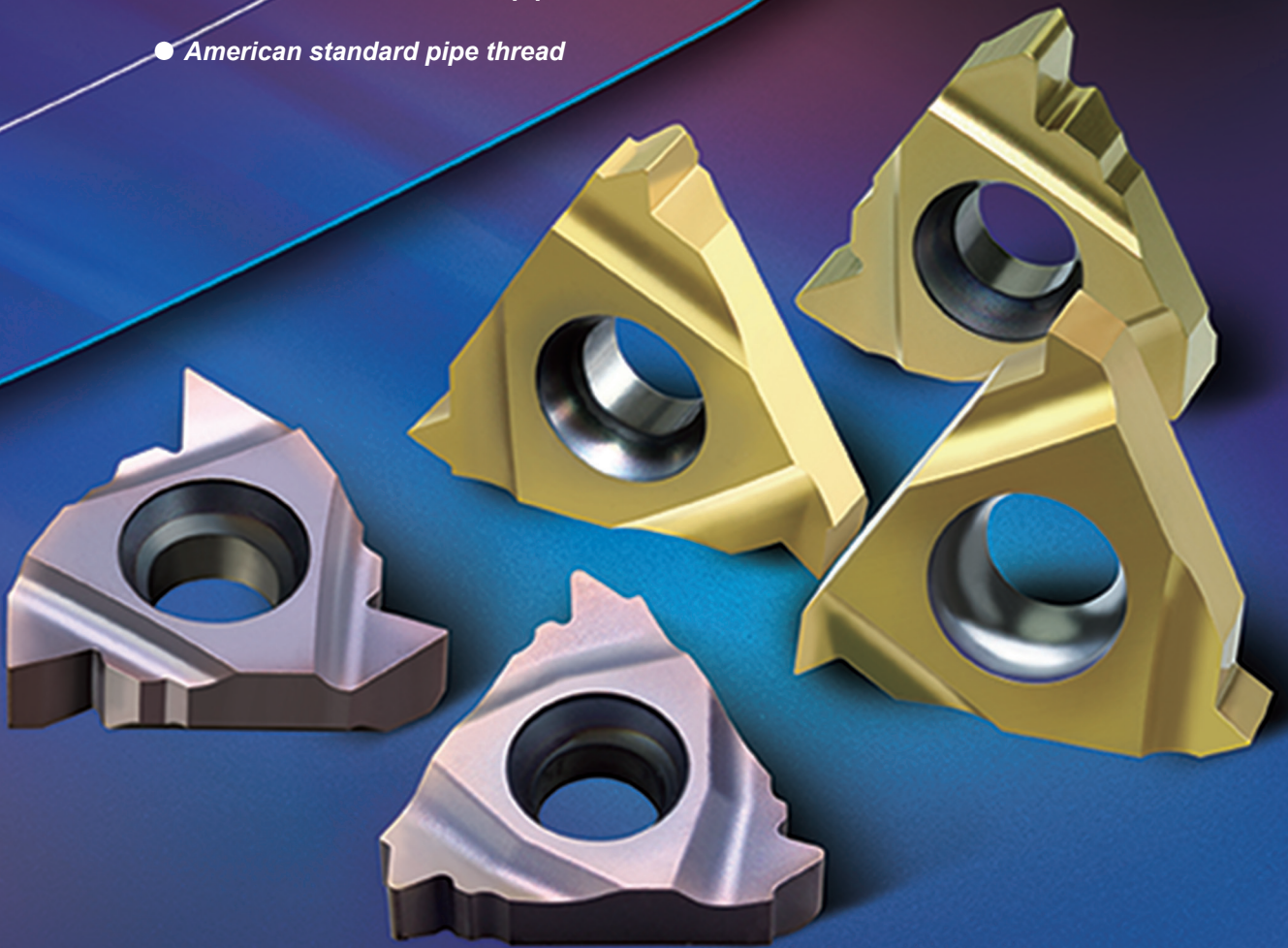


# 6series

- ISO metric thread
- General pitch thread
- Whitworth thread
- Unified thread
- British standard pipe thread
- American standard pipe thread



## Threading insert

Fully ground high precision inserts for high quality, high precision threading in a variety of materials e.g. steel, stainless steel, hard-to-machine materials.

How to select threading tools

## How to select threading tools

### Structure of threading tools selected table

- Categorized as external threading and internal threading according to machining type.
- Separately listed out according to series.

**Dimensions of product**

**Indicating external threading or internal threading**

**Threading insert type**  
Including type, standard, tolerance class

**Diagram of thread pitch**

**External threading tools**

**ISO metric thread (with end)**

ISO 965-1980 DIN 13  
GB/T 197-2003 Tolerance class: 6g/6H

**Product specification**  
Including type (right hand and left hand), basic dimensions, stock, applicable inserts, spare parts

**Product specification**  
Including type (right hand and left hand), basic dimensions, stock

**Dimension diagram of insert**

Type	Stock	Basic dimensions(mm)					Applicable inserts	Inserts screw	Shim	Shim screw	Wrench						
		a	h	b	L	s											
ZSER	1616H16	▲	16	16	16	100	20	Z16ER□□□□	I60 M3.5X12T	MT16-□□MN	SM4X8C	WT15P					
	2020K16	▲	20	20	20	125	25										
	2525M16	▲	25	25	25	150	32										
	3225P16	▲	32	32	25	170	32										
	3232P16	▲	32	32	32	170	40										
	2525M22	▲	25	25	25	150	32										
ZSEL	3225P22	▲	32	32	25	170	32	Z22ER□□□□	I60 M5X17	MT22-□□MN	SM5X8.5	WT20P					
	3232P22	▲	32	32	32	170	40										
	4040S22	△	40	40	40	250	50										
	1616H16	▲	16	16	16	100	20						Z16EL□□□□	I60 M3.5X12T	MT16-□□MN	SM4X8C	WT15P
	2020K16	▲	20	20	20	125	25										
	2525M16	▲	25	25	25	150	32										
3225P16	▲	32	32	25	170	32											
3232P16	▲	32	32	32	170	40											
2525M22	▲	25	25	25	150	32											
External thread	3225P22	▲	32	32	25	170	32	Z22EL□□□□	I60 M5X17	MT22-□□MN	SM5X8.5	WT20P					
	3232P22	▲	32	32	32	170	40										
	4040S22	△	40	40	40	250	50										
	Z16ER0.0ISO												I60 M3.5X12T	MT16-□□MN	SM4X8C	WT15P	
	Z16ER0.75ISO																
	Z16ER1.0ISO																
Z16ER1.25ISO																	
Z16ER1.5ISO																	
Z16ER1.75ISO																	
External thread	Z16ER2.0ISO						I60 M5X17	MT22-□□MN	SM5X8.5	WT20P							
	Z16ER2.5ISO																
	Z16ER3.0ISO																
	Z22ER3.0ISO																
	Z22ER4.0ISO																
	Z22ER4.5ISO																
	Z22ER5.0ISO																
	Z22ER5.5ISO																
	Z22ER6.0ISO																
	Z22EL0.0ISO																
	Z22EL0.75ISO																
	Z22EL1.0ISO																

▲ Stock available    △ Make-to-order

Type	Basic dimensions(mm)				Recommended coating grade	
	Pitch	S	ØC	ed	YBG203	YBG205
The right hand tools						
Z16ER0.0ISO	0.50	3.52	9.525	4.0	★	○
Z16ER0.75ISO	0.75	3.52	9.525	4.0	★	○
Z16ER1.0ISO	1.00	3.52	9.525	4.0	★	○
Z16ER1.25ISO	1.25	3.52	9.525	4.0	★	○
Z16ER1.5ISO	1.50	3.52	9.525	4.0	★	○
Z16ER1.75ISO	1.75	3.52	9.525	4.0	★	○
Z16ER2.0ISO	2.00	3.52	9.525	4.0	★	○
Z16ER2.5ISO	2.50	3.52	9.525	4.0	★	○
Z16ER3.0ISO	3.00	3.52	9.525	4.0	★	○
Z22ER3.0ISO	3.50	4.65	12.7	5.0	★	○
Z22ER4.0ISO	4.00	4.65	12.7	5.0	★	○
Z22ER4.5ISO	4.50	4.65	12.7	5.0	★	○
Z22ER5.0ISO	5.00	4.65	12.7	5.0	★	○
Z22ER5.5ISO	5.50	4.65	12.7	5.0	★	○
Z22ER6.0ISO	6.00	4.65	12.7	5.0	★	○

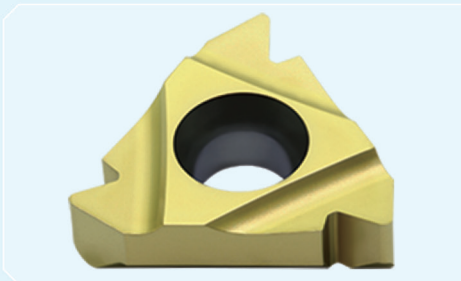
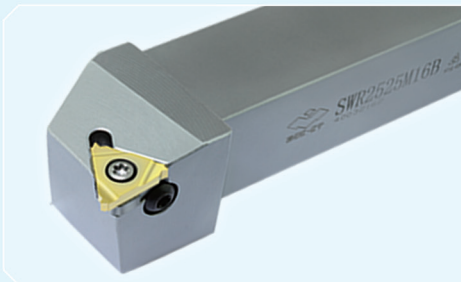
★ Recommended grade (always stock available)    ● Available grade (always stock available)    ○ Make-to-order



# TURNING



## Threading Tools



<b>Threading tools overview</b>	•	A294-A295
<b>Introduction on threading insert grade and chipbreaker</b>	•	A296
<b>Threading insert</b>	•	A297-A304
Thin Threading insert code key		A297
Thin ISO metric external thread		A298-A299
Thin General pitch thread		A300
Thin Whitworth thread		A301
Thin Unified thread		A302
Thin British standard pipe thread		A303
Thin American standard pipe thread		A304
Thin threading insert code key		A305
Thin ISO metric external thread		A306
Thin general pitch thread		A307
Thin Whitworth thread		A308
Thin unified thread		A309
Thin British standard pipe thread		A310
Thin American standard pipe thread		A311
<b>Threading tools</b>	•	A312-A314
Threading tools code key		A312
External threading tools		A313
Internal threading tools		A314
<b>Application information on threading</b>	•	A315-A325



General turning

Parting and grooving

Threading

Threading tools overview

Applications		For general use			
Legend					
Thread name		ISO metric thread With end	General pitch thread Without end	General pitch thread Without end	
Profil		<b>GM</b>	<b>60</b>	<b>55</b>	
Shape of insert (length: 11, 16, 22mm)		R style shown  A298-299	R style shown  A300	R style shown  A300	
Tool holder	Pitch	Dimensions (mm) (H×W×L) (Dia×L×Min. dia)	Pitch/mm	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)
	External thread	 R-type shown A313 16×16×100 20×20×125 25×25×150 32×25×170 32×32×170 40×40×250	0.5~6.0	0.5~5.0 (5~48)	0.5~5.0 (5~48)
Internal thread	 R-type shown A314 16×125×12 16×150×16 16×150×20 20×150×25 20×180×25 25×150×32 32×200×40 32×250×40 40×300×50 50×350×63	0.5~6.0	0.5~5.0 (5~48)	0.5~5.0 (5~48)	



For general use	For aerospace industry	Heater, gas and water pipe thread	For gas and water faucet and pipe connection
Whitworth thread	Unified thread (American standard threads)	British standard taper pipe threads	American standard taper pipe threads
<b>W</b>	<b>UN</b>	<b>BSPT</b>	<b>NPT</b>
R style shown	R style shown	R style shown	R style shown
<p>A301</p>	<p>A302</p>	<p>A303</p>	<p>A304</p>
Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)
8~19	8~24	11~28	8~27
8~19	8~24	11~28	8~27

General turning

Parting and grooving

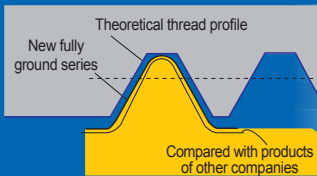
Threading

Threading tools overview

suitable for threading in a variety of materials

# New nano coating grade YBG203

- Specially treated edge for superior surface quality
- Sharp nose with small cutting resistance and superior performance
- Full ground inserts with high dimensional precision for high quality threading



Thread type	Grade of tolerance
ISO metric thread	6g/6H
Whitworth thread W	Medium Class A
British standard pipe thread	Standard BSPT
Unified thread	2A/2B
American standard pipe thread	Standard NPT

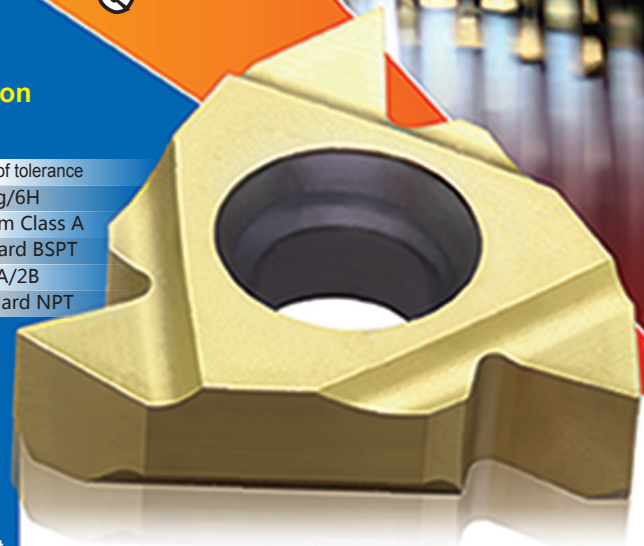
- New nano coating grade specially designed for threading with longer insert life



Advanced surface treatment techniques effectively reduce friction and allows for better wear observation.

Advanced TiAlN substrate nano coating, in combination with proper coating ingredients, improves the mechanical and thermal properties of coating.

Further optimizing coating structure, improving coating stress, enhancing bond strength of coating and substrate.



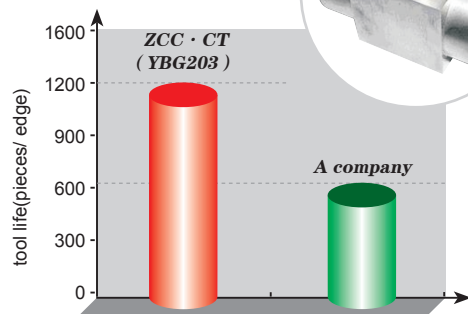
### Case:

Workpiece material: 42CrMo(HB260)

Insert: Z16ER2.0ISO/YBG203

Thread pitch: p=2.0mm

Cutting data: Vc=120 m/min



84% tool life improvement of ZCC·CT product than that of company A under the same cutting condition.

**Threading inserts code key**

**Insert size**

Code	Diameter of IC(mm)
Z11	ø6.35
Z16	ø9.525
Z22	ø12.7

**Cutting style**

- E -External threading inserts
- I -Internal threading inserts

**Cutting direction**

- R-Righ
- L-Left

**Z16 E R 2.0 ISO (PP)**

**Screw pitch**

Full profile (Range of screw pitch is indicated by numbers).

mm	TPI
0.5-6.0	48-5

V profile (Range of screw pitch is indicated by letters).

	mm	TPI
A	0.5-1.5	48-16
AG	0.5-3.0	48-8
G	1.75-3.0	14-8
N	3.5-5.0	7-5

Thread specification	Range of thread pitch
ISO metric thread	0.5-6.0
General pitch thread	0.5-5.0
Whitworth thread W	8-19
British standard pipe thread	11-28
Unified thread	8-24
American standard pipe thread	8-27

**Profile**

- ISO—ISO metric 60° thread
- 60—60° general pitch thread
- 55—55° general pitch thread
- W—Whitworth thread
- UN—Unified thread(American standard threads)
- BSPT—British standard taper piper thread
- NPT—American standard taper piper thread

**Chip breaker**

- fully ground edge insert
- PP -3-Dimensional chip-breaking insert

General turning

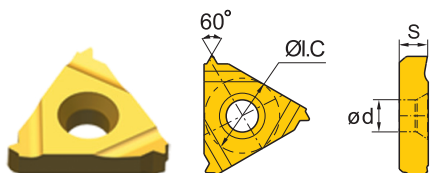
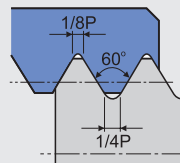
Parting and grooving

Threading

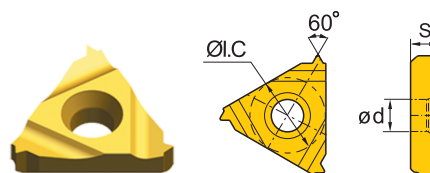
Threading insert

### ISO metric thread (with end)

ISO 965-1980    DIN 13  
 GB/T 197-2003    Tolerance class: 6g/6H



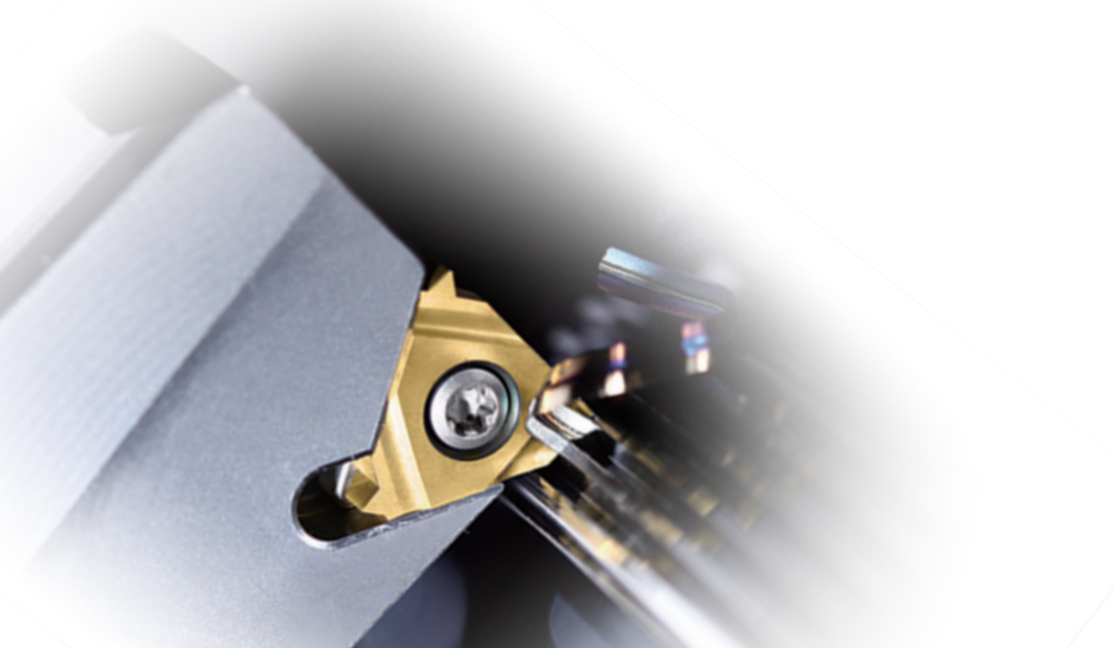
R type



L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	ØI.C	ød	YBG203	YBG205
External thread	<b>Z16ER0.5ISO</b>	<b>Z16EL0.5ISO</b>	0.50	3.52	9.525	4.0	★	○
	<b>Z16ER0.75ISO</b>	<b>Z16EL0.75ISO</b>	0.75	3.52	9.525	4.0	★	○
	<b>Z16ER1.0ISO</b>	<b>Z16EL1.0ISO</b>	1.00	3.52	9.525	4.0	★	○
	<b>Z16ER1.25ISO</b>	<b>Z16EL1.25ISO</b>	1.25	3.52	9.525	4.0	★	○
	<b>Z16ER1.5ISO</b>	<b>Z16EL1.5ISO</b>	1.50	3.52	9.525	4.0	★	○
	<b>Z16ER1.75ISO</b>	<b>Z16EL1.75ISO</b>	1.75	3.52	9.525	4.0	★	○
	<b>Z16ER2.0ISO</b>	<b>Z16EL2.0ISO</b>	2.00	3.52	9.525	4.0	★	○
	<b>Z16ER2.5ISO</b>	<b>Z16EL2.5ISO</b>	2.50	3.52	9.525	4.0	★	○
	<b>Z16ER3.0ISO</b>	<b>Z16EL3.0ISO</b>	3.00	3.52	9.525	4.0	★	○
	<b>Z22ER3.5ISO</b>	<b>Z22EL3.5ISO</b>	3.50	4.65	12.7	5.0	★	○
	<b>Z22ER4.0ISO</b>	<b>Z22EL4.0ISO</b>	4.00	4.65	12.7	5.0	★	○
	<b>Z22ER4.5ISO</b>	<b>Z22EL4.5ISO</b>	4.50	4.65	12.7	5.0	★	○
	<b>Z22ER5.0ISO</b>	<b>Z22EL5.0ISO</b>	5.00	4.65	12.7	5.0	★	○
	<b>Z22ER5.5ISO</b>	<b>Z22EL5.5ISO</b>	5.50	4.65	12.7	5.0	★	○
<b>Z22ER6.0ISO</b>	<b>Z22EL6.0ISO</b>	6.00	4.65	12.7	5.0	★	○	

★Recommended grade (always stock available)    ●Available grade (always stock available)    ○Make-to-order

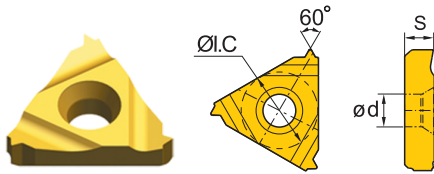
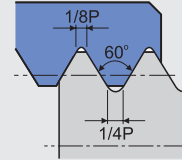




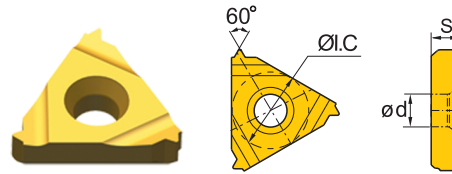


### ISO metric thread (with end)

ISO 965-1980    DIN 13  
 GB/T 197-2003    Tolerance class: 6g/6H



R type



L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	ØI.C	ød	YBG203	YBG205
Internal thread	Z11IR0.5ISO	Z11IL0.5ISO	0.50	3.05	6.35	3.2	★	○
	Z11IR0.75ISO	Z11IL0.75ISO	0.75	3.05	6.35	3.2	★	○
	Z11IR1.0ISO	Z11IL1.0ISO	1.00	3.05	6.35	3.2	★	○
	Z11IR1.25ISO	Z11IL1.25ISO	1.25	3.05	6.35	3.2	★	○
	Z11IR1.5ISO	Z11IL1.5ISO	1.50	3.05	6.35	3.2	★	○
	Z11IR1.75ISO	Z11IL1.75ISO	1.75	3.05	6.35	3.2	★	○
	Z11IR2.0ISO	Z11IL2.0ISO	2.00	3.05	6.35	3.2	★	○
	Z16IR0.5ISO	Z16IL0.5ISO	0.50	3.52	9.525	4.0	★	○
	Z16IR0.75ISO	Z16IL0.75ISO	0.75	3.52	9.525	4.0	★	○
	Z16IR1.0ISO	Z16IL1.0ISO	1.00	3.52	9.525	4.0	★	○
	Z16IR1.25ISO	Z16IL1.25ISO	1.25	3.52	9.525	4.0	★	○
	Z16IR1.5ISO	Z16IL1.5ISO	1.50	3.52	9.525	4.0	★	○
	Z16IR1.75ISO	Z16IL1.75ISO	1.75	3.52	9.525	4.0	★	○
	Z16IR2.0ISO	Z16IL2.0ISO	2.00	3.52	9.525	4.0	★	○
	Z16IR2.5ISO	Z16IL2.5ISO	2.50	3.52	9.525	4.0	★	○
	Z16IR3.0ISO	Z16IL3.0ISO	3.00	3.52	9.525	4.0	★	○
	Z22IR3.5ISO	Z22IL3.5ISO	3.50	4.65	12.7	5.0	★	○
	Z22IR4.0ISO	Z22IL4.0ISO	4.00	4.65	12.7	5.0	★	○
	Z22IR4.5ISO	Z22IL4.5ISO	4.50	4.65	12.7	5.0	★	○
	Z22IR5.0ISO	Z22IL5.0ISO	5.00	4.65	12.7	5.0	★	○
Z22IR5.5ISO	Z22IL5.5ISO	5.50	4.65	12.7	5.0	★	○	
Z22IR6.0ISO	Z22IL6.0ISO	6.00	4.65	12.7	5.0	★	○	

★Recommended grade (always stock available)    ●Available grade (always stock available)    ○Make-to-order

General turning

Parting and grooving

Threading

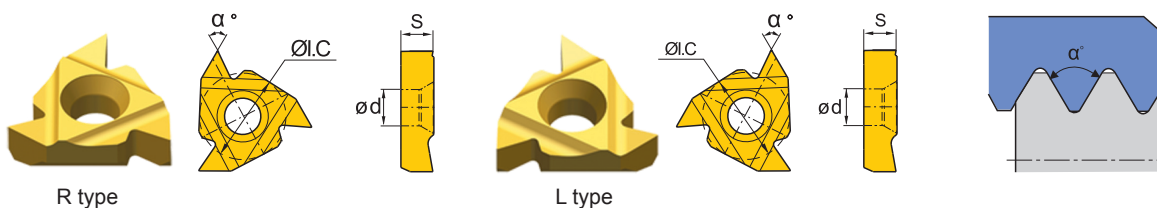
Threading insert



# TURNING Threading Tools

## Threading insert

### General pitch thread (without end)



R type

L type

		Type		Basic dimensions(mm)				Recommended coating grade		
		The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	α°	YBG203	YBG205
External thread	55°	<b>Z16ERA55</b>	<b>Z16ELA55</b>	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★	○
		<b>Z16ERG55</b>	<b>Z16ELG55</b>	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★	○
		<b>Z16ERAG55</b>	<b>Z16ELAG55</b>	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★	○
		<b>Z22ERN55</b>	<b>Z22ELN55</b>	3.5-5.0(7-5)	4.65	12.7	5.0	55°	★	○
	60°	<b>Z16ERA60</b>	<b>Z16ELA60</b>	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★	○
		<b>Z16ERG60</b>	<b>Z16ELG60</b>	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★	○
		<b>Z16ERAG60</b>	<b>Z16ELAG60</b>	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★	○
		<b>Z22ERN60</b>	<b>Z22ELN60</b>	3.5-5.0(7-5)	4.65	12.7	5.0	60°	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type

L type

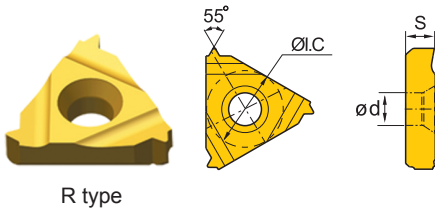
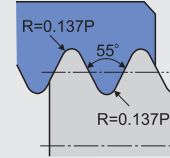
		Type		Basic dimensions(mm)				Recommended coating grade		
		The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	α°	YBG203	YBG205
Internal thread	55°	<b>Z11IRA55</b>	<b>Z11ILA55</b>	0.5-1.5(48-16)	3.05	6.35	3.2	55°	★	○
		<b>Z16IRA55</b>	<b>Z16ILA55</b>	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★	○
		<b>Z16IRG55</b>	<b>Z16ILG55</b>	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★	○
		<b>Z16IRAG55</b>	<b>Z16ILAG55</b>	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★	○
		<b>Z22IRN55</b>	<b>Z22ILN55</b>	3.5-5.0(7-5)	4.65	12.7	5.0	55°	★	○
	60°	<b>Z11IRA60</b>	<b>Z11ILA60</b>	0.5-1.5(48-16)	3.05	6.35	3.2	60°	★	○
		<b>Z16IRA60</b>	<b>Z16ILA60</b>	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★	○
		<b>Z16IRG60</b>	<b>Z16ILG60</b>	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★	○
		<b>Z16IRAG60</b>	<b>Z16ILAG60</b>	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★	○
		<b>Z22IRN60</b>	<b>Z22ILN60</b>	3.5-5.0(7-5)	4.65	12.7	5.0	60°	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

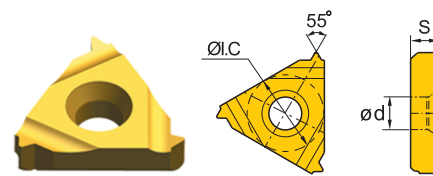
General turning  
Parting and grooving  
Threading  
Threading insert

**Whitworth thread (with end)**

ISO 228/1:1982,  
DIN 259, B.S.84:1956  
Tolerance class: Medium class A



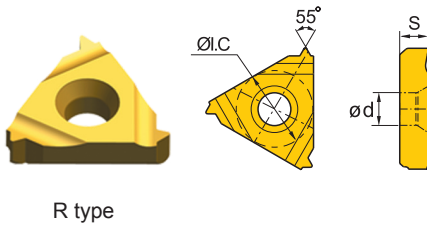
R type



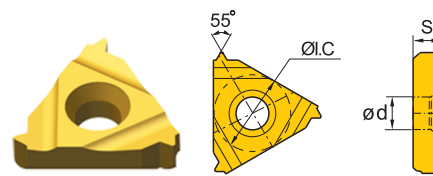
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	Z16ER8W	Z16EL8W	8	3.52	9.525	4.0	★	○
	Z16ER9W	Z16EL9W	9	3.52	9.525	4.0	★	○
	Z16ER10W	Z16EL10W	10	3.52	9.525	4.0	★	○
	Z16ER11W	Z16EL11W	11	3.52	9.525	4.0	★	○
	Z16ER12W	Z16EL12W	12	3.52	9.525	4.0	★	○
	Z16ER14W	Z16EL14W	14	3.52	9.525	4.0	★	○
	Z16ER16W	Z16EL16W	16	3.52	9.525	4.0	★	○
	Z16ER18W	Z16EL18W	18	3.52	9.525	4.0	★	○
	Z16ER19W	Z16EL19W	19	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type



L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	Z16IR8W	Z16IL8W	8	3.52	9.525	4.0	★	○
	Z16IR9W	Z16IL9W	9	3.52	9.525	4.0	★	○
	Z16IR10W	Z16IL10W	10	3.52	9.525	4.0	★	○
	Z16IR11W	Z16IL11W	11	3.52	9.525	4.0	★	○
	Z16IR12W	Z16IL12W	12	3.52	9.525	4.0	★	○
	Z16IR14W	Z16IL14W	14	3.52	9.525	4.0	★	○
	Z16IR16W	Z16IL16W	16	3.52	9.525	4.0	★	○
	Z16IR18W	Z16IL18W	18	3.52	9.525	4.0	★	○
	Z16IR19W	Z16IL19W	19	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

General turning

Parting and grooving

Threading

Threading insert

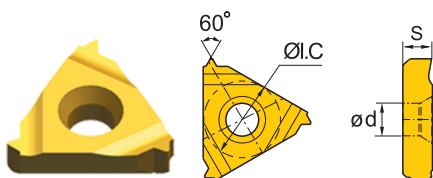
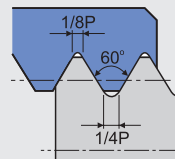


# TURNING Threading Tools

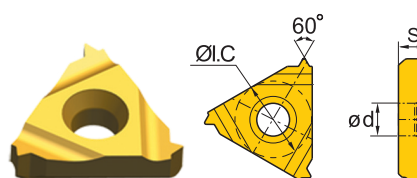
Threading insert

## Unified thread (with end)

ASME B1.1-1989  
Tolerance class: 2A/2B



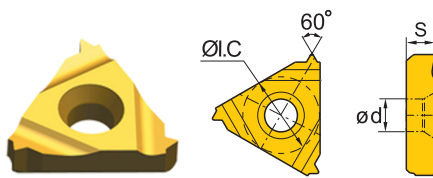
R type



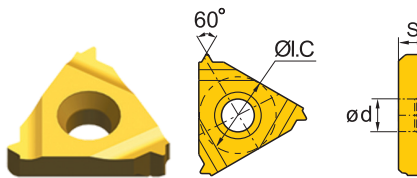
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	Z16ER8UN	Z16EL8UN	8	3.52	9.525	4.0	★	○
	Z16ER10UN	Z16EL10UN	10	3.52	9.525	4.0	★	○
	Z16ER12UN	Z16EL12UN	12	3.52	9.525	4.0	★	○
	Z16ER14UN	Z16EL14UN	14	3.52	9.525	4.0	★	○
	Z16ER16UN	Z16EL16UN	16	3.52	9.525	4.0	★	○
	Z16ER18UN	Z16EL18UN	18	3.52	9.525	4.0	★	○
	Z16ER20UN	Z16EL20UN	20	3.52	9.525	4.0	★	○
	Z16ER24UN	Z16EL24UN	24	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type



L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	Z16IR8UN	Z16IL8UN	8	3.52	9.525	4.0	★	○
	Z16IR10UN	Z16IL10UN	10	3.52	9.525	4.0	★	○
	Z16IR12UN	Z16IL12UN	12	3.52	9.525	4.0	★	○
	Z16IR14UN	Z16IL14UN	14	3.52	9.525	4.0	★	○
	Z16IR16UN	Z16IL16UN	16	3.52	9.525	4.0	★	○
	Z16IR18UN	Z16IL18UN	18	3.52	9.525	4.0	★	○
	Z16IR20UN	Z16IL20UN	20	3.52	9.525	4.0	★	○
	Z16IR24UN	Z16IL24UN	24	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

General turning

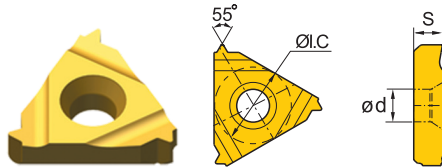
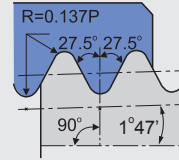
Parting and grooving

Threading

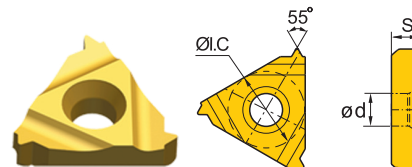
Threading insert

### British standard taper pipe thread (with end)

ISO 7/1:1994  
B.S.21:1985  
Standard BSPT



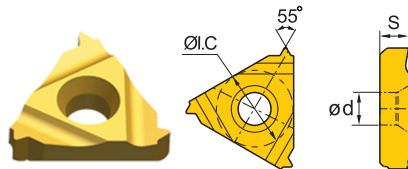
R type



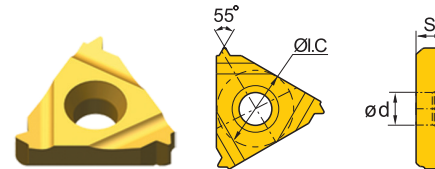
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	Z16ER11BSPT	Z16EL11BSPT	11	3.52	9.525	4.0	★	○
	Z16ER14BSPT	Z16EL14BSPT	14	3.52	9.525	4.0	★	○
	Z16ER19BSPT	Z16EL19BSPT	19	3.52	9.525	4.0	★	○
	Z16ER28BSPT	Z16EL28BSPT	28	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type



L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	Z16IR11BSPT	Z16IL11BSPT	11	3.52	9.525	4.0	★	○
	Z16IR14BSPT	Z16IL14BSPT	14	3.52	9.525	4.0	★	○
	Z16IR19BSPT	Z16IL19BSPT	19	3.52	9.525	4.0	★	○
	Z16IR28BSPT	Z16IL28BSPT	28	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

General turning

Parting and grooving

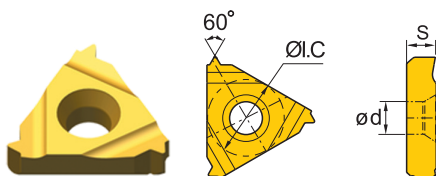
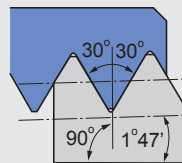
Threading

Threading insert

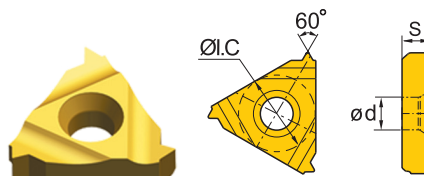


### American standard taper pipe thread (with end)

ASME B1.20.1-1983  
Standard NPT



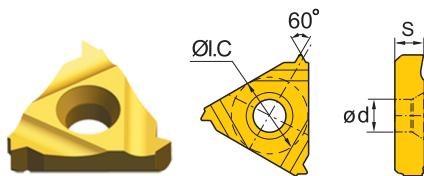
R type



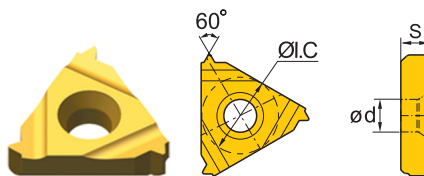
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	<b>Z16ER8NPT</b>	<b>Z16EL8NPT</b>	8	3.52	9.525	4.0	★	○
	<b>Z16ER11.5NPT</b>	<b>Z16EL11.5NPT</b>	11.5	3.52	9.525	4.0	★	○
	<b>Z16ER14NPT</b>	<b>Z16EL14NPT</b>	14	3.52	9.525	4.0	★	○
	<b>Z16ER18NPT</b>	<b>Z16EL18NPT</b>	18	3.52	9.525	4.0	★	○
	<b>Z16ER27NPT</b>	<b>Z16EL27NPT</b>	27	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type



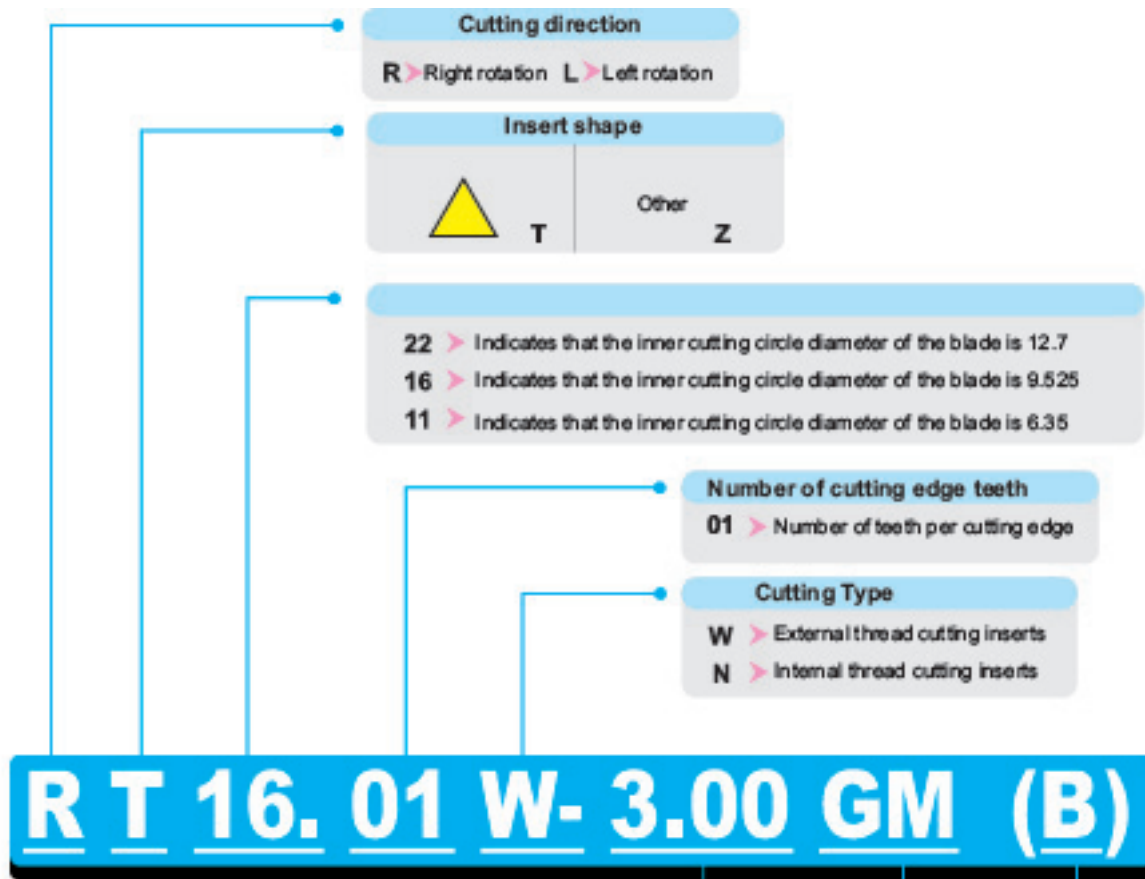
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	<b>Z16IR8NPT</b>	<b>Z16IL8NPT</b>	8	3.52	9.525	4.0	★	○
	<b>Z16IR11.5NPT</b>	<b>Z16IL11.5NPT</b>	11.5	3.52	9.525	4.0	★	○
	<b>Z16IR14NPT</b>	<b>Z16IL14NPT</b>	14	3.52	9.525	4.0	★	○
	<b>Z16IR18NPT</b>	<b>Z16IL18NPT</b>	18	3.52	9.525	4.0	★	○
	<b>Z16IR27NPT</b>	<b>Z16IL27NPT</b>	27	3.52	9.525	4.0	★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



Threading inserts code key



**R T 16. 01 W- 3.00 GM (B)**

Pitch		
Full tooth shape (pitch range is indicated by numbers)		
mm	TPI	
0.35-9.0	72-2	
V-tooth (pitch range is indicated by letter)		
	mm	TPI
<b>A</b>	0.5-1.5	48-16
<b>AG</b>	0.5-3.0	48-8
<b>G</b>	1.75-3.0	14-8
<b>N</b>	3.5-5.0	7-5
<b>Q</b>	5.5-6.0	41/2-4

Threaded tooth shape	
<b>GM</b>	ISO metric 60° thread
<b>60</b>	60° general pitch thread
<b>55</b>	55° general pitch thread
<b>W</b>	Whitworth thread
<b>UN</b>	Unified thread
<b>BSPT</b>	British standard pipe thread
<b>NPT</b>	American standard pipe thread

Supplementary number  
**B** > Thin Threaded inserts

General turning

Parting and grooving

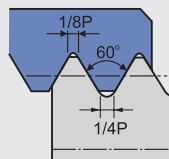
Threading

Threading tools

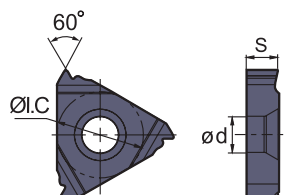
### ISO metric thread (with end) **Thin type**

ISO 965-1980, DIN 13, GB/T 197-2003

Tolerance class: 6g/6H



R type

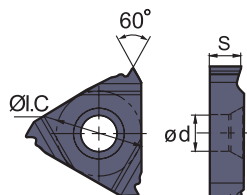


	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm	S	ØI.C	ød	YBG202
External thread	<b>RT16.01W-0.50GMB</b>	0.50	3.52	9.525	4.0	★
	<b>RT16.01W-0.75GMB</b>	0.75	3.52	9.525	4.0	★
	<b>RT16.01W-1.00GMB</b>	1.00	3.52	9.525	4.0	★
	<b>RT16.01W-1.25GMB</b>	1.25	3.52	9.525	4.0	★
	<b>RT16.01W-1.50GMB</b>	1.50	3.52	9.525	4.0	★
	<b>RT16.01W-1.75GMB</b>	1.75	3.52	9.525	4.0	★
	<b>RT16.01W-2.00GMB</b>	2.00	3.52	9.525	4.0	★
	<b>RT16.01W-2.50GMB</b>	2.50	3.52	9.525	4.0	★
	<b>RT16.01W-3.00GMB</b>	3.00	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type

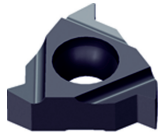


	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm	S	ØI.C	ød	YBG202
Internal thread	<b>RT16.01N-0.50GMB</b>	0.50	3.52	9.525	4.0	★
	<b>RT16.01N-0.75GMB</b>	0.75	3.52	9.525	4.0	★
	<b>RT16.01N-1.00GMB</b>	1.00	3.52	9.525	4.0	★
	<b>RT16.01N-1.25GMB</b>	1.25	3.52	9.525	4.0	★
	<b>RT16.01N-1.50GMB</b>	1.50	3.52	9.525	4.0	★
	<b>RT16.01N-1.75GMB</b>	1.75	3.52	9.525	4.0	★
	<b>RT16.01N-2.00GMB</b>	2.00	3.52	9.525	4.0	★
	<b>RT16.01N-2.50GMB</b>	2.50	3.52	9.525	4.0	★
	<b>RT16.01N-3.00GMB</b>	3.00	3.52	9.525	4.0	★

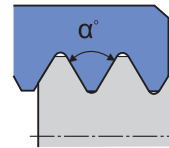
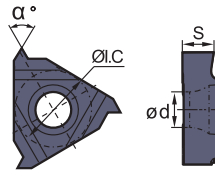
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



General pitch thread (without end) **Thin type**



R type



		Type	Basic dimensions(mm)				Recommended coating grade	
		The right hand tools	Pitch/mm (pitch/Inch)	S	øI.C	ød	α°	YBG202
External thread	60°	RT16.01W-A60B	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★
		RT16.01W-G60B	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★
		RT16.01W-AG60B	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★
	55°	RT16.01W-A55B	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★
		RT16.01W-G55B	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★
		RT16.01W-AG55B	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★

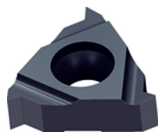
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

General turning

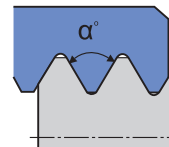
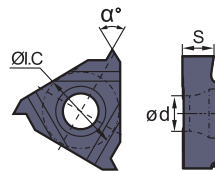
Parting and grooving

Threading

Threading tools



R type



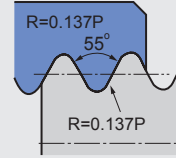
		Type	Basic dimensions(mm)				Recommended coating grade	
		The right hand tools	Pitch/mm (pitch/Inch)	S	øI.C	ød	α°	YBG202
Internal thread	60°	RT16.01N-A60B	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★
		RT16.01N-G60B	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★
		RT16.01N-AG60B	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★
	55°	RT16.01N-A55B	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★
		RT16.01N-G55B	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★
		RT16.01N-AG55B	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

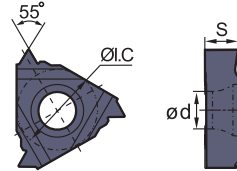
### Whitworth thread (with end) **Thin type**

ISO 228/1:1982, DIN 259, B.S.84:1956

Tolerance class: Medium class A

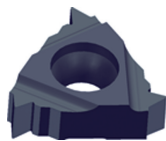


R type

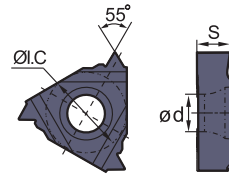


	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
External thread	<b>RT16.01W-8WB</b>	8	3.52	9.525	4.0	★
	<b>RT16.01W-9WB</b>	9	3.52	9.525	4.0	★
	<b>RT16.01W-10WB</b>	10	3.52	9.525	4.0	★
	<b>RT16.01W-11WB</b>	11	3.52	9.525	4.0	★
	<b>RT16.01W-12WB</b>	12	3.52	9.525	4.0	★
	<b>RT16.01W-14WB</b>	14	3.52	9.525	4.0	★
	<b>RT16.01W-16WB</b>	16	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type

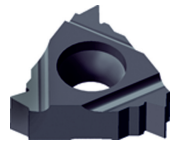
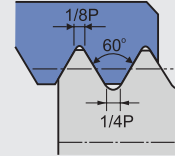


	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
Internal thread	<b>RT16.01N-8WB</b>	8	3.52	9.525	4.0	★
	<b>RT16.01N-9WB</b>	9	3.52	9.525	4.0	★
	<b>RT16.01N-10WB</b>	10	3.52	9.525	4.0	★
	<b>RT16.01N-11WB</b>	11	3.52	9.525	4.0	★
	<b>RT16.01N-12WB</b>	12	3.52	9.525	4.0	★
	<b>RT16.01N-14WB</b>	14	3.52	9.525	4.0	★
	<b>RT16.01N-16WB</b>	16	3.52	9.525	4.0	★

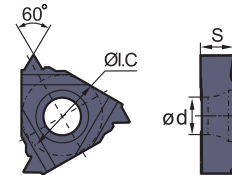
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Unified thread (with end) **Thin type**

ASME B1.1-1989  
Tolerance class: 2A/2B

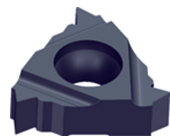


R type

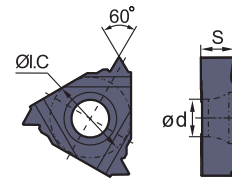


	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
External thread	RT16.01W-8UNB	8	3.52	9.525	4.0	★
	RT16.01W-10UNB	10	3.52	9.525	4.0	★
	RT16.01W-12UNB	12	3.52	9.525	4.0	★
	RT16.01W-14UNB	14	3.52	9.525	4.0	★
	RT16.01W-16UNB	16	3.52	9.525	4.0	★
	RT16.01W-18UNB	18	3.52	9.525	4.0	★
	RT16.01W-20UNB	20	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type



	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
Internal thread	RT16.01N-8UNB	8	3.52	9.525	4.0	★
	RT16.01N-10UNB	10	3.52	9.525	4.0	★
	RT16.01N-12UNB	12	3.52	9.525	4.0	★
	RT16.01N-14UNB	14	3.52	9.525	4.0	★
	RT16.01N-16UNB	16	3.52	9.525	4.0	★
	RT16.01N-18UNB	18	3.52	9.525	4.0	★
	RT16.01N-20UNB	20	3.52	9.525	4.0	★
	RT16.01N-24UNB	24	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

General turning

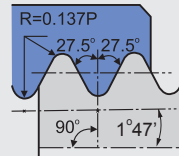
Parting and grooving

Threading

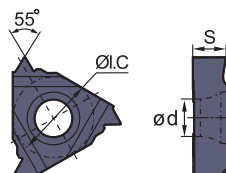
Threading tools

### British standard taper pipe thread (with end) **Thin type**

ISO 7/1:1994, B.S.21:1985  
Standard BSPT



R type

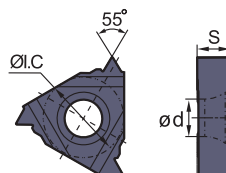


	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
External thread	<b>RT16.01W-11BSPTB</b>	11	3.52	9.525	4.0	★
	<b>RT16.01W-14BSPTB</b>	14	3.52	9.525	4.0	★
	<b>RT16.01W-19BSPTB</b>	19	3.52	9.525	4.0	★
	<b>RT16.01W-28BSPTB</b>	28	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type



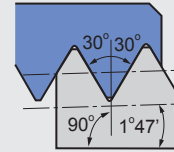
	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
Internal thread	<b>RT16.01N-11BSPTB</b>	11	3.52	9.525	4.0	★
	<b>RT16.01N-14BSPTB</b>	14	3.52	9.525	4.0	★
	<b>RT16.01N-19BSPTB</b>	19	3.52	9.525	4.0	★
	<b>RT16.01N-28BSPTB</b>	28	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

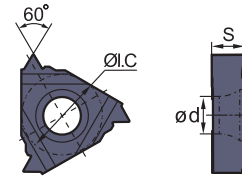


### American standard taper pipe thread (with end) **Thin type**

ASME B1.20.1-1983  
Standard NPT

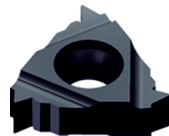


R type

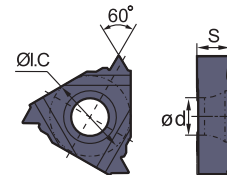


	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
External thread	<b>RT16.01W-8NPTB</b>	8	3.52	9.525	4.0	★
	<b>RT16.01W-11.5NPTB</b>	11.5	3.52	9.525	4.0	★
	<b>RT16.01W-14NPTB</b>	14	3.52	9.525	4.0	★
	<b>RT16.01W-18NPTB</b>	18	3.52	9.525	4.0	★
	<b>RT16.01W-27NPTB</b>	27	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



R type



	Type	Basic dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG202
Internal thread	<b>RT16.01N-8NPTB</b>	8	3.52	9.525	4.0	★
	<b>RT16.01N-11.5NPTB</b>	11.5	3.52	9.525	4.0	★
	<b>RT16.01N-14NPTB</b>	14	3.52	9.525	4.0	★
	<b>RT16.01N-18NPTB</b>	18	3.52	9.525	4.0	★
	<b>RT16.01N-27NPTB</b>	27	3.52	9.525	4.0	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

General turning

Parting and grooving

Threading

Threading tools

### Threading tools code key

General turning

Parting and grooving

Threading

Threading tools

#### Clamping system

Top clamping

Screw clamping



ZC



ZS

#### Thread type

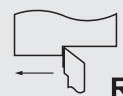
**I** > Internal thread

**E** > External thread

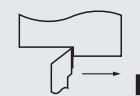
#### Cutting direction

Right hand

Left hand



R



L

**ZS E R 20 20 K 16**

#### Nose height



Note: 00 for round tool holder.  
Only to integer, for example:  
h=8mm is labeled as 08.

#### Shank width



Note: Diameter for round tool holder  
for example: b=8mm is labeled as 08.

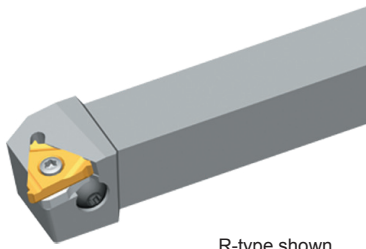
#### Tool length

Code	H	K	M	P	Q	R	S	T	U
Length	100	125	150	170	180	200	250	300	350

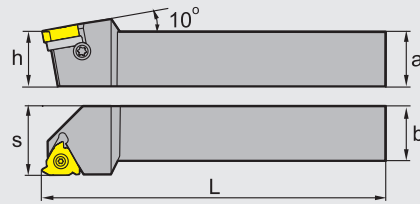
#### Insert size

Code	11	16	22
Triangle side length	11	16	22
Inscribed circle	6,35	9,525	12,70

External threading tools



R-type shown



Type	Stock	Basic dimensions(mm)					Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
		a	h	b	L	s					
ZSER	1616H16	▲	16	16	16	100	Z16ER□□□□	I60 M3.5×12TT	MT16-□□MN	SM4X8C	WT15IP
	2020K16	▲	20	20	20	125					
	2525M16	▲	25	25	25	150					
	3225P16	▲	32	32	25	170					
	3232P16	▲	32	32	32	170					
	2525M22	▲	25	25	25	150					
	3225P22	▲	32	32	25	170					
	3232P22	▲	32	32	32	170					
	4040S22	△	40	40	40	250					
ZSEL	1616H16	▲	16	16	16	100	Z16EL□□□□	I60 M3.5×12TT	MT16-□□MN	SM4X8C	WT15IP
	2020K16	▲	20	20	20	125					
	2525M16	▲	25	25	25	150					
	3225P16	▲	32	32	25	170					
	3232P16	▲	32	32	32	170					
	2525M22	▲	25	25	25	150					
	3225P22	▲	32	32	25	170					
	3232P22	▲	32	32	32	170					
	4040S22	△	40	40	40	250					

▲ Stock available

△ Make-to-order

General turning

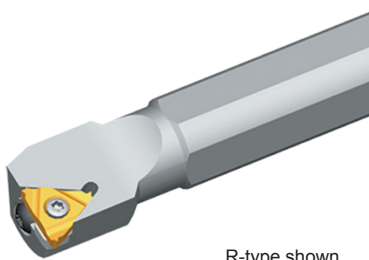
Parting and grooving

Threading

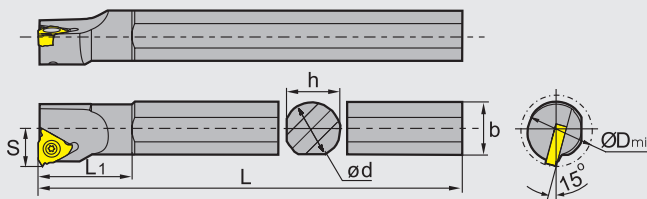
Threading tools



## Internal threading tools



R-type shown



General turning

Parting and grooving

Threading

Threading tools

Type	Stock	Basic dimensions(mm)							Applicable inserts	Inserts screw	Shim	Shim screw	Wrench			
		d	L	b	D <sub>min</sub>	s	h	L <sub>1</sub>								
ZSIR	0016K11	▲	16	125	15.5	12	10	15	20.9	Z11R□□□□	I60 M2.5X6.5T	---	---	WT08IP		
	0016M11	▲	16	150	16	16	10.5	15	25.9		Z16R□□□□	I60 M3.5X08TT	---		---	
	0016M16	▲	16	150	15.5	20	12	15	27			I60 M3.5X12TT	MT16-□□MN		SM4X8C	
	0020M16	▲	20	150	19	25	14	18	28.7	I60 M5×13.2			---	---		
	0020Q16	▲	20	180	19	25	14	18	34			Z22R□□□□	I60 M4×15X	MT22-□□MN	SM5X8.5	
	0025M16	▲	25	150	24	32	17	23	28.8	Z22R□□□□			I60 M4×15X	MT22-□□MN	SM5X8.5	
	0032R16	▲	32	200	31	40	22	30	30.9		I60 M5×13.2	---				---
	0032S16	▲	32	250	31	40	22	30	30.9							
	0040T16	▲	40	300	38.5	50	27	37	31.5		I60 M5×13.2	---				---
	0050U16	▲	50	350	48.5	63	35	49	40.2							
	0020Q22	▲	20	180	19	25	15	18	35	Z22R□□□□	I60 M4×15X	MT22-□□MN	SM5X8.5			
	0025R22	▲	25	200	24	32	19	23	39					I60 M5×13.2	---	---
	0032S22	▲	32	250	31	40	22	30	36.4							
	0040T22	▲	40	300	38.5	50	27	37	37.2					I60 M5×13.2	---	---
	0050U22	▲	50	350	48.5	63	35	47	42.6							
ZSIL	0016K11	▲	16	125	15.5	12	10	15	20.9	Z11L□□□□	I60 M2.5X6.5T	---	---	WT07IP		
	0016M11	▲	16	150	16	16	10.5	15	25.9		Z16L□□□□	I60 M3.5X08TT	---		---	
	0016M16	▲	16	150	16	20	12	15	27			I60 M3.5X12TT	MT16-□□MN		SM4X8C	
	0020M16	▲	20	150	19	25	14	18	28.7	I60 M5×13.2			---	---		
	0020Q16	▲	20	180	19	25	14	18	34			Z22L□□□□	I60 M4×15X	MT22-□□MN	SM5X8.5	
	0025M16	▲	25	150	24	32	17	23	28.8	I60 M5×13.2						---
	0032R16	▲	32	200	31	40	22	30	30.9		I60 M5×13.2	---				
	0032S16	▲	32	250	31	40	22	30	30.9	I60 M5×13.2						---
	0040T16	▲	40	300	38.5	50	27	37	31.5		I60 M5×13.2	---				
	0050U16	▲	50	350	48.5	63	35	49	40.2	I60 M5×13.2			---	---		
	0020Q22	▲	20	180	19	25	15	18	35		Z22L□□□□	I60 M4×15X			MT22-□□MN	SM5X8.5
	0025R22	▲	25	200	24	32	19	23	39	I60 M5×13.2			---	---		
	0032S22	▲	32	250	31	40	22	30	36.4							
	0040T22	▲	40	300	38.5	50	27	37	37.2	I60 M5×13.2			---	---		
	0050U22	▲	50	350	48.5	63	35	47	42.6							

▲Stock available    △Make-to-order

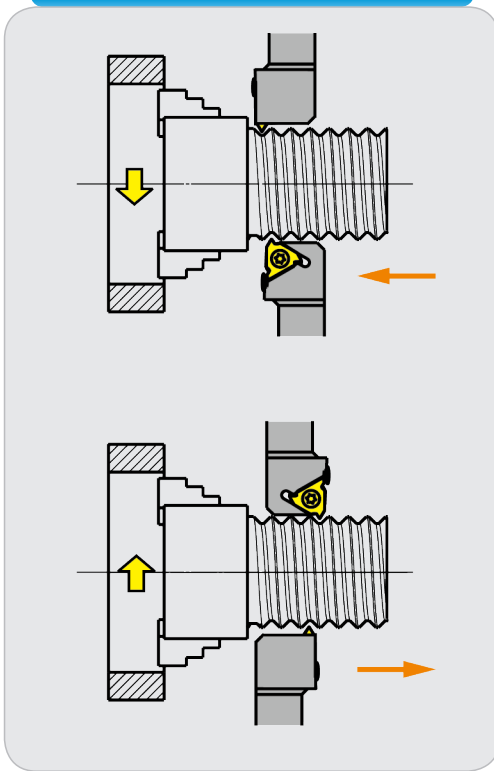


Please follow the following steps to get the best threading result:

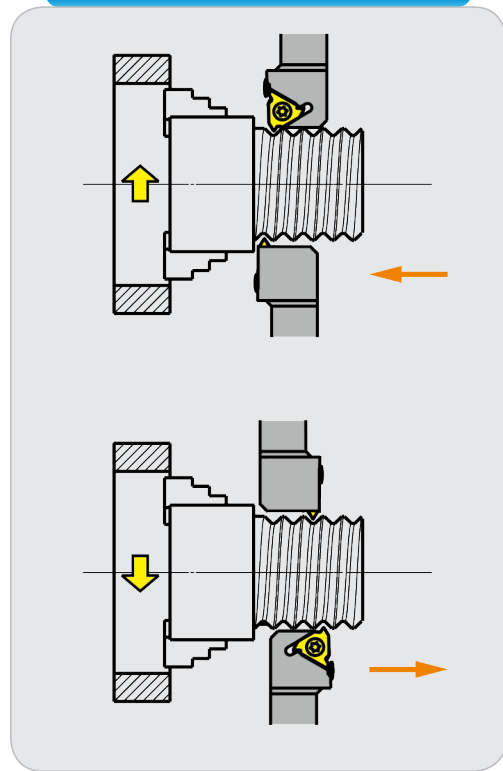
- 1 Select proper thread machining method.
- 2 Define helical angle and select shim.
- 3 Select proper insert and tool holder size.
- 4 By checking reference table of standard threading programs, select feasible cutting parameters.
- 5 Select feed way.

### Machining method of threading tools

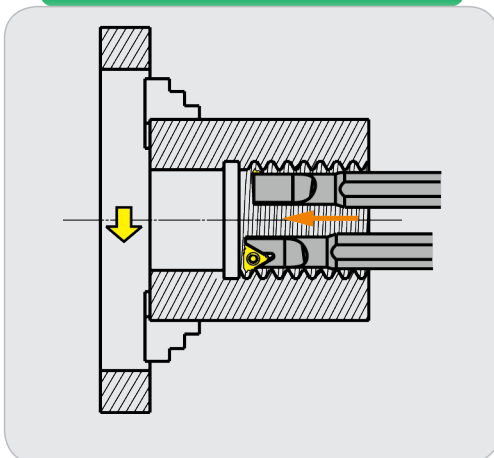
External threading machining (Right thread)



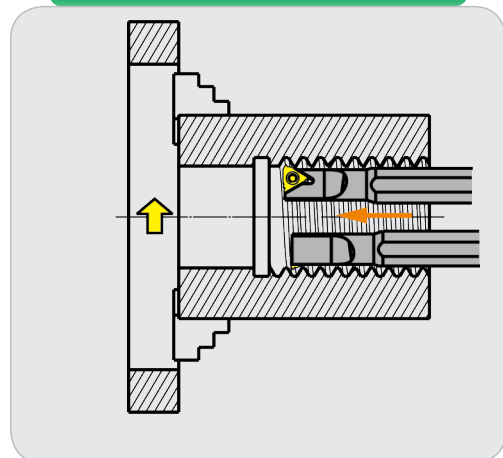
External threading machining (Left thread)



Internal threading machining (Right thread)



Internal threading machining (Left thread)



### Decide helical angle and select shim

The clearance angle of threading inserts is actually along the edge (flank). This has significant effect on heat diffusion, spread of abrasion as well as tool life, security and pitch quality. The clearance angle of threading pitch on clearance face is determined by thread helical angle. These two angles are similar to each other to some extent. If inclined angle of insert is different from the helical angle, then the clearance angle won't be the same either.

The helical angle of pitch has to be the same with the inclined angle of insert to prevent over wearing on the clearance face which could affect tool life. the helical angle is calculated as below:

$$e = \arctan \frac{p}{d_2 \times \pi}$$

P= Pitch

d<sub>2</sub>= pitch diameter

The most common inclined angle is 1°. MT standard shim and its inclined angle is also 1°.

Calculation of clearance angle:

Clearance angle is calculated as below:

$$\beta = \arctan (\tan \theta \times \tan \alpha)$$

2θ=Thread profile angle

α=The rake angle of external standard threading tools is 10°; the rake angle of internal standard threading tools is 15°.

The shim has to be changed when helical angle of thread is ≤ clearance angle of tool, which could cause intervene on insert flank.

Please change the shim to adjust the difference between helical angle of thread and inclined angle of shim to be within 2°~0°.

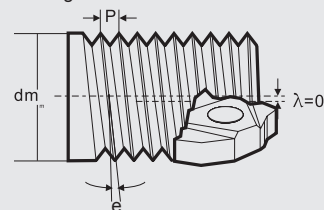
For example: when P=1.5, d<sub>2</sub>=24mm, helical angle 1.14°-(2°~0°)=inclined angle (-0.86°~1.14°) it is feasible to use standard shim 1°.

Shim specification table is as follows:

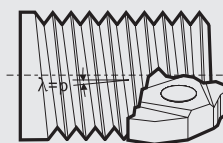
Screw pitch range	Insert dimensions	Inclined angle	Shim
0.5-3.0	16	0	MT16-00MN
		1	MT16-01MN
		2	MT16-02MN
		3	MT16-03MN
3.5-6.0	22	0	MT22-00MN
		1	MT22-01MN
		2	MT22-02MN
		3	MT22-03MN

Note: the standard angle of shim for our threading tools is 1°. ((MT16-01MN or MT22-01MN))

e = Helical angle



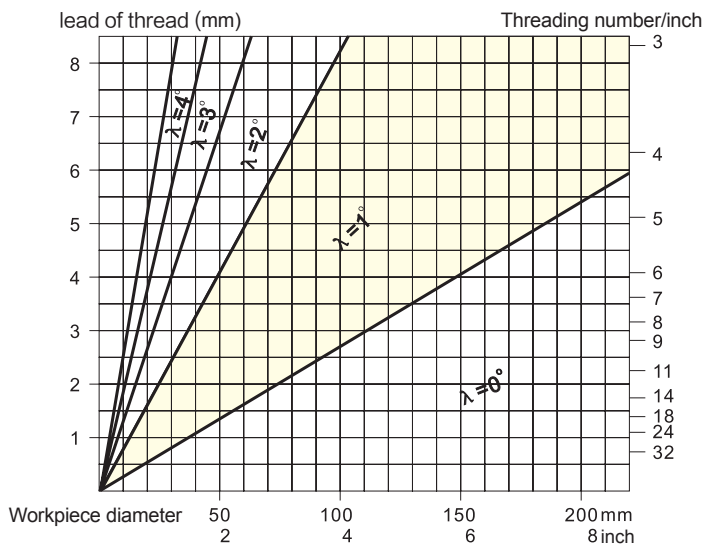
λ = Inclined angle



Please refer to the table below for actual value:

Thread profile angle 2θ	β	
	External thread	Internal thread
60°	5.8°	8.79°
55°	5.24°	7.94°
30°	2.7°	4.1°
29°	2.6°	3.96°

Select shim:





Select proper inserts and size of tool holder (Please refer to detailed table of threading tools and inserts)

### Parameter table for threading program under different standards

■ Table of recommended in-feed for metric ISO external threading with wiper edge

Screw pitch	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0
Total in-feed	0.72	0.86	1.02	1.17	1.33	1.63	1.94	2.58	3.21
Number of passes	5	6	7	8	9	11	13	15	17
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)								
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.20/-	0.20/-	0.21/-	0.22/-	0.24/-	0.26/-	0.26/-	0.35/-	0.40/-
2	0.18/0.10	0.18/0.10	0.18/0.10	0.20/0.12	0.22/0.13	0.24/0.14	0.24/0.14	0.30/0.17	0.35/0.20
3	0.16/0.09	0.14/0.09	0.18/0.10	0.18/0.10	0.20/0.12	0.21/0.12	0.20/0.12	0.25/0.14	0.30/0.17
4	0.10/0.06	0.10/0.08	0.15/0.09	0.15/0.09	0.15/0.09	0.18/0.10	0.20/0.12	0.20/0.12	0.28/0.18
5	0.08/-	0.08/0.06	0.12/0.07	0.13/0.08	0.12/0.07	0.15/0.09	0.18/0.10	0.18/0.10	0.25/0.14
6			0.10/0.06	0.11/0.06	0.12/0.07	0.12/0.07	0.15/0.09	0.18/0.10	0.20/0.12
7			0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.13/0.08	0.16/0.09	0.18/0.10
8				0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.15/0.09	0.16/0.09
9					0.08/-	0.10/0.06	0.10/0.06	0.15/0.09	0.15/0.09
10						0.08/0.05	0.10/0.06	0.13/0.08	0.15/0.09
11						0.08/-	0.08/0.06	0.12/0.07	0.13/0.08
12							0.08/0.05	0.12/0.07	0.13/0.08
13								0.11/0.06	0.12/0.07
14								0.10/0.06	0.12/0.07
15								0.08/-	0.11/0.06
16									0.10/0.06
17									0.08/-

General turning

Parting and grooving

Threading

Application information of threading



■ Table of recommended in-feed for metric ISO internal threading with wiper edge

Screw pitch	1.00	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0
Total in-feed	0.62	0.77	0.92	1.06	1.21	0.15	1.79	2.36	2.95
Number of passes	5	6	7	8	9	11	13	15	17
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)								
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.18/-	0.20/-	0.22/-	0.23/-	0.24/-	0.26/-	0.26/-	0.30/-	0.32/-
2	0.14/0.08	0.15/0.09	0.16/0.09	0.16/0.09	0.18/0.10	0.20/0.12	0.20/0.12	0.25/0.14	0.28/0.16
3	0.12/0.07	0.12/0.07	0.14/0.08	0.14/0.08	0.15/0.09	0.15/0.09	0.20/0.12	0.22/0.13	0.25/0.14
4	0.10/0.06	0.12/0.07	0.12/0.07	0.13/0.08	0.14/0.08	0.15/0.09	0.18/0.10	0.20/0.12	0.22/0.13
5	0.08/-	0.10/0.06	0.11/0.06	0.12/0.07	0.12/0.07	0.13/0.08	0.15/0.09	0.18/0.10	0.21/0.12
6			0.09/0.05	0.10/0.06	0.11/0.06	0.12/0.07	0.12/0.07	0.15/0.09	0.20/0.12
7			0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.12/0.07	0.15/0.09	0.18/0.10
8				0.08/-	0.09/0.05	0.10/0.06	0.10/0.06	0.15/0.09	0.18/0.10
9					0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.15/0.09
10						0.09/0.05	0.10/0.06	0.12/0.07	0.15/0.09
11						0.08/-	0.10/0.06	0.12/0.07	0.15/0.09
12							0.08/0.05	0.11/0.06	0.15/0.09
13								0.11/0.06	0.12/0.07
14								0.10/0.06	0.11/0.06
15								0.08/-	0.10/0.06
16									0.10/0.06
17									0.08/-

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Table of recommended in-feed for American unified standard external threading with wiper edge

Screw pitch	24	20	18	16	14	12	11	10	9	8	7	6	5
Total in-feed	0.649	0.779	0.866	0.974	1.113	1.299	1.416	1.558	1.731	1.948	2.226	2.597	3.116
Number of passes	5	6	6	7	9	9	10	11	12	13	14	15	16
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)												
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.206 / —	0.210 / —	0.233 / —	0.226 / —	0.196 / —	0.229 / —	0.220 / —	0.214 / —	0.210 / —	0.211 / —	0.213 / —	0.218 / —	0.229 / —
2	0.148 / 0.086	0.163 / 0.094	0.181 / 0.104	0.188 / 0.109	0.189 / 0.110	0.222 / 0.128	0.228 / 0.132	0.240 / 0.139	0.256 / 0.148	0.276 / 0.160	0.304 / 0.178	0.343 / 0.198	0.399 / 0.230
3	0.114 / 0.066	0.125 / 0.072	0.139 / 0.080	0.145 / 0.083	0.146 / 0.084	0.170 / 0.098	0.176 / 0.102	0.184 / 0.106	0.196 / 0.113	0.212 / 0.122	0.234 / 0.135	0.263 / 0.152	0.306 / 0.177
4	0.096 / 0.055	0.105 / 0.061	0.117 / 0.068	0.122 / 0.070	0.123 / 0.071	0.143 / 0.083	0.148 / 0.086	0.155 / 0.090	0.165 / 0.095	0.179 / 0.103	0.197 / 0.114	0.222 / 0.128	0.258 / 0.149
5	0.085 / 0.049	0.093 / 0.054	0.103 / 0.059	0.107 / 0.062	0.108 / 0.062	0.126 / 0.073	0.131 / 0.075	0.137 / 0.079	0.146 / 0.084	0.158 / 0.091	0.173 / 0.100	0.195 / 0.113	0.227 / 0.131
6		0.084 / 0.048	0.093 / 0.054	0.097 / 0.056	0.098 / 0.056	0.114 / 0.066	0.118 / 0.068	0.124 / 0.072	0.132 / 0.076	0.142 / 0.082	0.157 / 0.091	0.177 / 0.102	0.205 / 0.119
7				0.089 / 0.052	0.090 / 0.052	0.105 / 0.061	0.108 / 0.063	0.114 / 0.066	0.121 / 0.070	0.131 / 0.076	0.144 / 0.083	0.163 / 0.094	0.189 / 0.109
8					0.084 / 0.048	0.098 / 0.056	0.101 / 0.058	0.106 / 0.061	0.113 / 0.065	0.122 / 0.070	0.134 / 0.078	0.151 / 0.087	0.176 / 0.101
9					0.079 / 0.045	0.092 / 0.053	0.095 / 0.055	0.100 / 0.057	0.106 / 0.061	0.114 / 0.066	0.126 / 0.073	0.142 / 0.082	0.165 / 0.086
10							0.090 / 0.052	0.094 / 0.054	0.100 / 0.058	0.108 / 0.063	0.119 / 0.069	0.134 / 0.078	0.156 / 0.090
11								0.090 / 0.052	0.095 / 0.055	0.103 / 0.059	0.113 / 0.065	0.128 / 0.074	0.149 / 0.086
12									0.091 / 0.053	0.098 / 0.057	0.108 / 0.063	0.122 / 0.071	0.142 / 0.082
13										0.094 / 0.054	0.104 / 0.060	0.117 / 0.068	0.136 / 0.079
14											0.100 / 0.058	0.113 / 0.065	0.131 / 0.076
15												0.109 / 0.063	0.126 / 0.073
16													0.122 / 0.071

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Table of recommended in-feed for American unified standard internal threading with wiper edge

Screw pitch	24	20	18	16	14	12	11	10	9	8	7	6	5
Total in-feed	0.573	0.687	0.764	0.860	0.982	1.146	1.250	1.375	1.528	1.719	1.964	2.291	2.750
Number of passes	5	6	6	7	8	9	9	10	11	12	13	14	15
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)												
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.193 —	0.200 —	0.222 —	0.219 —	0.220 —	0.228 —	0.250 —	0.247 —	0.246 —	0.252 —	0.262 —	0.278 —	0.302 —
2	0.127 0.073	0.239 0.081	0.155 0.089	0.161 0.093	0.173 0.100	0.190 0.110	0.207 0.120	0.216 0.125	0.229 0.132	0.247 0.142	0.271 0.156	0.304 0.176	0.353 0.204
3	0.098 0.056	0.107 0.062	0.119 0.069	0.124 0.072	0.132 0.076	0.146 0.084	0.159 0.092	0.166 0.096	0.176 0.101	0.189 0.109	0.208 0.120	0.234 0.135	0.271 0.156
4	0.082 0.048	0.090 0.052	0.100 0.058	0.104 0.060	0.112 0.064	0.123 0.071	0.134 0.077	0.140 0.081	0.148 0.086	0.160 0.092	0.175 0.101	0.197 0.114	0.228 0.132
5	0.073 0.042	0.079 0.046	0.088 0.051	0.092 0.053	0.098 0.057	0.108 0.062	0.118 0.068	0.123 0.071	0.130 0.075	0.141 0.081	0.1543 0.089	0.173 0.100	0.201 0.116
6		0.072 0.041	0.080 0.046	0.083 0.048	0.089 0.051	0.098 0.056	0.107 0.062	0.111 0.064	0.118 0.068	0.127 0.073	0.140 0.081	0.157 0.091	0.182 0.105
7				0.077 0.044	0.082 0.047	0.090 0.052	0.098 0.057	0.102 0.059	0.108 0.063	0.117 0.067	0.128 0.074	0.144 0.083	0.167 0.097
8					0.076 0.044	0.084 0.048	0.091 0.053	0.096 0.055	0.101 0.058	0.109 0.063	0.119 0.069	0.134 0.078	0.156 0.090
9						0.079 0.045	0.086 0.050	0.090 0.052	0.095 0.055	0.102 0.059	0.112 0.065	0.126 0.073	0.146 0.084
10								0.085 0.049	0.090 0.052	0.097 0.056	0.106 0.061	0.119 0.069	0.138 0.080
11									0.085 0.049	0.092 0.053	0.101 0.058	0.113 0.065	0.131 0.076
12										0.088 0.051	0.096 0.056	0.108 0.063	0.126 0.073
13											0.092 0.053	0.101 0.060	0.121 0.070
14												0.100 0.058	0.116 0.067
15													0.112 0.065

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Table of recommended in-feed for British standard internal and external threading with wiper edge

Screw pitch	28	20	19	16	14	12	11	10	9	8	7	6	5
Total in-feed	0.581	0.813	0.856	1.017	1.162	1.355	1.479	1.626	1.807	2.033	2.324	2.711	3.253
Number of passes	5	6	6	8	8	9	9	10	11	12	14	15	16
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)												
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.179 /— —	0.211 /— —	0.223 /— —	0.196 /— —	0.223 /— —	0.226 /— —	0.246 /— —	0.236 /— —	0.230 /— —	0.255 /— —	0.195 /— —	0.197 /— —	0.204 /— —
2	0.134 /0.070	0.172 /0.089	0.181 /0.094	0.186 /0.097	0.213 /0.111	0.234 /0.122	0.265 /0.133	0.226 /0.139	0.282 /0.147	0.304 /0.158	0.322 /0.167	0.361 /0.189	0.421 /0.219
3	0.104 /0.054	0.132 /0.069	0.139 /0.072	0.143 /0.074	0.163 /0.085	0.180 /0.093	0.197 /0.102	0.206 /0.106	0.216 /0.113	0.233 /0.121	0.247 /0.128	0.278 /0.145	0.323 /0.166
4	0.087 /0.045	0.111 /0.058	0.117 /0.061	0.120 /0.063	0.138 /0.072	0.151 /0.079	0.165 /0.086	0.172 /0.090	0.182 /0.096	0.197 /0.102	0.208 /0.108	0.234 /0.122	0.272 /0.142
5	0.077 /0.040	0.098 /0.051	0.103 /0.054	0.106 /0.055	0.121 /0.063	0.133 /0.069	0.145 /0.076	0.152 /0.079	0.161 /0.084	0.1738 /0.090	0.183 /0.095	0.207 /0.108	0.240 /0.125
6		0.088 /0.046	0.093 /0.049	0.096 /0.050	0.110 /0.057	0.121 /0.063	0.131 /0.068	0.137 /0.071	0.145 /0.076	0.157 /0.082	0.166 /0.086	0.187 /0.097	0.217 /0.113
7				0.088 /0.046	0.101 /0.052	0.111 /0.058	0.121 /0.063	0.126 /0.066	0.134 /0.070	0.144 /0.075	0.152 /0.079	0.172 /0.089	0.200 /0.104
8				0.082 /0.043	0.093 /0.049	0.103 /0.054	0.113 /0.059	0.117 /0.061	0.124 /0.065	0.134 /0.070	0.142 /0.074	0.160 /0.083	0.186 /0.097
9						0.097 /0.050	0.106 /0.055	0.110 /0.057	0.117 /0.061	0.126 /0.066	0.133 /0.069	0.150 /0.078	0.174 /0.091
10								0.104 /0.064	0.111 /0.068	0.119 /0.062	0.126 /0.066	0.142 /0.074	0.165 /0.086
11									0.105 /0.055	0.113 /0.059	0.120 /0.062	0.135 /0.070	0.157 /0.082
12										0.108 /0.056	0.114 /0.060	0.129 /0.067	0.150 /0.078
13											0.110 /0.055	0.124 /0.064	0.144 /0.075
14												0.119 /0.062	0.138 /0.072
15												0.115 /0.060	0.133 /0.069
16													0.129 /0.067

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■ Table of recommended in-feed for NPT internal and external threading with wiper edge

Screw pitch	27	18	14	11.5	8
Total in-feed	0.75	1.129	1.451	1.767	2.54
Number of passes	6	8	10	12	14
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)				
	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.19/-	0.22/-	0.240/-	0.24/-	0.255/-
2	0.15/0.087	0.181/0.104	0.200/0.115	0.208/0.120	0.250/0.144
3	0.13/0.075	0.162/0.088	0.170/0.098	0.182/0.105	0.245/0.141
4	0.11/0.063	0.141/0.081	0.150/0.088	0.168/0.097	0.230/0.133
5	0.09/0.052	0.131/0.075	0.140/0.081	0.155/0.089	0.210/0.121
6	0.08/0.46	0.121/0.070	0.130/0.075	0.145/0.084	0.195/0.112
7		0.101/0.068	0.120/0.069	0.138/0.079	0.180/0.104
8		0.082/0.047	0.110/0.063	0.124/0.072	0.175/0.101
9			0.100/0.068	0.117/0.067	0.170/0.098
10			0.091/0.052	0.105/0.060	0.155/0.089
11				0.095/0.055	0.140/0.080
12				0.090/0.052	0.125/0.072
13					0.110/0.053
14					0.100/0.058

■ Table of recommended in-feed for BSPT internal and external threading with wiper edge

Screw pitch	28	19	14	11
Total in-feed	0.581	0.856	1.162	1.479
Number of passes	5	6	8	10
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)			
	X/Z	X/Z	X/Z	X/Z
1	0.178/-	0.223/-	0.222/-	0.214/-
2	0.134/0.070	0.181/0.094	0.213/0.111	0.242/0.128
3	0.103/0.054	0.139/0.072	0.163/0.085	0.186/0.097
4	0.087/0.045	0.117/0.061	0.138/0.072	0.157/0.082
5	0.078/0.040	0.103/0.064	0.121/0.063	0.138/0.072
6		0.093/0.049	0.110/0.057	0.125/0.065
7			0.101/0.052	0.115/0.060
8			0.094/0.049	0.107/0.056
9				0.100/0.052
10				0.095/0.049





**Table of recommended cutting parameters**

ISO	Material		Unit cutting force Kc0.4 N/mm <sup>2</sup>	Hardness HB	Grade	
					YBG202 YBG203 YBG205	
					Cutting speed(m/min)	
<b>P</b>	Carbon steel	C=0.15%	1900	125	150-175	
		C=0.35%	2100	150	140-155	
		C=0.60%	2250	200	130-145	
	Alloy steel	Anneal	2100	180	110-130	
		Hardened	2600	275	80-100	
		Hardened	2700	300	70-90	
		Hardened	2850	350	60-80	
	High alloy steel	Anneal	2600	200	90-115	
		Hardened	3900	325	70-90	
	Cast steel	Non-alloy	2000	180	180-210	
		low alloy	2500	200	90-115	
		High alloy	2700	225	90-115	
Martensite steel 12%Mn		3600	250	40-50		
<b>M</b>	Stainless steel	Austenite	2450	180	110-130	
		Martensite/Ferrite	2300	200	130-170	
<b>K</b>	Malleable cast iron	Ferrite	1100	130	110-140	
		Pearlite	1100	230	85-105	
	Gray cast iron	Low tensile-strength	1100	180	110-140	
		High tensile-strength	1500	260	90-115	
Nodular cast iron	Ferrite	1100	160	110-130		
	Pearlite	1800	250	80-100		
<b>N</b>	Al alloy	Non-aging treatment	500	60	1300-1450	
		Aging treatment	800	100	450-500	
	Cast aluminum alloy	Non-aging treatment	750	75	430-470	
Aging treatment		900	90	250-290		
<b>S</b>	Heat resistant alloy	Iron base	Anneal	3000	200	35-50
			Aging	3050	280	25-35
		Ni- or Co- base	Anneal	3500	250	15-25
			Aging	4150	350	10-20
		Casting	4150	320	10-15	
<b>H</b>	Hardened steel	Hardened steel	4500	HRC55	40-50	

Note: •The values in the above table are range values. High values in the range could be considered in actual cutting. When trying new cutting speed, please check the cutting edge condition before operation.  
 •In stainless steel threading, high cutting speed should be used to prevent built-up edge.  
 •The cutting parameters should be reduced when cutting small pitch thread and when using tools with small nose radius.  
 •When cutting thread by tools with small nose radius, such as NPT standard thread, it is advisable to use tools with big nose radius first to rough, so as to improve the life of tools with small nose radius.

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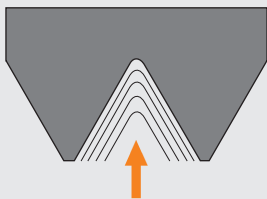
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## In-feed way of threading tools

### Radial in-feed



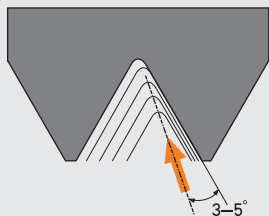
- Easy operating, high general.
- V-shape chip caused by long chip steel workpiece will produce big bend stress on cutting edge.
- It requires low cutting depth, sharp cutting edge and good tough material.
- Big quantity of heat when cutting ,V-shape chip is hard to control.
- Because the interface of cutting chips on the right and left side is long, so it is easy to cause vibration and make the cutting edge suffer more overloading.

### Flank in-feed



- Cutting edge suffer small bend stress, stable estate, it is easy for chips formation in deep cutting depth.
- There are enough space to leave chips flow when flank in-feed.
- Big abrasion on right flank.

### Modified flank in-feed



- Right Cutting Edge also engage on cutting depth to a certain extent, it can reduce the abrasion on right side of clearance face.
- Cutting edge suffer small bend stress, stable estate, it is easy for chips formation in deep cutting depth.
- Good Cutting Performance.

### Alternate flank in-feed



- Cutting edge trade off when machining, equality abrasion on left and right side of clearance face on cutting edge, it can improve the life of tools.
- Chips are flowing from both of right and left side, good chips flowing.
- Recommend using in big screw-pitch thread cutting.



Recommend adopting flank in-feed or alternate flank in-feed under allowable range of machining equipment or programmer, it can eliminate the machining vibration effectively, and it has enough space discharge the chips between pitch. Cutting edge suffer a small stress, machining stable, it likes the general turning process when machining thread, good chip control without extra chips.



## Common problems in threading and solutions

Problem	Cause	Solutions
Wear on clearance face	Cutting speed too high.	Reduce cutting speed.
	Low cutting depth, abrasion.	Reduce frequency of feed and friction of cutting edge.
	Inserts are over the center line.	Adopt correct center height.
Asymmetric wear on right and left cutting edge	The inclined angle of insert is different from the helical angle of thread.	Change to proper shim to get correct inclined angle.
	Flank in-feed is not correct.	Change the way of flank in-feed.
Breakage	Cutting speed too low.	Increase cutting speed.
	Cutting force too high.	Increase frequency of feed and reduce Max in-feed.
	Unstable clamping.	Check if workpiece vibrates. Reduce overhang of tool. Verify clamping of workpiece and tool.
	Chip twisting.	Increase the pressure of cooling liquid to blow away chips.
Plastic deformation	High cutting speed, high temperature on cutting area.	Reduce cutting speed. Increase feed frequency and reduce Max cutting depth.
	Insufficient cooling fluid.	Increase cooling fluid supply.
Low thread surface quality	Cutting speed too low. The insert is over the center line. Chips are not under control.	Increase cutting speed. Adjust centre height. Change the operation way of tools to well control chips.
Incorrect profile	Incorrect center height.	Adjust centre height.
	Pitch on machine is not correct.	Adjust machine.
Shallow profile	Cutting speed set wrong.	Adjust cutting depth.
Surface damage	Chips involved or contacted.	Change to flank in-feed to control chip flow direction.
Built-up edge	Temperature of cutting edge is too low. Usually occur when machining stainless steel and low carbon steel.	Increase cutting speed as well as pressure and concentration of cooling fluid. Choose inserts with good toughness.
Crack on surface	Cutting force too high	Reduce the cutting depth of each feed.
Vibration	Incorrect clamping of workpiece or tool	Verify clamping of workpiece and tool. Minimize overhang of tool.
	Incorrect cutting parameters	Increase cutting speed or reduce it substantially.
	Incorrect tool clamping	Adjust center height.