IR200W	—
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									MMT11IR190W	16IR190W	MMT16IR190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									—	16IR180W	—
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							—	16IR160W	—
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							MMT11IR140W	16IR140W	MMT16IR140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							—	16IR120W	16IR120W-S
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						—	16IR110W	—
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06					—	16IR100W	—
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				—	16IR090W	—
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			—	16IR080W	—
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			—	22IR070W	—
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	—	22IR060W	—
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	—	22IR050W	—

(Note) · Set the finishing allowance on a diameter at approx. 0.1mm when using an insert with a wiper.
· Please note the cutting depth and the number of passes when a nose radius of an insert without a wiper or of an internal threading insert is small to prevent damage to the insert nose.
· 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.

Standard of Depth of Cut (Internal Threading)

INTERNAL (RADIAL INFEED)

BSPT

Pitch (thread/inch)	Total Cutting Depth	1	2	3	4	5	6	7	8	9	Insert Type: G-class grinding inserts		Insert Type: 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		11IR140BSPT	16IR140BSPT	16IR140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06	—	16IR110BSPT	16IR110BSPT-S

Round DIN 405

Pitch (thread/inch)	Total Cutting Depth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Insert Type: G-class grinding inserts
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					16IR080RD
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			16IR060RD
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	22IR040RD

ISO Trapezoidal 30°

Pitch (mm)	Total Cutting Depth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Insert Type: G-class grinding inserts
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								16IR200TR
3	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06						16IR300TR
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			22IR400TR
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	22IR500TR

American ACME

Pitch (thread/inch)	Total Cutting Depth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Insert Type: G-class grinding inserts
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						16IR100ACME
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				16IR080ACME
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		22IR060ACME
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	22IR050ACME

API Buttress Casing

Pitch (thread/inch)	Total Cutting Depth	1	2	3	4	5	6	7	8	9	10	11	Insert Type: G-class grinding inserts
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	1	2	3	4	5	6	7	8	9	10	11	12	Insert Type: G-class grinding inserts
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	16IR080APRD

(Note)
- Set the finishing allowance on a diameter at approx. 0.1mm when using an insert with a wiper.
- Please note the cutting depth and the number of passes when a nose radius of an insert without a wiper or of an internal threading insert is small to prevent damage to the insert nose.
- 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.

American NPT

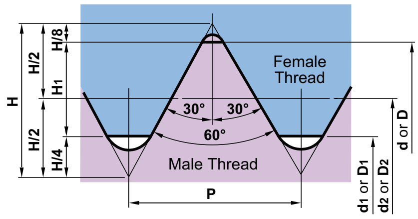
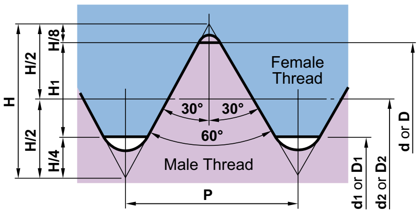
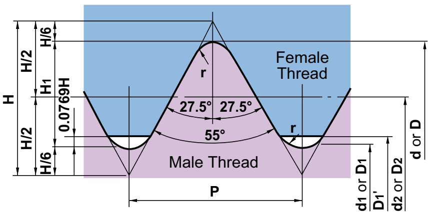
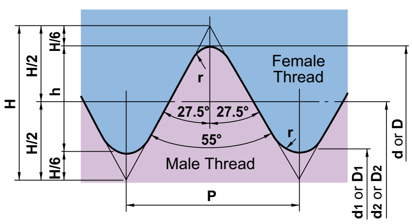
Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type: G-class grinding inserts
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06										MMT16IR270NPT
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06								16IR180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						16IR140NPT
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				16IR115NPT
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	16IR080NPT

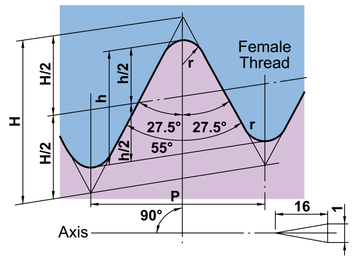
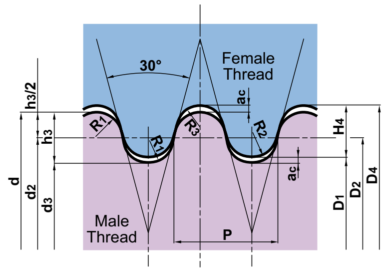
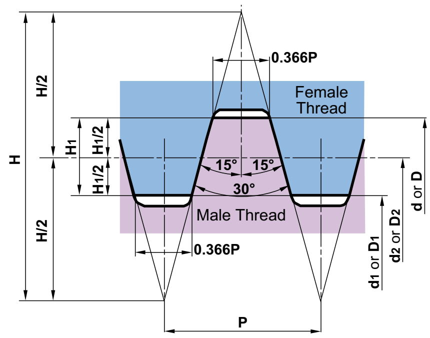
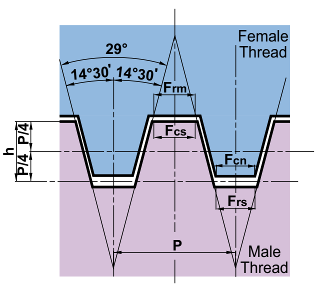
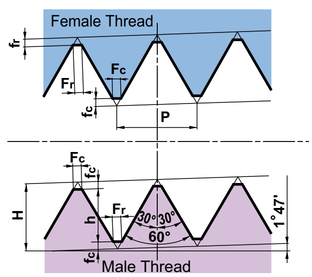
American NPTF

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type: G-class grinding inserts
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				16IR115NPTF
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	16IR080NPTF

(Note) · Set the finishing allowance on a diameter at approx. 0.1mm when using an insert with a wiper.
· Please note the cutting depth and the number of passes when a nose radius of an insert without a wiper or of an internal threading insert is small to prevent damage to the insert nose.
· 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.

Standard Thread and Corresponding Insert

Thread Name	Standard Thread Type	Symbol
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
American UN	 $H=0.866025\times25.4/n$ $d_2=(d-0.649519/n)\times25.4$ $H_1=0.541266\times25.4/n$ $d_1=(d-1.082532/n)\times25.4$ $d=(d)\times25.4$ $D=d$ $D_2=d_2$ $D_1=d_1$ $P=25.4/\text{thread}$	UNC UNF
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
Parallel Pipe Thread	 $H=0.960491P$ $d_2=d-h$ $d_1=d-2h$ $r=0.137329P$ $h=0.640327$ $D=d$ $D_2=d_2$ $D_1=d_1$ $25.4/\text{thread}$	PF G Rp

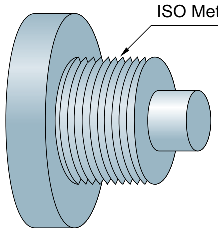
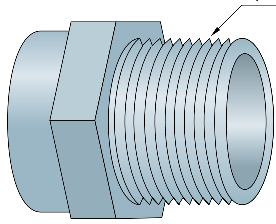
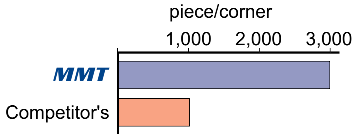
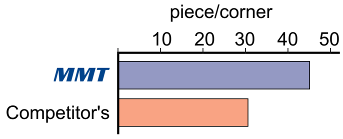
Thread Name	Standard Thread Type	Symbol
BSPT	 $H=0.960237P$ $h=0.640327$ $r=0.137278P$ $P=25.4/\text{thread}$	BSPT
Round DIN405	 $a_c=0.05\times P$ $h_3=H_4=0.5\times P$ $R_1=0.238507\times P$ $R_2=0.255967\times P$ $R_3=0.221047\times P$	Rd
ISO Trapezoidal 30°		Tr
American ACME		ACME
American NPT	 $H=0.866025P$ $h=0.800000P$	NPT

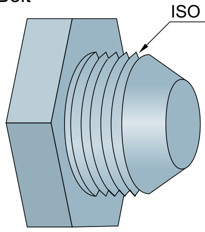
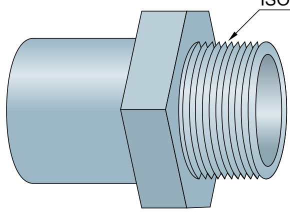
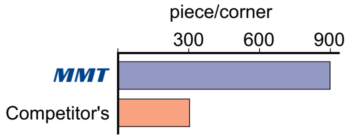
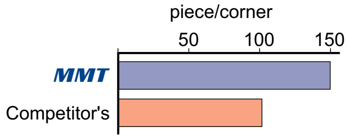
Wiper : Insert order number is determined by selected pitch.
General : An insert is applicable to several pitch types.

Troubleshooting

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 Example

Insert (Grade)		MMT16ER100ISO(VP10MF)	MMT16ER110BSPT(VP15TF)
Workpiece		JIS SCM35 Plug 	JIS SUS316 Bolt 
Cutting Conditions	Cutting Speed (m/min)	120	100
	Pass	5 times	20 times
	Cutting method	Radial Infeed	Radial Infeed
	Depth of cut	Fixed cut area	Fixed cut area
Coolant		Wet	Wet
Result		 MMT inserts had smaller wear than conventional products. Tool life increased 3 fold.	 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 (m/min)	140	80
	Pass	6 times	10 times
	Cutting method	Radial Infeed	Radial Infeed
	Depth of cut	Fixed cut area	Fixed cut area
Coolant		Wet	Wet
Result		 MMT inserts had better chip control and gave smaller burrs on incomplete threads compared to conventional products. 3 times longer tool life was possible.	 Better chip control from the MMT inserts prevented chips wrapping around the workpiece. Tool life lengthened x 1.5

For Your Safety
●Do not touch cutting edges and chips without gloves. ●Machine within the recommended conditions, and replace worn tools with new ones before breakage. ●Use protectors such as safety covers and protective glasses. High-temperature chips can scatter and long chips can be discharged. ●Always take precautions against fire when using water-insoluble coolant. ●Clamp the inserts and parts firmly with the wrench or spanner provided.

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(Tools specifications subject to change without notice.)

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