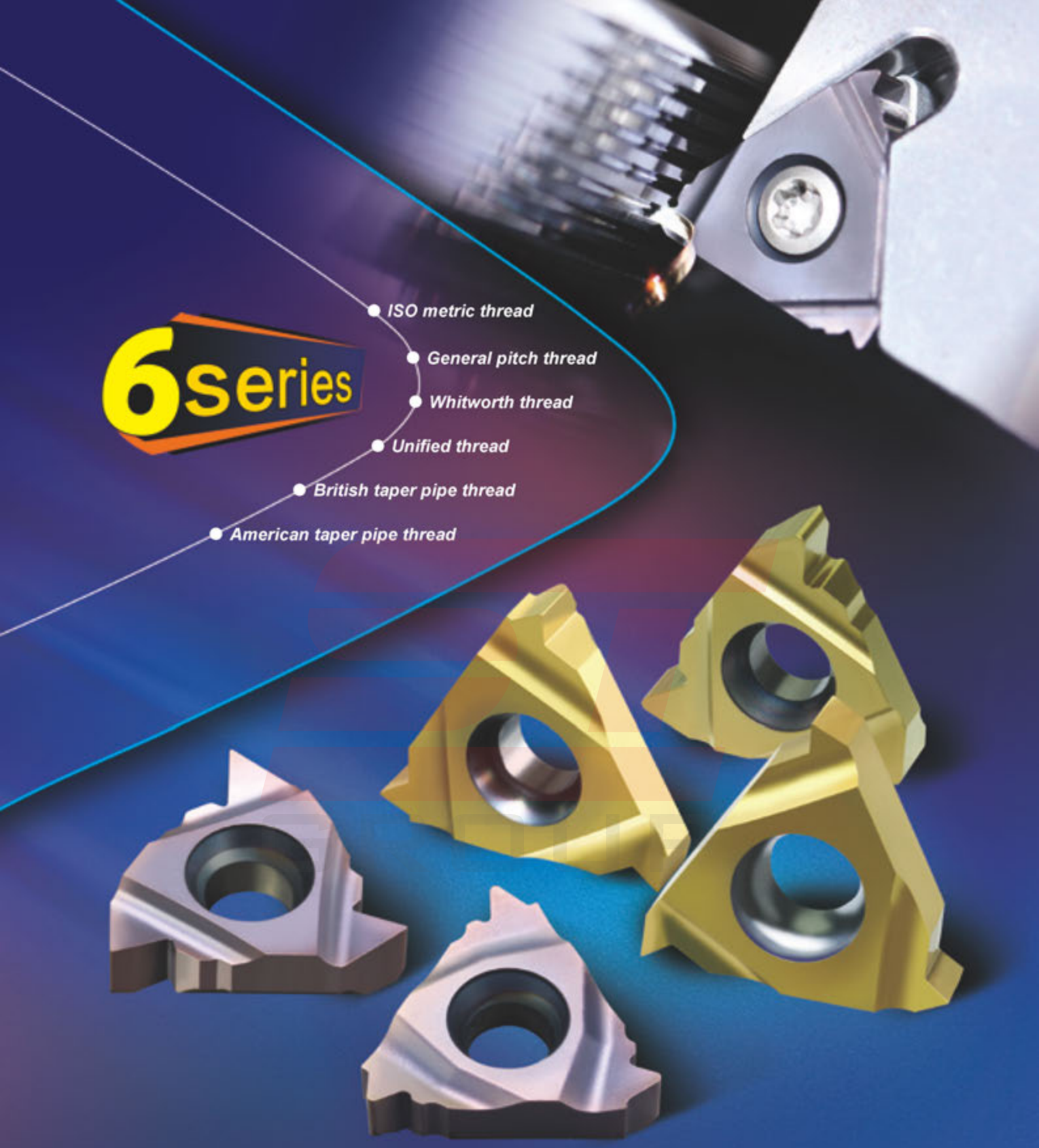


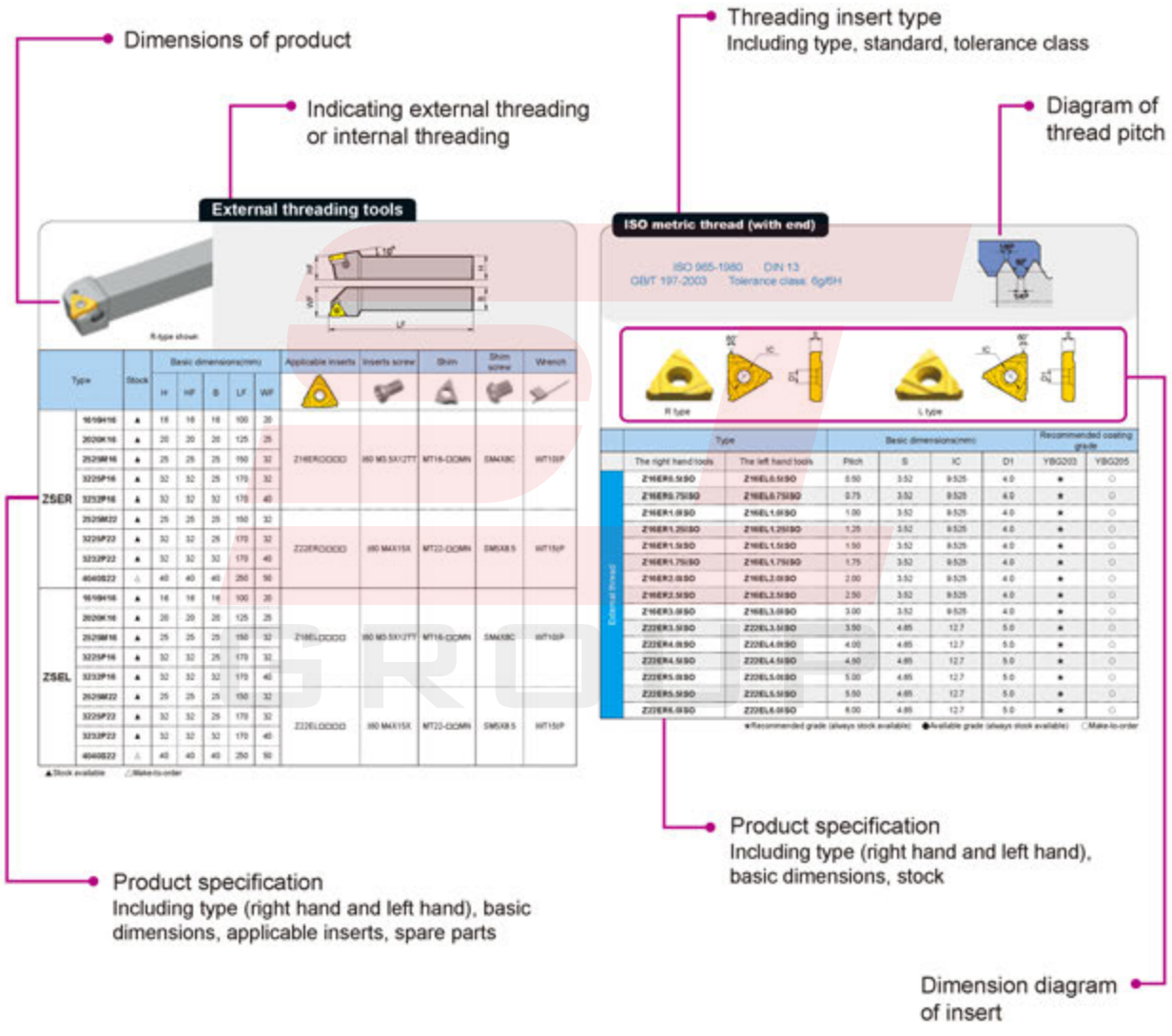
Threading insert

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

How to select threading tools

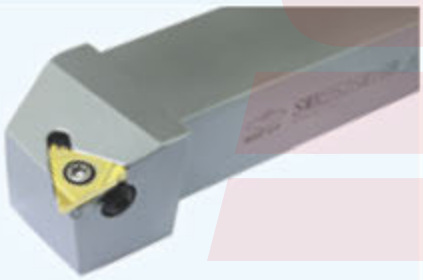
Structure of threading tools selected table

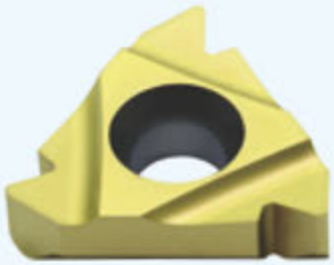
- Categorized as external threading and internal threading according to machining type.
- Separately listed out according to series.



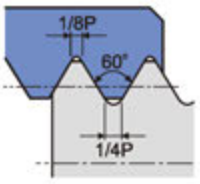
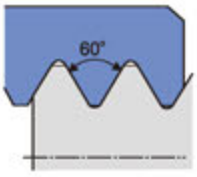
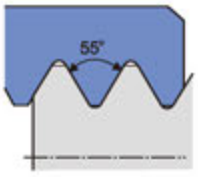
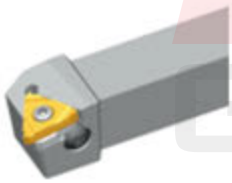
TURNING A

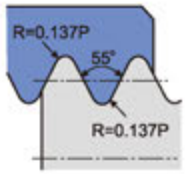
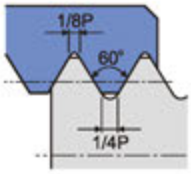
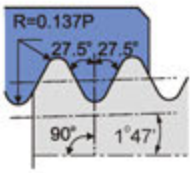
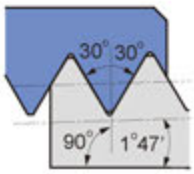
Threading tools



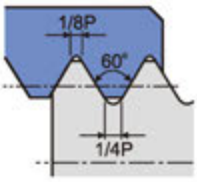
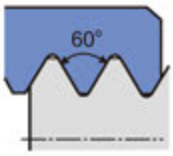
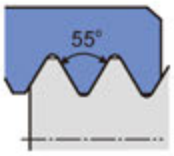
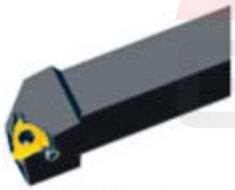


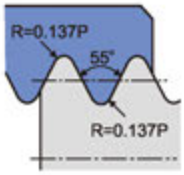
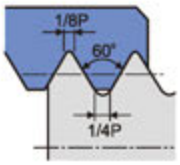
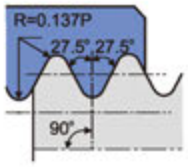
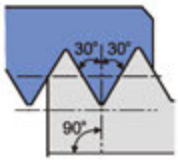
Threading tools overview

Applications		For general use					
Legend of thread profile							
Thread name		ISO metric thread With end		General pitch thread Without end		General pitch thread Without end	
Thread profile		**ISO**		**60**		**55**	
Picture of insert (length: 11, 16, 22mm)		R style shown  A294 A301		R style shown  A296 A302		R style shown  A396 A302	
Pitch / Tool holder	Dimensions (mm) (H×W×L) (Dia×L×Min. dia)	Pitch/mm		Pitch/mm (pitch/Inch)		Pitch/mm (pitch/Inch)	
External thread	 R-type shown A308	16×16×100 20×20×125 25×25×150 32×25×170 32×32×170 40×40×250	0.5~6.0	1.0~3.0	0.5~5.0 (5~48)	0.5~5.0 (5~48)	0.5~5.0 (5~48)	0.5~5.0 (5~48)
Internal thread	 R-type shown A309	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	1.0~3.0	0.5~5.0 (5~48)	0.5~5.0 (5~48)	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 taper pipe thread		American taper pipe thread	
W		**UN**		**BSPT**		**NPT**	
R style shown		R style shown		R style shown		R style shown	
							
A297	A303	A298	A304	A299	A305	A300	A306
Pitch/mm (pitch/Inch)		Pitch/mm (pitch/Inch)		Pitch/mm (pitch/Inch)		Pitch/mm (pitch/Inch)	
8~19	11~19	8~24	12~16	11~28	11~19	8~27	11.5~18
8~19	11~19	8~24	12~16	11~28	11~19	8~27	11.5~18

Threading tools overview

Applications		For general use		
Legend of thread profile				
Thread name		ISO metric thread With end	General pitch thread Without end	General pitch thread Without end
Thread profile		**GM**	**60**	**55**
Picture of insert (length: 11, 16, 22mm)		R style shown  A311	R style shown  A313	R style shown  A313
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 A319	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 A320	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)

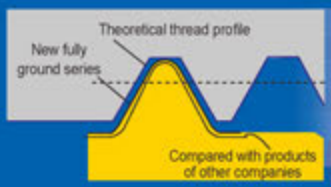
For general use	For aerospace industry	Heater, gas and water pipe thread	For gas and water faucet and pipe connection
			
Whitworth thread	Unified thread (American standard threads)	British taper pipe thread	American taper pipe thread
W	**UN**	**BSPT**	**NPT**
R style shown  A314	R style shown  A315	R style shown  A316	R style shown  A317
Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)
8~16	8~20	11~28	8~27
8~16	8~20	11~28	8~27

YBG203

New nano coating grade

suitable for threading in a variety of materials

- **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**



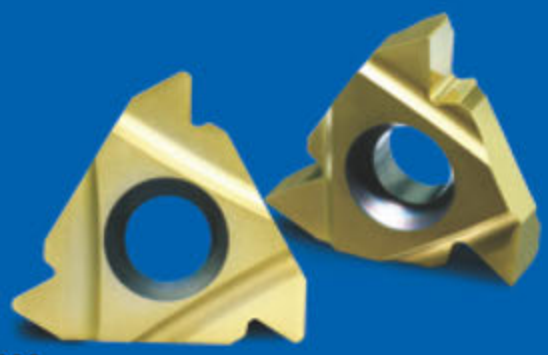
Thread type	Grade of tolerance
ISO metric thread	6g/6H
Whitworth thread W	Medium Class A
British taper pipe thread	Standard BSPT
Unified thread	2A/2B
American taper pipe thread	Standard NPT

- **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 structre, improving coating stress, enhancing bond strength of coating and substrate.



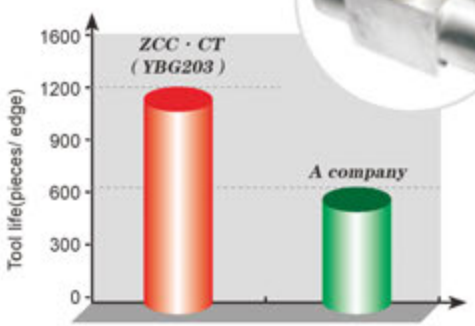
Case:

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	∅6.35
Z16	∅9.525
Z22	∅12.7

Cutting style

E -External threading inserts

I -Internal threading inserts

Cutting direction

R-Righ

L-Left

Z16 E R 2.0 ISO (PP)

Thread pitch

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

mm	TPI
0.5-6.0	48-5

V profile (Range of Thread 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 taper pipe thread	11-28
Unified thread	8-24
American taper pipe thread	8-27

Thread 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 taper pipe thread

NPT—American taper pipe thread

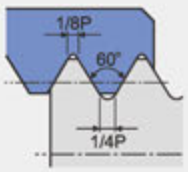
Chip breaker

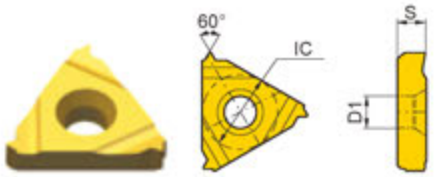
□-fully ground edge insert

PP –3-Dimensional chip-breaking insert

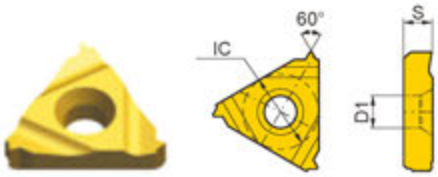
ISO metric thread (with end)

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





R type



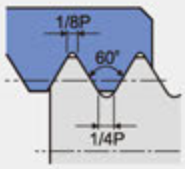
L type

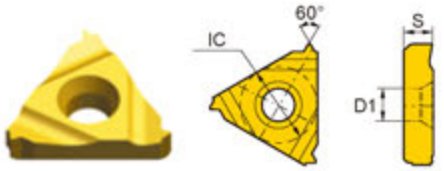
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	IC	D1	YBG203	YBG205
External thread	Z16ER0.5ISO	Z16EL0.5ISO	0.50	3.52	9.525	4.0	★	○
	Z16ER0.75ISO	Z16EL0.75ISO	0.75	3.52	9.525	4.0	★	○
	Z16ER1.0ISO	Z16EL1.0ISO	1.00	3.52	9.525	4.0	★	○
	Z16ER1.25ISO	Z16EL1.25ISO	1.25	3.52	9.525	4.0	★	○
	Z16ER1.5ISO	Z16EL1.5ISO	1.50	3.52	9.525	4.0	★	○
	Z16ER1.75ISO	Z16EL1.75ISO	1.75	3.52	9.525	4.0	★	○
	Z16ER2.0ISO	Z16EL2.0ISO	2.00	3.52	9.525	4.0	★	○
	Z16ER2.5ISO	Z16EL2.5ISO	2.50	3.52	9.525	4.0	★	○
	Z16ER3.0ISO	Z16EL3.0ISO	3.00	3.52	9.525	4.0	★	○
	Z22ER3.5ISO	Z22EL3.5ISO	3.50	4.65	12.7	5.0	★	○
	Z22ER4.0ISO	Z22EL4.0ISO	4.00	4.65	12.7	5.0	★	○
	Z22ER4.5ISO	Z22EL4.5ISO	4.50	4.65	12.7	5.0	★	○
	Z22ER5.0ISO	Z22EL5.0ISO	5.00	4.65	12.7	5.0	★	○
	Z22ER5.5ISO	Z22EL5.5ISO	5.50	4.65	12.7	5.0	★	○
	Z22ER6.0ISO	Z22EL6.0ISO	6.00	4.65	12.7	5.0	★	○

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

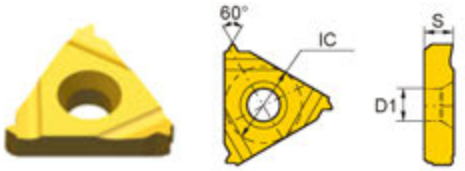
ISO metric thread (with end)

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





R type

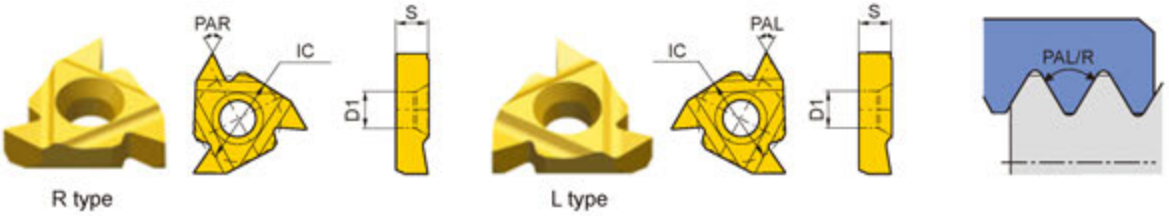


L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	IC	D1	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 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	IC	D1	PAL/R	YBG203	YBG205
External thread	55°	Z16ERA55	Z16ELA55	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★	○
		Z16ERG55	Z16ELG55	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★	○
		Z16ERAG55	Z16ELAG55	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★	○
		Z22ERN55	Z22ELN55	3.5-5.0(7-5)	4.65	12.7	5.0	55°	★	○
	60°	Z16ERA60	Z16ELA60	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★	○
		Z16ERG60	Z16ELG60	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★	○
		Z16ERAG60	Z16ELAG60	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★	○
		Z22ERN60	Z22ELN60	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

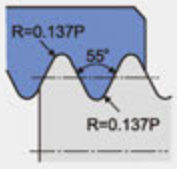
R type L type

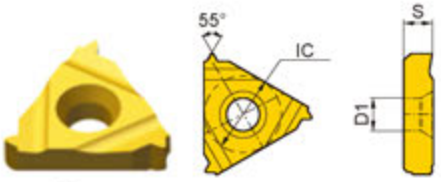
		Type		Basic dimensions(mm)					Recommended coating grade	
		The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	PAL/R	YBG203	YBG205
Internal thread	55°	Z11IRA55	Z11ILA55	0.5-1.5(48-16)	3.05	6.35	3.2	55°	★	○
		Z16IRA55	Z16ILA55	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★	○
		Z16IRG55	Z16ILG55	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★	○
		Z16IRAG55	Z16ILAG55	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★	○
		Z22IRN55	Z22ILN55	3.5-5.0(7-5)	4.65	12.7	5.0	55°	★	○
	60°	Z11IRA60	Z11ILA60	0.5-1.5(48-16)	3.05	6.35	3.2	60°	★	○
		Z16IRA60	Z16ILA60	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★	○
		Z16IRG60	Z16ILG60	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★	○
		Z16IRAG60	Z16ILAG60	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★	○
		Z22IRN60	Z22ILN60	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

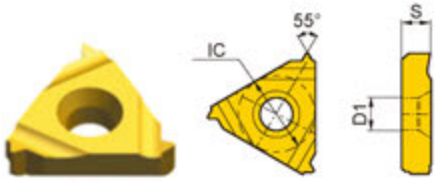
Whitworth thread (with end)

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





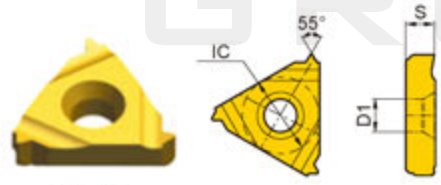
R type



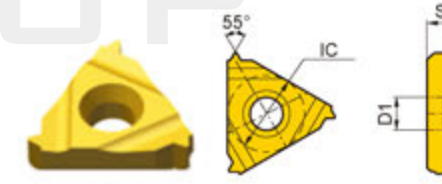
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	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



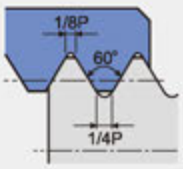
L type

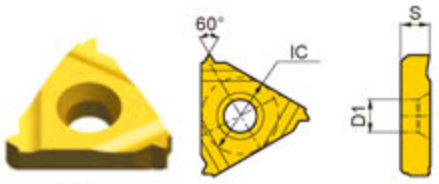
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YBG203	YBG205
Internal thread	Z16IR8W	Z16IL8W	8	3.52	9.525	4.0	★	○
	Z16IR9W	Z16IL9W	9	3.52	9.525	4.0	★	○
	Z16IR10W	Z16IL10W	10	3.52	9.525	4.0	★	○
	Z16IR11W	Z16IL11W	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

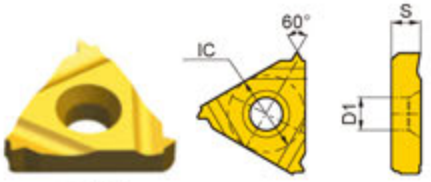
Unified thread (with end)

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





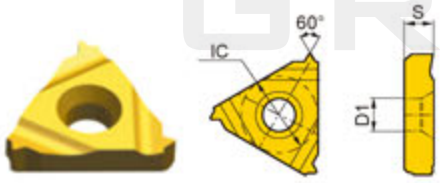
R type



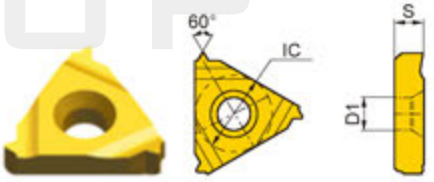
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	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



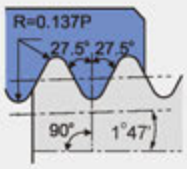
L type

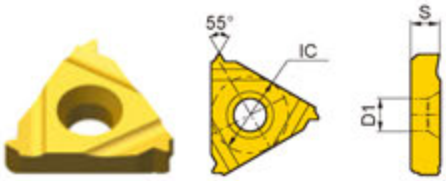
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YBG203	YBG205
Internal thread	Z16IR8UN	Z16IL8UN	8	3.52	9.525	4.0	★	○
	Z16IR10UN	Z16IL10UN	10	3.52	9.525	4.0	★	○
	Z16IR12UN	Z16IL12UN	12	3.52	9.525	4.0	★	○
	Z16IR14UN	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

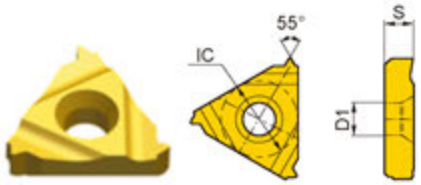
British taper pipe thread (with end)

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





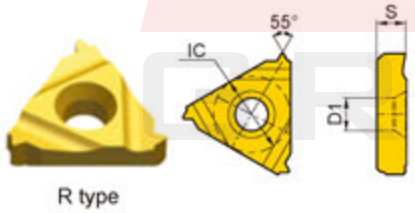
R type



L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	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



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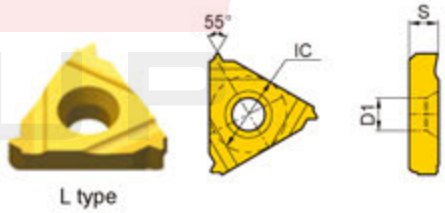


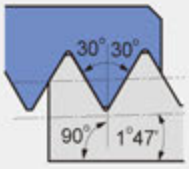
L type

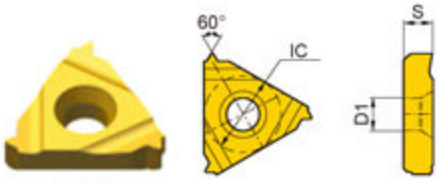
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YBG203	YBG205
Internal thread	**Z16IR11BSPT**	**Z16IL11BSPT**	11	3.52	9.525	4.0	★	○
	Z16IR14BSPT	**Z16IL14BSPT**	14	3.52	9.525	4.0	★	○
	Z16IR19BSPT	**Z16IL19BSPT**	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

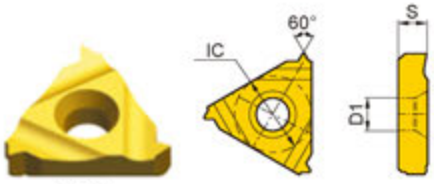
American taper pipe thread (with end)

ASME B1.20.1-1983
Standard NPT





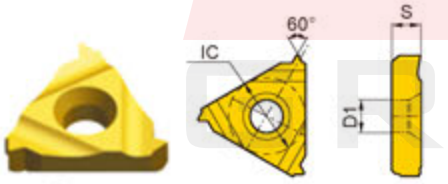
R type



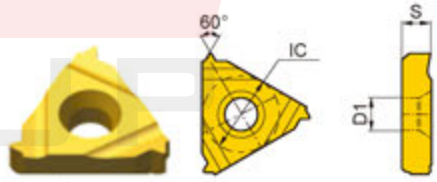
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YBG203	YBG205
External thread	**Z16ER8NPT**	**Z16EL8NPT**	8	3.52	9.525	4.0	★	○
	Z16ER11.5NPT	**Z16EL11.5NPT**	11.5	3.52	9.525	4.0	★	○
	Z16ER14NPT	**Z16EL14NPT**	14	3.52	9.525	4.0	★	○
	Z16ER18NPT	**Z16EL18NPT**	18	3.52	9.525	4.0	★	○
	Z16ER27NPT	**Z16EL27NPT**	27	3.52	9.525	4.0	★	○

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



R type



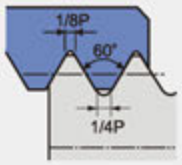
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YBG203	YBG205
Internal thread	**Z16IR8NPT**	**Z16IL8NPT**	8	3.52	9.525	4.0	★	○
	Z16IR11.5NPT	**Z16IL11.5NPT**	11.5	3.52	9.525	4.0	★	○
	Z16IR14NPT	**Z16IL14NPT**	14	3.52	9.525	4.0	★	○
	Z16IR18NPT	**Z16IL18NPT**	18	3.52	9.525	4.0	★	○
	Z16IR27NPT	**Z16IL27NPT**	27	3.52	9.525	4.0	★	○

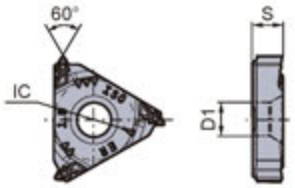
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

ISO metric thread (with end) PP chipbreaker

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

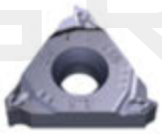


R type

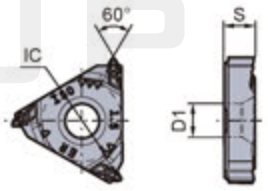


	Type	Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	Pitch	S	IC	D1	YB9120	YBG205
External thread	**Z16ER1.0ISOPP**	1.00	3.52	9.525	4.0	★	○
	Z16ER1.25ISOPP	1.25	3.52	9.525	4.0	★	○
	Z16ER1.5ISOPP	1.50	3.52	9.525	4.0	★	○
	Z16ER1.75ISOPP	1.75	3.52	9.525	4.0	★	○
	Z16ER2.0ISOPP	2.00	3.52	9.525	4.0	★	○
	Z16ER2.5ISOPP	2.50	3.52	9.525	4.0	★	○
	Z16ER3.0ISOPP	3.00	3.52	9.525	4.0	★	○

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



R type

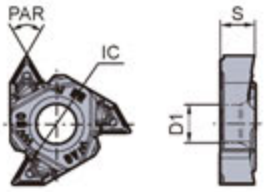


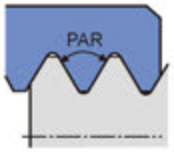
	Type	Basic dimensions(mm)				Recommended coating grade		
	The right hand tools	Pitch	S	IC	D1	YBG205H	YB9120	YBG205
Internal thread	**Z11IR1.0ISOPP**	1.00	3.05	6.35	3.2	○	★	○
	Z11IR1.25ISOPP	1.25	3.05	6.35	3.2	○	★	○
	Z11IR1.5ISOPP	1.50	3.05	6.35	3.2	○	★	○
	Z16IR1.0ISOPP	1.00	3.52	9.525	4.0		★	○
	Z16IR1.25ISOPP	1.25	3.52	9.525	4.0		★	○
	Z16IR1.5ISOPP	1.50	3.52	9.525	4.0		★	○
	Z16IR1.75ISOPP	1.75	3.52	9.525	4.0		★	○
	Z16IR2.0ISOPP	2.00	3.52	9.525	4.0		★	○
	Z16IR2.5ISOPP	2.50	3.52	9.525	4.0		★	○
	Z16IR3.0ISOPP	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) PP chipbreaker

R type

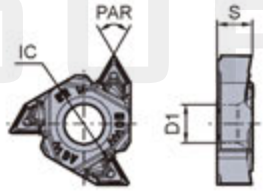


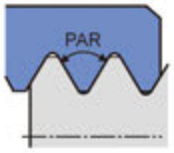


		Type	Basic dimensions(mm)					Recommended coating grade	
		The right hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	PAR	YB9120	YBG205
External thread	55°	Z16ERA55PP	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★	○
		Z16ERG55PP	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★	○
		Z16ERAG55PP	0.5-0.3(48-8)	3.52	9.525	4.0	55°	★	○
		Z22ERN55PP	3.5-5.0(7-5)	4.65	12.7	5.0	55°	★	○
	60°	Z16ERA60PP	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★	○
		Z16ERG60PP	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★	○
		Z16ERAG60PP	0.5-0.3(48-8)	3.52	9.525	4.0	60°	★	○
		Z22ERN60PP	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



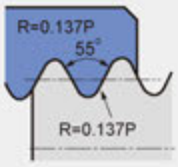


		Type	Basic dimensions(mm)					Recommended coating grade		
		The right hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	PAR	YBG205H	YB9120	YBG205
Internal thread	55°	Z11IRA55PP	0.5-1.5(48-16)	3.05	6.35	3.2	55°	○	★	○
		Z16IRA55PP	0.5-1.5(48-16)	3.52	9.525	4.0	55°		★	○
		Z16IRG55PP	1.75-3.0(14-8)	3.52	9.525	4.0	55°		★	○
		Z16IRAG55PP	0.5-3.0(48-8)	3.52	9.525	4.0	55°		★	○
		Z22IRN55PP	3.5-5.0(7-5)	4.65	12.7	5.0	55°		★	○
	60°	Z11IRA60PP	0.5-1.5(48-16)	3.05	6.35	3.2	60°	○	★	○
		Z16IRA60PP	0.5-1.5(48-16)	3.52	9.525	4.0	60°		★	○
		Z16IRG60PP	1.75-3.0(14-8)	3.52	9.525	4.0	60°		★	○
		Z16IRAG60PP	0.5-3.0(48-8)	3.52	9.525	4.0	60°		★	○
		Z22IRN60PP	3.5-5.0(7-5)	4.65	12.7	5.0	60°		★	○

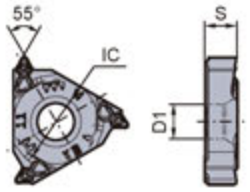
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Whitworth thread (with end) PP chipbreaker

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



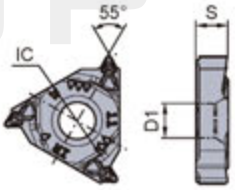
R type



	Type	Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YB9120	YBG205
External thread	Z16ER11WPP	11	3.52	9.525	4.0	★	○
	Z16ER14WPP	14	3.52	9.525	4.0	★	○
	Z16ER19WPP	19	3.52	9.525	4.0	★	○

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

R type

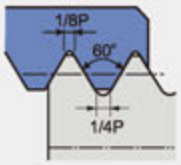


	Type	Basic dimensions(mm)				Recommended coating grade		
	The right hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YBG205H	YB9120	YBG205
Internal thread	Z11IR14WPP	14	3.05	6.35	3.2	○	★	
	Z16IR11WPP	11	3.52	9.525	4.0		★	○
	Z16IR14WPP	14	3.52	9.525	4.0		★	○
	Z16IR19WPP	19	3.52	9.525	4.0		★	○

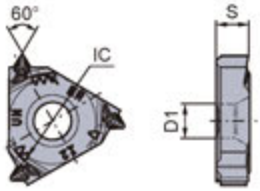
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Unified thread (with end) PP chipbreaker

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



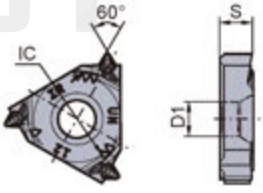
R type



	Type	Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YB9120	YBG205
External thread	**Z16ER12UNPP**	12	3.52	9.525	4.0	★	○
	Z16ER14UNPP	14	3.52	9.525	4.0	★	○
	Z16ER16UNPP	16	3.52	9.525	4.0	★	○

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

R type

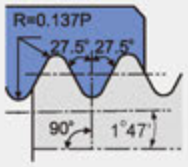


	Type	Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YB9120	YBG205
Internal thread	**Z16IR12UNPP**	12	3.52	9.525	4.0	★	○
	Z16IR14UNPP	14	3.52	9.525	4.0	★	○
	Z16IR16UNPP	16	3.52	9.525	4.0	★	○

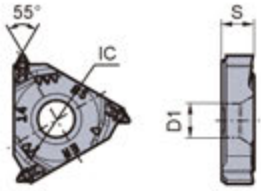
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

British taper pipe thread (with end) PP chipbreaker

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



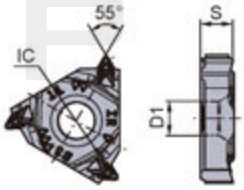
R type



	Type	Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YB9120	YBG205
External thread	Z16ER11BSPTPP	11	3.52	9.525	4.0	★	○
	Z16ER14BSPTPP	14	3.52	9.525	4.0	★	○
	Z16ER19BSPTPP	19	3.52	9.525	4.0	★	○

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

R type

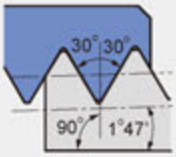


	Type	Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YB9120	YBG205
Internal thread	Z16IR11BSPTPP	11	3.52	9.525	4.0	★	○
	Z16IR14BSPTPP	14	3.52	9.525	4.0	★	○
	Z16IR19BSPTPP	19	3.52	9.525	4.0	★	○

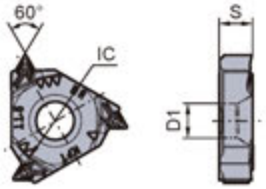
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

American taper pipe thread (with end) PP chipbreaker

ASME B1.20.1-1983
Standard NPT



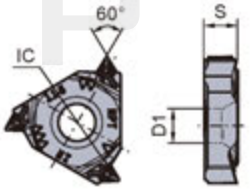
R type



	Type	Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	Pitch/mm (pitch/Inch)	S(mm)	IC(mm)	D1(mm)	YB9120	YBG205
External thread	Z16ER11.5NPTPP	11.5	3.52	9.525	4.0	★	○
	Z16ER14NPTPP	14	3.52	9.525	4.0	★	○
	Z16ER18NPTPP	18	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(mm)	IC(mm)	D1(mm)	YB9120	YBG205
Internal thread	Z16IR11.5NPTPP	11.5	3.52	9.525	4.0	★	○
	Z16IR14NPTPP	14	3.52	9.525	4.0	★	○
	Z16IR18NPTPP	18	3.52	9.525	4.0	★	○

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

Threading tools code key

Clamping system

Top clamping — Screw clamping

Thread type

I ➤ Internal thread

E ➤ External thread

Cutting direction

Right hand — Left hand

ZS E R 20 20 K 16 (C)

Nose height (mm)

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

Shank width (mm)

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

Tool length (mm)

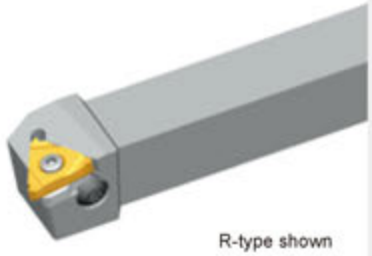
Code	H	K	M	P	Q	R	S	T	U
Length	100	125	150	170	180	200	250	300	350

Insert size (mm)

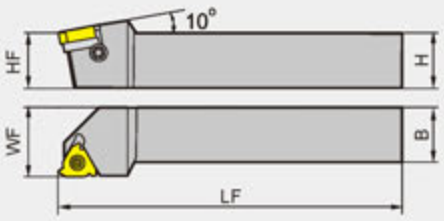
Code	11	16	22
Triangle side length	11	16	22
Inscribed circle	6.35	9.525	12.70

C—Inner-cooling

External threading tools



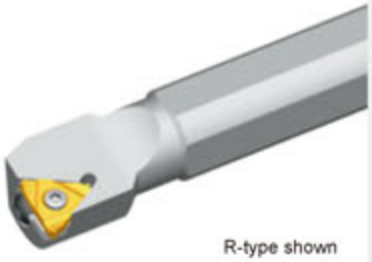
R-type shown



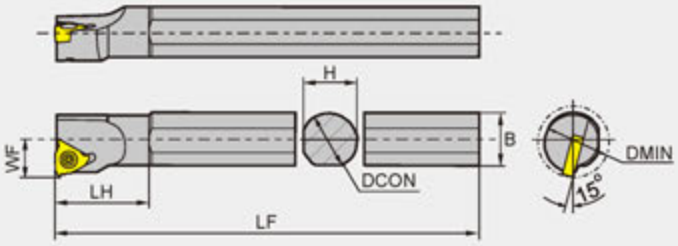
Type		Stock	Basic dimensions(mm)					Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
			H	HF	B	LF	WF					
ZSER	1616H16	▲	16	16	16	100	20	Z16ER□□□□	I60 M3.5×12TT	MT16-□□MN	SM4×8C	WT10IP
	2020K16	▲	20	20	20	125	25					
	2525M16	▲	25	25	25	150	32					
	3225P16	▲	32	32	25	170	32					
	3232P16	▲	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	Z22ER□□□□	I60 M4×15X	MT22-□□MN	SM5×8.5	WT15IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					
ZSEL	1616H16	▲	16	16	16	100	20	Z16EL□□□□	I60 M3.5×12TT	MT16-□□MN	SM4×8C	WT10IP
	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	Z22EL□□□□	I60 M4×15X	MT22-□□MN	SM5×8.5	WT15IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					

▲Stock available △Make-to-order

Internal threading tools



R-type shown



Type		Stock	Basic dimensions(mm)							Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
			DCON	LF	B	DMIN	WF	H	LH					
ZSIR	0016K11	▲	16	125	15.5	12	10	15	20.9	Z11IR□□□□	I60 M2.5×6.5T	---	---	WT08IP
	0016M11	▲	16	150	16	16	10.5	15	25.9					
	0016M16	▲	16	150	15.5	20	12	15	27	Z16IR□□□□	I60 M3.5×08TT	---	---	WT10IP
	0020M16	▲	20	150	19	25	14	18	28.7		I60 M3.5×12TT	MT16-□□MN	SM4×8C	
	0020Q16	▲	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8					
	0032R16	▲	32	200	31	40	22	30	30.9					
	0032S16	▲	32	250	31	40	22	30	30.9					
	0040T16	▲	40	300	38.5	50	27	37	31.5					
	0050U16	▲	50	350	48.5	63	35	49	40.2					
	0020Q22	▲	20	180	19	25	15	18	35	Z22IR□□□□	I60 M5×13.2	---	---	WT15IP
	0025R22	▲	25	200	24	32	19	23	39		I60 M4×15X	MT22-□□MN	SM5×8.5	
	0032S22	▲	32	250	31	40	22	30	36.4					
	0040T22	▲	40	300	38.5	50	27	37	37.2					
	0050U22	▲	50	350	48.5	63	35	47	42.6					
ZSIL	0016K11	▲	16	125	15.5	12	10	15	20.9	Z11IL□□□□	I60 M2.5×6.5T	---	---	WT08IP
	0016M11	▲	16	150	16	16	10.5	15	25.9					
	0016M16	▲	16	150	16	20	12	15	27	Z16IL□□□□	I60 M3.5×08TT	---	---	WT10IP
	0020M16	▲	20	150	19	25	14	18	28.7		I60 M3.5×12	MT16-□□MN	SM4×8C	
	0020Q16	▲	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8					
	0032R16	▲	32	200	31	40	22	30	30.9					
	0032S16	▲	32	250	31	40	22	30	30.9					
	0040T16	▲	40	300	38.5	50	27	37	31.5					
	0050U16	▲	50	350	48.5	63	35	49	40.2					
	0020Q22	▲	20	180	19	25	15	18	35	Z22IL□□□□	I60 M5×13.2	---	---	WT15IP
	0025R22	▲	25	200	24	32	19	23	39		I60 M4×15X	MT22-□□MN	SM5×8.5	
	0032S22	▲	32	250	31	40	22	30	36.4					
	0040T22	▲	40	300	38.5	50	27	37	37.2					
	0050U22	▲	50	350	48.5	63	35	47	42.6					

▲Stock available △Make-to-order

Thick threading inserts code key

Cutting direction

R > Righ L > Left

Insert

T Others Z

Insert size

22 > Diameter of IC ø12.7
16 > Diameter of IC ø9.525
11 > Diameter of IC ø6.35

Number of cutting edge pitch

01 > Number of pitch per cutting edge

Cutting style

W > External threading insert
N > Internal threading insert

R T 22. 01 W- 4.50 GM

Thread pitch

full profile(range of Thread pitch is indicated by numbers)

mm	TPI
0.35-0.9	72-2

V profile (range of Thread pitch is indicated by numbers)

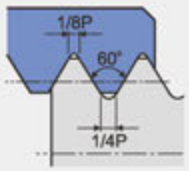
letter	mm	TPI
A	0.5-1.5	48-16
AG	0.5-3.0	48-8
G	1.75-3.0	14-8
N	3.5-5.0	7-5
Q	5.5-6.0	41/2-4

Thread profile

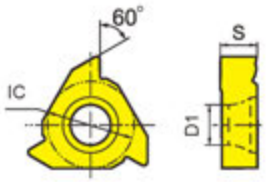
GM—ISO metric 60°thread
60—60° general pitch thread
55—55° general pitch thread
W—Whitworth thread
UN—Unified thread
BSPT—British taper pipe thread
NPT—American taper pipe thread

ISO metric thread (with end)

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



R type



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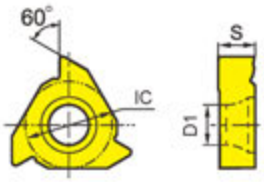
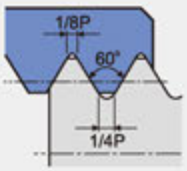


	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	IC	D1	YBG201	
							R	L
External thread	RT16.01W-0.50GM	LT16.01W-0.50GM	0.50	3.97	9.525	4.4	○	○
	RT16.01W-0.75GM	LT16.01W-0.75GM	0.75	3.97	9.525	4.4	○	○
	RT16.01W-1.00GM	LT16.01W-1.00GM	1.00	3.97	9.525	4.4	○	○
	RT16.01W-1.25GM	LT16.01W-1.25GM	1.25	3.97	9.525	4.4	★	○
	RT16.01W-1.50GM	LT16.01W-1.50GM	1.50	3.97	9.525	4.4	★	★
	RT16.01W-1.75GM	LT16.01W-1.75GM	1.75	3.97	9.525	4.4	★	○
	RT16.01W-2.00GM	LT16.01W-2.00GM	2.00	3.97	9.525	4.4	★	★
	RT16.01W-2.50GM	LT16.01W-2.50GM	2.50	3.97	9.525	4.4	★	○
	RT16.01W-3.00GM	LT16.01W-3.00GM	3.00	3.97	9.525	4.4	★	○
	RT22.01W-3.50GM	LT22.01W-3.50GM	3.50	5.56	12.7	5.5	★	○
	RT22.01W-4.00GM	LT22.01W-4.00GM	4.00	5.56	12.7	5.5	★	○
	RT22.01W-4.50GM	LT22.01W-4.50GM	4.50	5.56	12.7	5.5	★	○
	RT22.01W-5.00GM	LT22.01W-5.00GM	5.00	5.56	12.7	5.5	★	○
	RT22.01W-5.50GM	LT22.01W-5.50GM	5.50	5.56	12.7	5.5	○	○
	RT22.01W-6.00GM	LT22.01W-6.00GM	6.00	5.56	12.7	5.5	★	○

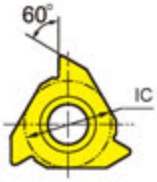
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

ISO metric thread (with end)

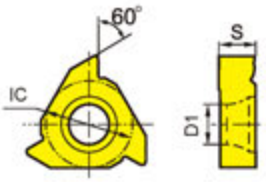
ISO 965-1980 DIN 13
GB/T 197-2003 Tolerance class: 6g/6H



R type



L type

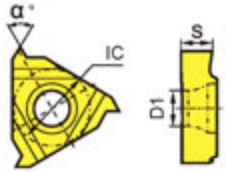


	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	IC	D1	YBG201	
							R	L
Internal thread	RT11.01N-0.50GM	LT11.01N-0.50GM	0.50	3.18	6.35	2.8	○	○
	RT11.01N-0.75GM	LT11.01N-0.75GM	0.75	3.18	6.35	2.8	○	○
	RT11.01N-1.00GM	LT11.01N-1.00GM	1.00	3.18	6.35	2.8	○	○
	RT11.01N-1.25GM	LT11.01N-1.25GM	1.25	3.18	6.35	2.8	○	○
	RT11.01N-1.50GM	LT11.01N-1.50GM	1.50	3.18	6.35	2.8	★	○
	RT11.01N-1.75GM	LT11.01N-1.75GM	1.75	3.18	6.35	2.8	○	○
	RT11.01N-2.00GM	LT11.01N-2.00GM	2.00	3.18	6.35	2.8	★	○
	RT16.01N-0.50GM	LT16.01N-0.50GM	0.50	3.97	9.525	4.4	○	○
	RT16.01N-0.75GM	LT16.01N-0.75GM	0.75	3.97	9.525	4.4	○	○
	RT16.01N-1.00GM	LT16.01N-1.00GM	1.00	3.97	9.525	4.4	★	○
	RT16.01N-1.25GM	LT16.01N-1.25GM	1.25	3.97	9.525	4.4	○	○
	RT16.01N-1.50GM	LT16.01N-1.50GM	1.50	3.97	9.525	4.4	★	★
	RT16.01N-1.75GM	LT16.01N-1.75GM	1.75	3.97	9.525	4.4	○	○
	RT16.01N-2.00GM	LT16.01N-2.00GM	2.00	3.97	9.525	4.4	★	★
	RT16.01N-2.50GM	LT16.01N-2.50GM	2.50	3.97	9.525	4.4	★	★
	RT16.01N-3.00GM	LT16.01N-3.00GM	3.00	3.97	9.525	4.4	★	★
	RT22.01N-3.50GM	LT22.01N-3.50GM	3.50	5.56	12.7	5.5	○	○
	RT22.01N-4.00GM	LT22.01N-4.00GM	4.00	5.56	12.7	5.5	★	○
	RT22.01N-4.50GM	LT22.01N-4.50GM	4.50	5.56	12.7	5.5	○	○
	RT22.01N-5.00GM	LT22.01N-5.00GM	5.00	5.56	12.7	5.5	★	○
	RT22.01N-5.50GM	LT22.01N-5.50GM	5.50	5.56	12.7	5.5	○	○
	RT22.01N-6.00GM	LT22.01N-6.00GM	6.00	5.56	12.7	5.5	★	○

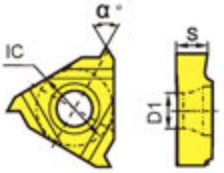
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

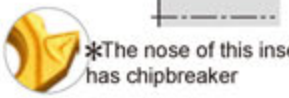
General pitch thread (without end)


R type




L type



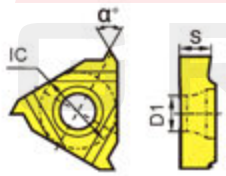


✻The nose of this insert has chipbreaker

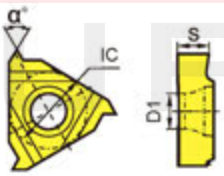
		Type		Basic dimensions(mm)					Recommended coating grade	
		The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	α°	YBG201 R	YBG201 L
External thread	60°	RT16.01W-A60	LT16.01W-A60	0.5-1.5(48-16)	3.97	9.525	4.4	60°	★	○
		RT16.01W-G60	LT16.01W-G60	1.75-3.0(14-8)	3.97	9.525	4.4	60°	○	○
		RT16.01W-G60P*	LT16.01W-G60P*	1.75-3.0(14-8)	3.97	9.525	4.4	60°	★	○
		RT16.01W-AG60	LT16.01W-AG60	0.5-3.0(48-8)	3.97	9.525	4.4	60°	★	○
		RT22.01W-N60P*	LT22.01W-N60P*	3.5-5.0(7-5)	5.56	12.7	5.5	60°	○	○
	55°	RT16.01W-A55	LT16.01W-A55	0.5-1.5(48-16)	3.97	9.525	4.4	55°	○	○
		RT16.01W-G55	LT16.01W-G55	1.75-3.0(14-8)	3.97	9.525	4.4	55°	○	○
		RT16.01W-G55P*	LT16.01W-G55P*	1.75-3.0(14-8)	3.97	9.525	4.4	55°	★	★
		RT16.01W-AG55	LT16.01W-AG55	0.5-3.0(48-8)	3.97	9.525	4.4	55°	★	○
		RT22.01W-N55P*	LT22.01W-N55P*	3.5-5.0(7-5)	5.56	12.7	5.5	55°	○	○

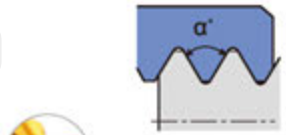
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order


R type




L type





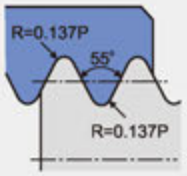
✻The nose of this insert has chipbreaker

		Type		Basic dimensions(mm)					Recommended coating grade	
		The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	α°	YBG201 R	YBG201 L
Internal thread	60°	RT16.01N-A60	LT16.01N-A60	0.5-1.5 (48-16)	3.97	9.525	4.4	60°	○	○
		RT16.01N-G60	LT16.01N-G60	1.75-3.0(14-8)	3.97	9.525	4.4	60°	○	○
		RT16.01N-G60P*	LT16.01N-G60P*	1.75-3.0(14-8)	3.97	9.525	4.4	60°	★	○
		RT16.01N-AG60	LT16.01N-AG60	0.5-3.0 (48-8)	3.97	9.525	4.4	60°	★	○
		RT22.01N-N60P*	LT22.01N-N60P*	3.5-5.0 (7-5)	5.56	12.7	5.5	60°	○	○
	55°	RT16.01N-A55	LT16.01N-A55	0.5-1.5(48-16)	3.97	9.525	4.4	55°	○	○
		RT16.01N-G55	LT16.01N-G55	1.75-3.0(14-8)	3.97	9.525	4.4	55°	○	○
		RT16.01N-G55P*	LT16.01N-G55P*	1.75-3.0(14-8)	3.97	9.525	4.4	55°	★	○
		RT16.01N-AG55	LT16.01N-AG55	0.5-3.0(48-8)	3.97	9.525	4.4	55°	★	○
		RT22.01N-N55P*	LT22.01N-N55P*	3.5-5.0(7-5)	5.56	12.7	5.5	55°	○	○

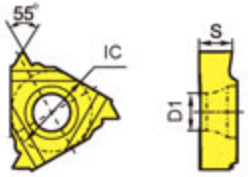
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Whitworth thread (with end)

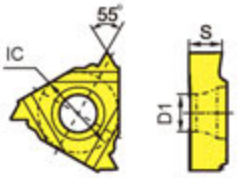
ISO 228/1:1982,
DIN 259, B.S.84:1956
Tolerance class: Medium class A



R type



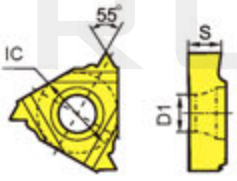
L type



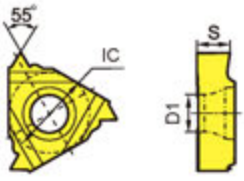
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	YBG201	
							R	L
External thread	RT16.01W-8W	LT16.01W-8W	8	3.97	9.525	4.4	○	○
	RT16.01W-9W	LT16.01W-9W	9	3.97	9.525	4.4	○	○
	RT16.01W-10W	LT16.01W-10W	10	3.97	9.525	4.4	○	○
	RT16.01W-11W	LT16.01W-11W	11	3.97	9.525	4.4	○	○
	RT16.01W-12W	LT16.01W-12W	12	3.97	9.525	4.4	○	○
	RT16.01W-14W	LT16.01W-14W	14	3.97	9.525	4.4	○	○
	RT16.01W-16W	LT16.01W-16W	16	3.97	9.525	4.4	○	○

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

R type



L type

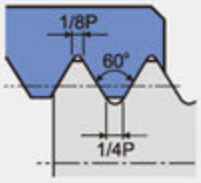


	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	YBG201	
							R	L
Internal thread	RT16.01N-8W	LT16.01N-8W	8	3.97	9.525	4.4	○	○
	RT16.01N-9W	LT16.01N-9W	9	3.97	9.525	4.4	○	○
	RT16.01N-10W	LT16.01N-10W	10	3.97	9.525	4.4	○	○
	RT16.01N-11W	LT16.01N-11W	11	3.97	9.525	4.4	○	○
	RT16.01N-12W	LT16.01N-12W	12	3.97	9.525	4.4	○	○
	RT16.01N-14W	LT16.01N-14W	14	3.97	9.525	4.4	○	○
	RT16.01N-16W	LT16.01N-16W	16	3.97	9.525	4.4	○	○

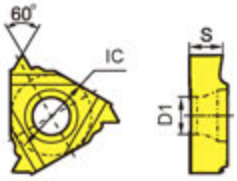
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Unified thread (with end)

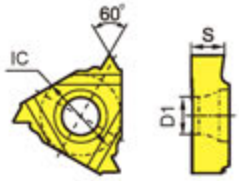
ASME B1.1-1989
Tolerance class: 2A/2B




R type



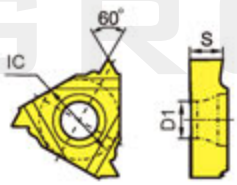

L type



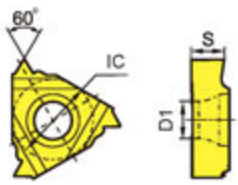
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	YBG201	
							R	L
External thread	RT16.01W-8UN	LT16.01W-8UN	8	3.97	9.525	4.4	○	○
	RT16.01W-10UN	LT16.01W-10UN	10	3.97	9.525	4.4	○	○
	RT16.01W-12UN	LT16.01W-12UN	12	3.97	9.525	4.4	○	○
	RT16.01W-14UN	LT16.01W-14UN	14	3.97	9.525	4.4	○	○
	RT16.01W-16UN	LT16.01W-16UN	16	3.97	9.525	4.4	○	○
	RT16.01W-18UN	LT16.01W-18UN	18	3.97	9.525	4.4	○	○
	RT16.01W-20UN	LT16.01W-20UN	20	3.97	9.525	4.4	○	○

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


R type




L type

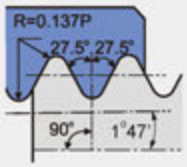


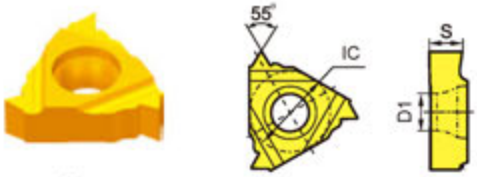
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	YBG201	
							R	L
Internal thread	RT16.01N-8UN	LT16.01N-8UN	8	3.97	9.525	4.4	○	○
	RT16.01N-10UN	LT16.01N-10UN	10	3.97	9.525	4.4	○	○
	RT16.01N-12UN	LT16.01N-12UN	12	3.97	9.525	4.4	○	○
	RT16.01N-14UN	LT16.01N-14UN	14	3.97	9.525	4.4	○	○
	RT16.01N-16UN	LT16.01N-16UN	16	3.97	9.525	4.4	○	○
	RT16.01N-18UN	LT16.01N-18UN	18	3.97	9.525	4.4	○	○
	RT16.01N-20UN	LT16.01N-20UN	20	3.97	9.525	4.4	○	○
	RT16.01N-24UN	LT16.01N-24UN	24	3.97	9.525	4.4	○	○

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

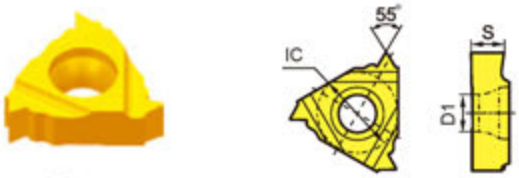
British taper pipe thread (with end)

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





R type

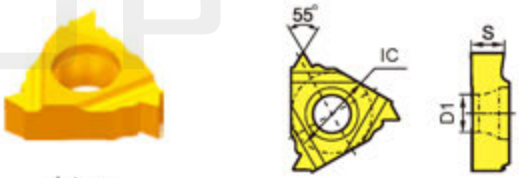


L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	YBG201	
							R	L
External thread	RT16.01W-11 BSPT	LT16.01W-11 BSPT	11	3.97	9.525	4.4	○	○
	RT16.01W-14 BSPT	LT16.01W-14 BSPT	14	3.97	9.525	4.4	○	○
	RT16.01W-19 BSPT	LT16.01W-19 BSPT	19	3.97	9.525	4.4	○	○
	RT16.01W-28 BSPT	LT16.01W-28 BSPT	28	3.97	9.525	4.4	○	○

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

R type



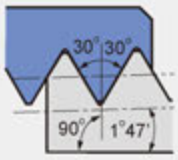
L type

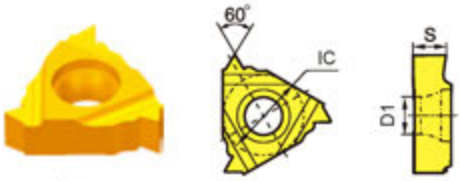
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	YBG201	
							R	L
Internal thread	RT16.01N-11 BSPT	LT16.01N-11 BSPT	11	3.97	9.525	4.4	○	○
	RT16.01N-14 BSPT	LT16.01N-14 BSPT	14	3.97	9.525	4.4	○	○
	RT16.01N-19 BSPT	LT16.01N-19 BSPT	19	3.97	9.525	4.4	○	○
	RT16.01N-28 BSPT	LT16.01N-28 BSPT	28	3.97	9.525	4.4	○	○

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

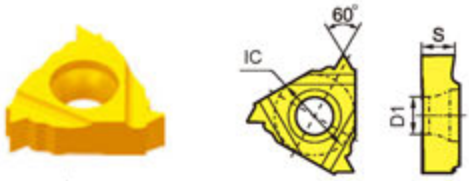
American taper pipe thread (with end)

ASME B1.20.1-1983
Standard NPT





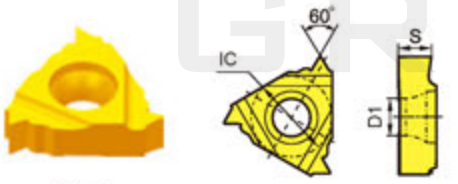
R type



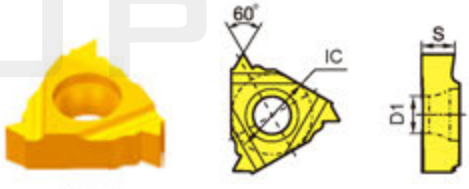
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	IC	D1	YBG201	
							R	L
External thread	RT16.01W-8NPT	LT16.01W-8NPT	8	3.97	9.525	4.4	○	○
	RT16.01W-11.5 NPT	LT16.01W-11.5NPT	11.5	3.97	9.525	4.4	○	○
	RT16.01W-14NPT	LT16.01W-14NPT	14	3.97	9.525	4.4	○	○
	RT16.01W-18NPT	LT16.01W-18NPT	18	3.97	9.525	4.4	○	○
	RT16.01W-27NPT	LT16.01W-27NPT	27	3.97	9.525	4.4	○	○

★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	IC	D1	YBG201	
							R	L
Internal thread	RT16.01N-8NPT	LT16.01N-8NPT	8	3.97	9.525	4.4	○	○
	RT16.01N-11.5NPT	LT16.01N-11.5NPT	11.5	3.97	9.525	4.4	○	○
	RT16.01N-14NPT	LT16.01N-14NPT	14	3.97	9.525	4.4	○	○
	RT16.01N-18NPT	LT16.01N-18NPT	18	3.97	9.525	4.4	○	○
	RT16.01N-27NPT	LT16.01N-27NPT	27	3.97	9.525	4.4	○	○

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

Tools for thick threading insert

Thick threading insert tools code key

Clamping system

Top clamping — C

Screw clamping — S

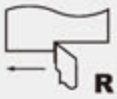
Thread type

N > Internal thread

W > External thread

Cutting direction

Right hand — R



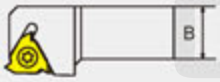
Left hand — L

S W R 20 20 K 16

Nose height (mm)

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

Shank width (mm)



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

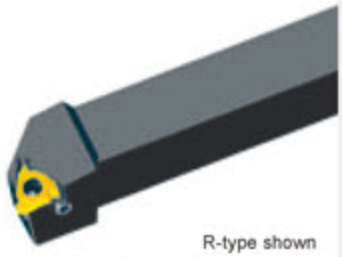
Tool length (mm)

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

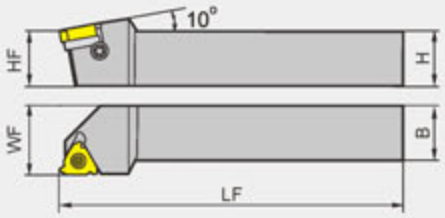
Insert size (mm)

Code	11	16	22
Triangle side length	11	16	22
Diameter of IC	6.35	9.525	12.70

External threading tools



R-type shown

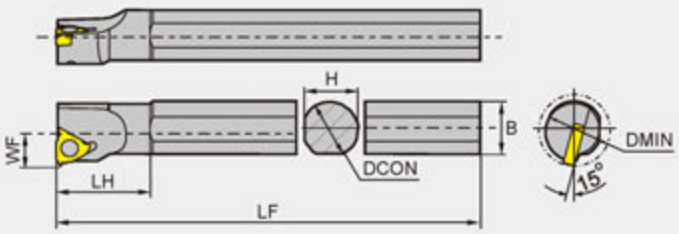


Type		Stock	Basic dimensions(mm)					Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
			H	HF	B	LF	WF					
SWR	1616H16	▲	16	16	16	100	20	RT16.01W-□□□□	I60M3.5×12	MT16-□□M	SM4×8C	WT15IP
	2020K16	▲	20	20	20	125	25					
	2525M16	▲	25	25	25	150	32					
	3225P16	▲	32	32	25	170	32					
	3232P16	▲	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	RT22.01W-□□□□	I60M5×17	MT22-□□M	SM4×8C	WT15IP WT20IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					
SWL	1616H16	▲	16	16	16	100	20	LT16.01W-□□□□	I60M3.5×12	MT16-□□M	SM4×8C	WT15IP
	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	LT22.01W-□□□□	I60M5×17	MT22-□□M	SM4×8C	WT15IP WT20IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					

▲Stock available △Make-to-order

Internal threading tools

R-type shown



Type		Stock	Basic dimensions(mm)							Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
			DCON	LF	B	DMIN	WF	H	LH					
SNR	0016K11	▲	16	125	16	12	10	15	20.9	RT11.01N-□□□□	I60 M2.5×6.5	---	---	WT07IP
	0016M11	▲	16	150	15.5	16	10.5	15	25.9					
	0016M16	▲	16	150	15.5	20	12	15	27		I60 M3.5×8	---	---	WT15IP
	0020M16	▲	20	150	19	25	14	18	28.7					
	0020Q16	▲	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8	RT16.01N-□□□□	I60 M3.5×12	MT16-□□M	SM4×8C	WT15IP
	0032R16	▲	32	200	31	40	22	30	30.9					
	0032S16	▲	32	250	31	40	22	30	30.9					
	0040T16	▲	40	300	38.5	50	27	37	31.5					
	0050U16	▲	50	350	49.5	63	35	49	40.2					
	0020Q22	▲	20	180	21.5	25	15	18	35		I60 M5×10			WT20IP
	0025R22	▲	25	200	24	32	19	23	39					
	0032S22	▲	32	250	31	40	22	30	36.4	RT22.01N-□□□□	I60 M5×17	MT22-□□M	SM4×8C	WT15IP WT20IP
	0040T22	▲	40	300	38.5	50	27	37	37.2					
	0050U22	▲	50	350	48.5	63	35	47	42.6					
SNL	0016K11	▲	16	125	16	12	10	15	20.9	LT11.01N-□□□□	I60 M2.5×6.5	---	---	WT07IP
	0016M11	▲	16	150	15.5	16	10.5	15	25.9					
	0016M16	▲	16	150	15.5	20	12	15	27		I60 M3.5×8	---	---	WT15IP
	0020M16	▲	20	150	19	25	14	18	28.7					
	0020Q16	▲	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8	LT16.01N-□□□□	I60 M3.5×12	MT16-□□M	SM4×8C	WT15IP
	0032R16	▲	32	200	31	40	22	30	30.9					
	0032S16	▲	32	250	31	40	22	30	30.9					
	0040T16	▲	40	300	38.5	50	27	37	31.5					
	0050U16	▲	50	350	49.5	63	35	49	40.2					
	0020Q22	▲	20	180	21.5	25	15	18	35		I60 M5×10	---	---	WT20IP
	0025R22	▲	25	200	24	32	19	23	39					
	0032S22	▲	32	250	31	40	22	30	36.4	LT22.01N-□□□□	I60 M5×17	MT22-□□M	SM4×8C	WT15IP WT20IP
	0040T22	▲	40	300	38.5	50	27	37	37.2					
	0050U22	▲	50	350	48.5	63	35	47	42.6					

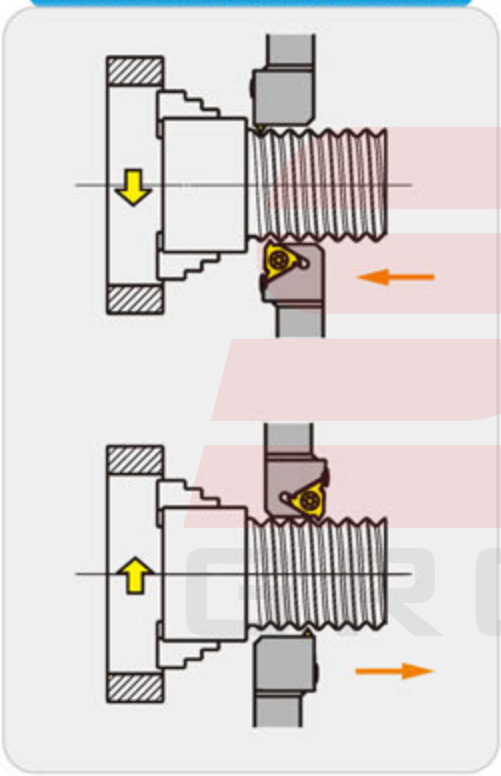
▲Stock available △Make-to-order

Please follow the steps to get the best threading result:

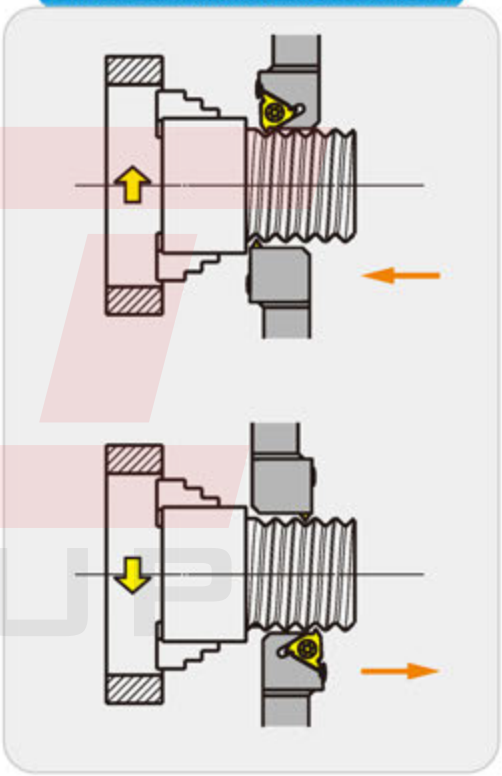
1. Select proper thread machining method.
2. Define helical angle and select shim.
3. Select proper insert and tool holder size.
4. By checking reference table of standard threading programs, select feasible cutting parameters.
5. Select feed way.

Machining method of threading tools

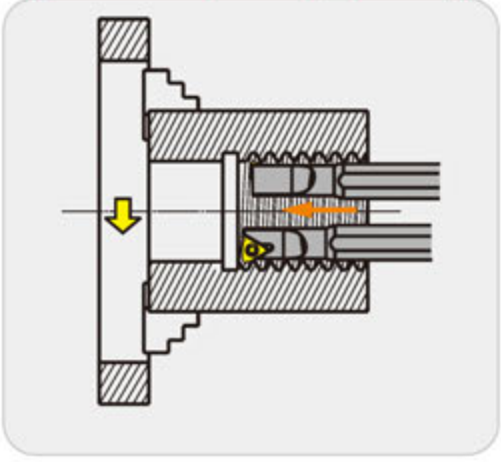
External threading machining (Right thread)



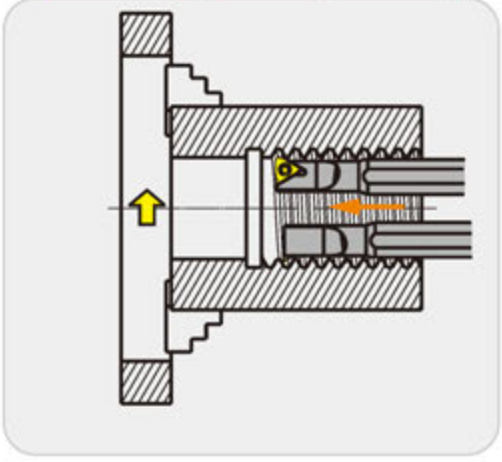
External threading machining (Left thread)



Internal threading machining (Right thread)

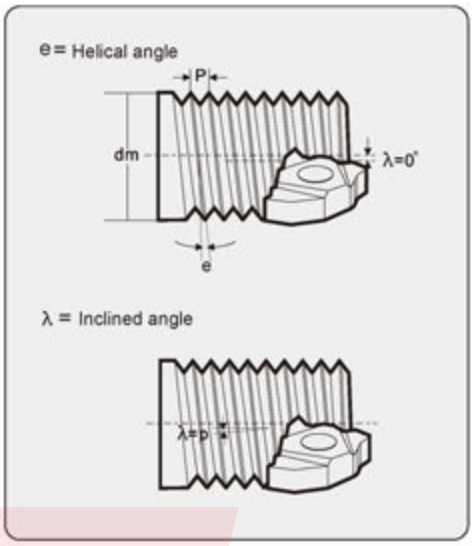


Internal threading machining (Left thread)



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_2= 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°.

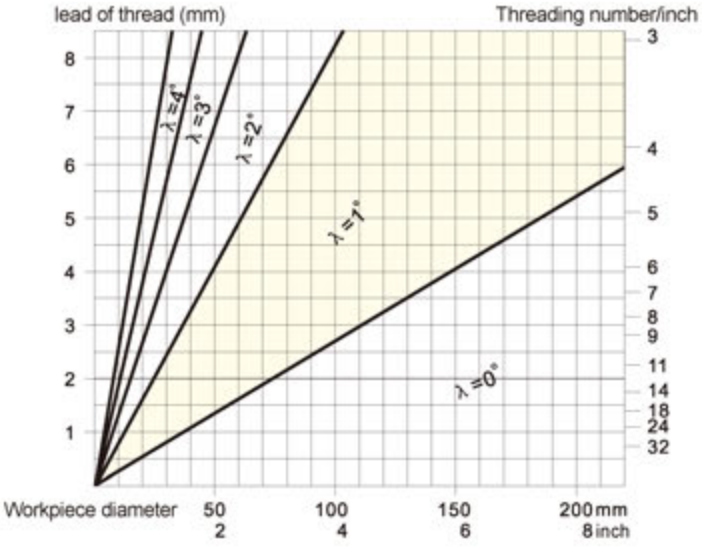
The shim has to be changed when helical angle of thread is ≤ clearance angle of tool, which could cause intervene on insert flank.
Please change the shim to adjust the difference between helical angle of thread and inclined angle of shim to be within 2°~0°.

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°

For example: when P=1.5, d2=24mm,
helical angle1.14°-(2°~0°)=inclined angle (-0.86°~1.14°)
it is feasible to use standard shim 1°.

Select shim:



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)

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

Screw pitch (mm)	0.5	0.75	1	1.25	1.5	1.75	2	2.5	3	3.5	4	4.5	5	5.5	6
Total in-feed (mm)	0.38	0.53	0.68	0.85	1.02	1.16	1.33	1.67	1.98	2.3	2.61	2.93	3.25	3.56	3.88
Number of passes	4	4	5	6	7	8	9	11	12	13	14	14	15	16	17
Sequence of threading tool pass	Radial feed/pass units: mm														
1	0.12	0.18	0.2	0.2	0.23	0.24	0.26	0.26	0.26	0.3	0.33	0.35	0.38	0.4	0.4
2	0.1	0.15	0.15	0.18	0.19	0.2	0.22	0.23	0.24	0.28	0.3	0.32	0.35	0.38	0.38
3	0.09	0.12	0.14	0.15	0.17	0.18	0.18	0.21	0.22	0.25	0.28	0.3	0.32	0.35	0.36
4	0.07	0.08	0.11	0.13	0.13	0.14	0.15	0.18	0.2	0.22	0.25	0.28	0.3	0.32	0.34
5			0.08	0.11	0.12	0.12	0.13	0.15	0.18	0.2	0.22	0.26	0.28	0.3	0.32
6				0.08	0.1	0.1	0.12	0.12	0.17	0.2	0.2	0.25	0.25	0.28	0.3
7					0.08	0.1	0.1	0.12	0.16	0.18	0.18	0.22	0.22	0.25	0.28
8						0.08	0.09	0.12	0.15	0.15	0.18	0.2	0.2	0.22	0.25
9							0.08	0.1	0.12	0.12	0.15	0.18	0.2	0.2	0.22
10								0.1	0.1	0.12	0.12	0.15	0.18	0.18	0.2
11								0.08	0.1	0.1	0.12	0.12	0.15	0.15	0.18
12									0.08	0.1	0.1	0.12	0.12	0.13	0.15
13										0.08	0.1	0.1	0.12	0.12	0.12
14											0.08	0.08	0.1	0.1	0.12
15													0.08	0.1	0.1
16														0.08	0.08
17															0.08

Table of recommended in-feed for metric ISO internal threading

Screw pitch (mm)	0.5	0.75	1	1.25	1.5	1.75	2	2.5	3	3.5	4	4.5	5	5.5	6
Total in-feed (mm)	0.35	0.48	0.66	0.83	0.97	1.14	1.27	1.58	1.8	2.15	2.44	2.73	3.02	3.31	3.6
Number of passes	4	4	5	6	7	8	9	11	12	13	14	14	15	16	17
Sequence of threading tool pass	Radial feed/pass units: mm														
1	0.11	0.15	0.18	0.2	0.22	0.22	0.24	0.25	0.25	0.26	0.26	0.28	0.28	0.3	0.3
2	0.09	0.13	0.15	0.18	0.18	0.18	0.2	0.22	0.23	0.25	0.25	0.26	0.28	0.3	0.3
3	0.08	0.12	0.14	0.15	0.16	0.16	0.18	0.2	0.2	0.23	0.24	0.25	0.26	0.28	0.28
4	0.07	0.08	0.11	0.12	0.13	0.15	0.15	0.18	0.18	0.21	0.22	0.25	0.26	0.28	0.28
5			0.08	0.1	0.11	0.13	0.12	0.15	0.16	0.2	0.2	0.24	0.25	0.26	0.26
6				0.08	0.09	0.12	0.12	0.12	0.15	0.18	0.2	0.22	0.23	0.25	0.25
7					0.08	0.1	0.1	0.12	0.15	0.16	0.18	0.2	0.21	0.23	0.25
8						0.08	0.08	0.1	0.12	0.14	0.18	0.2	0.2	0.23	0.23
9							0.08	0.1	0.1	0.12	0.16	0.18	0.2	0.2	0.23
10								0.07	0.1	0.12	0.15	0.18	0.18	0.2	0.21
11								0.07	0.08	0.1	0.12	0.15	0.18	0.18	0.2
12									0.08	0.1	0.1	0.13	0.15	0.15	0.2
13										0.08	0.1	0.11	0.15	0.15	0.18
14											0.08	0.08	0.11	0.12	0.15
15													0.08	0.1	0.12
16														0.08	0.08
17															0.08

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

Screw pitch (mm)	24	20	18	16	14	12	10	8
Total in-feed (mm)	0.72	0.85	0.92	1.06	1.2	1.39	1.67	2.07
Number of passes	5	6	6	7	8	9	10	12
Sequence of threading tool pass	Radial feed/pass units: mm							
1	0.2	0.2	0.22	0.23	0.24	0.24	0.25	0.25
2	0.18	0.18	0.2	0.2	0.21	0.22	0.23	0.23
3	0.15	0.16	0.16	0.18	0.18	0.2	0.21	0.23
4	0.11	0.13	0.14	0.15	0.15	0.18	0.2	0.2
5	0.08	0.1	0.12	0.12	0.13	0.15	0.18	0.2
6		0.08	0.08	0.1	0.11	0.13	0.15	0.18
7				0.08	0.1	0.11	0.15	0.18
8					0.08	0.08	0.12	0.15
9						0.08	0.1	0.15
10							0.08	0.12
11								0.1
12								0.08

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

Screw oitch	24	20	18	16	14	12	10	8
Total in-feed（mm）	0.71	0.83	0.92	1.03	1.16	1.29	1.53	1.9
Number of passes	5	6	6	7	8	9	10	12
Sequence of threading tool pass	Radial feed/pass units：mm							
1	0.19	0.2	0.22	0.23	0.24	0.24	0.25	0.25
2	0.17	0.18	0.2	0.2	0.2	0.2	0.23	0.23
3	0.15	0.15	0.17	0.17	0.18	0.18	0.2	0.23
4	0.12	0.12	0.14	0.14	0.15	0.15	0.18	0.2
5	0.08	0.1	0.11	0.12	0.12	0.12	0.15	0.18
6		0.08	0.08	0.1	0.1	0.12	0.13	0.15
7				0.07	0.1	0.1	0.11	0.15
8					0.07	0.1	0.11	0.12
9						0.08	0.1	0.12
10							0.07	0.1
11								0.1
12								0.07

Table of recommended in-feed for Whitworth internal and external threading

Screw oitch	28	20	19	18	16	14	12	11	10	9	8
Total in-feed (mm)	0.66	0.88	0.91	0.99	1.09	1.25	1.42	1.58	1.71	1.9	2.13
Number of passes	5	6	6	7	8	8	8	9	10	11	12
Order to follow in threading operation	Radial feed/pass units: mm										
1	0.18	0.2	0.2	0.2	0.2	0.22	0.23	0.24	0.24	0.23	0.23
2	0.15	0.18	0.18	0.18	0.18	0.2	0.21	0.22	0.22	0.22	0.22
3	0.14	0.16	0.17	0.15	0.16	0.2	0.21	0.2	0.2	0.21	0.22
4	0.11	0.14	0.15	0.15	0.15	0.18	0.2	0.2	0.2	0.2	0.21
5	0.08	0.12	0.13	0.13	0.12	0.15	0.2	0.18	0.18	0.2	0.2
6		0.08	0.08	0.1	0.12	0.12	0.16	0.18	0.16	0.18	0.2
7				0.08	0.08	0.1	0.12	0.15	0.15	0.15	0.18
8					0.08	0.08	0.09	0.12	0.15	0.15	0.16
9								0.09	0.12	0.13	0.15
10									0.09	0.13	0.15
11										0.1	0.12
12											0.09

Table of recommended in-feed for NPT internal and external threading

Screw oitch	27	18	14	11.5	8
Total in-feed (mm)	0.77	1.14	1.46	1.77	2.54
Number of passes	6	8	10	12	14
Sequence of threading tool pass	Radial feed/pass units: mm				
1	0.19	0.22	0.24	0.24	0.24
2	0.16	0.2	0.22	0.22	0.24
3	0.14	0.18	0.2	0.2	0.23
4	0.11	0.15	0.15	0.18	0.22
5	0.09	0.12	0.15	0.15	0.22
6	0.08	0.1	0.12	0.15	0.2
7		0.1	0.12	0.13	0.2
8		0.07	0.1	0.13	0.18
9			0.08	0.11	0.16
10			0.08	0.1	0.16
11				0.08	0.15
12				0.08	0.12
13					0.12
14					0.1

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

Screw oitch	28	19	14	11
Total in-feed (mm)	0.66	0.94	1.25	1.56
Number of passes	5	6	8	10
Order to follow in threading operation	Radial feed/pcs units: mm			
1	0.18	0.22	0.22	0.22
2	0.15	0.2	0.2	0.2
3	0.14	0.18	0.18	0.2
4	0.11	0.15	0.16	0.18
5	0.08	0.11	0.15	0.15
6		0.08	0.15	0.15
7			0.11	0.13
8			0.08	0.13
9				0.11
10				0.09

Table of recommended cutting parameters

ISO	Material			Unit cutting force Kc0.4 N/mm²	Hardness HB	Grade: YBG201 YBG202 YBG203 YBG205 — Cutting speed(m/min)
P	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
M	Stainless steel	Austenite		2450	180	110-130
		Martensite/Ferrite		2300	200	130-170
K	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
N	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
S	Super 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
H	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.

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.

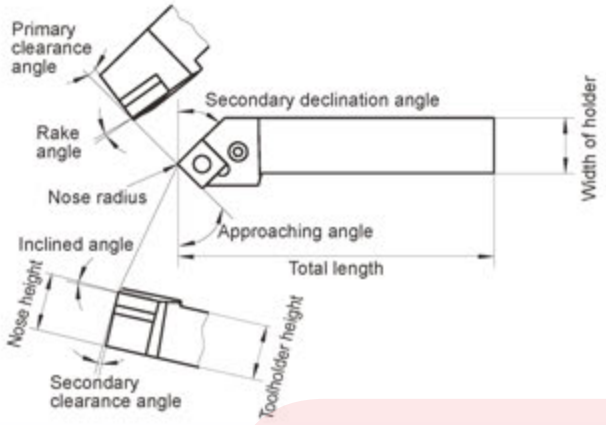
Recommend adopting flank in-feed or alternate flank in-feed under allowable range of machining equipment or programmer, it can eliminate the machining vibration effectively, and it has enough space discharge the chips between pitch. Cutting edge suffer a small stress, machining stable, it likes the general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

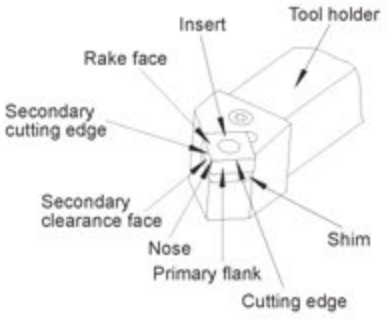
Common problems in threading and solutions

Problem	Cause	Solutions
Wear on clearance face	Cutting speed too high.	Reduce cutting speed.
	Low cutting depth, friction and wear.	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 tangling.	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	Chip involved in or touched the machined surface.	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.

The functions of each part of turning tools

1 The names of each part of turning tools





2 Effects of rake angle

Larger rake angle makes cutting edge sharper, reduces resistant forces of chip flow, diminishes friction and prevent deformation, leading to smaller cutting forces and cutting power, lower cutting temperature, less abrasion and higher surface quality. However, too large rake angle would reduce the rigidity and strength of tool. Heat can't be diffused easily. Serious breakage and abrasion on tool would occur, reducing tool life. Please choose rake angle according to machining conditions.

Value selection	Situations
Small rake angle	●When machining brittle and hard materials ●When roughing and intermittent cutting
Big rake angle	●When machining plastic or soft materials ●When finishing

3 Effects of clearance angle

The main function of clearance angle is to reduce the friction between the clearance face of tool and the surface of workpiece. When the rake angle is fixed, larger clearance angle can increase the sharpness of cutting edge, reduce cutting forces and friction, and then achieve higher surface quality. However, if clearance angle is too large, the strength of cutting edge would decrease. Also, heat can't be diffused easily and serious abrasion would occur, reducing tool life.

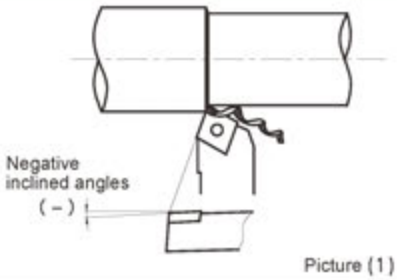
The principle of choosing clearance angle: Choose small clearance angle if friction is not serious.

Value Selection	Situations
Small clearance angle	●In order to increase nose strength when roughing ●When machining brittle and hard materials
Large clearance angle	●In order to reduce friction when finishing ●When machining materials easy to be hardened

4 Effects of inclined angle

Positive or negative inclined angle determines the direction of chip flow, and also affects the strength and impact resistance of insert nose.

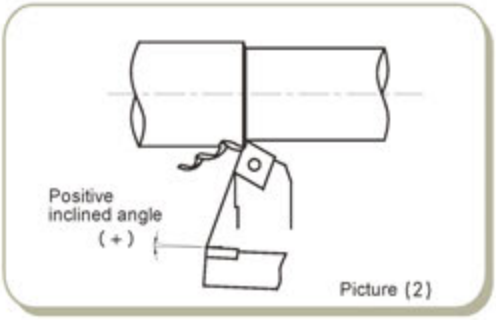
◆As diagram (1) shows, when the inclined angle is negative, namely nose is in the lowest point as apposed to the bottom of tool, chips flow to the machined surface of workpiece.



Picture (1)

◆ As diagram (2) shows, when inclined angle is positive, namely the nose is in the highest point as apposed to the bottom of the tool, chips flow to the areas of workpiece surface that haven't been machined.

◆ The change of inclined angle also affects insert nose strength and impact resistance. When the inclined angle is negative, the nose is in the lowest point of cutting edge. When the cutting edge enters the workpiece, the contacting point is on the cutting edge or rake face, protecting the nose from impact and increase the strength of the nose. Normally, negative inclined angle should be chosen for tools with big rake angle. This can not only increase nose strength, but also prevent the impact of entry.

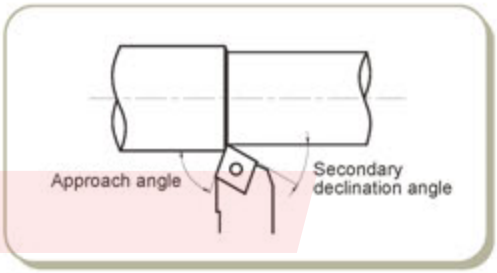


Picture (2)

5 Effects of approach angle

Reduced approaching angle increases the strength of tools and enable heat to diffuse easily, improving surface quality. This is because when the approach angle is small, cutting edge width is large, and then the unit width of cutting edge bears less cutting force. Meanwhile, tool life can be improved.

Normally, select 90°approach angle for turning of slender and step shaft; select 45° approach angle for external turning, end surface machining and chamfering. When approach angle is larger, radial force is reduced, cutting is stable, cutting thickness is increased, and chip breaking is excellent.



Value selection	Situations
Small approach angle	For those materials with high intensity, high hardness and hardened layer on the surface
Big approach angle	When rigidity of the machine is not enough

6 Effects of secondary declination angle

Minor angle is the main angle that can affect surface quality, and it can also affect tool strength. If the approach angle is too small, the friction between the secondary flank and machined surface of workpiece will increase, causing vibration.

The principle of selecting minor angle: Select small minor angle when roughing or when the friction is unaffected and there is no vibration. Select large minor angle when finishing.

7 Nose radius

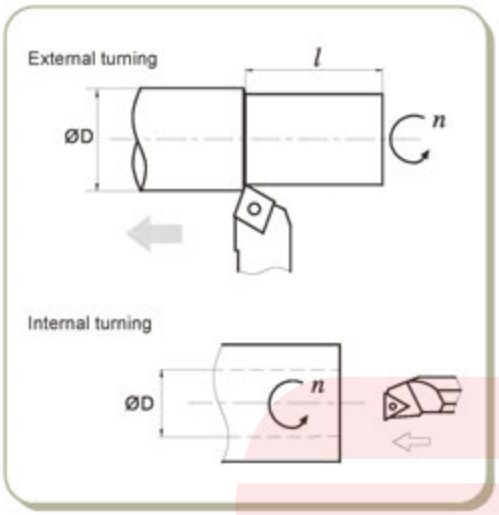
Nose radius significantly affects nose strength and surface quality.

Large nose radius means higher cutting edge strength, and the abrasion on the rake face and clearance face can be reduced to some extent. However, if the nose radius is too large, radial force will increase, and vibration is easy to occur, affecting machining precision and surface quality.

Value selection	Situations
Small nose radius	●Finishing at small cutting depth ●Machining parts such as slender shaft ●When the rigidity of the machine is not enough
Large nose radius	●When roughing ●When machining hard materials (intermittent cutting) ●When the rigidity of the machine is not enough

Calculation method of turning parameters

1 Calculation of cutting speed



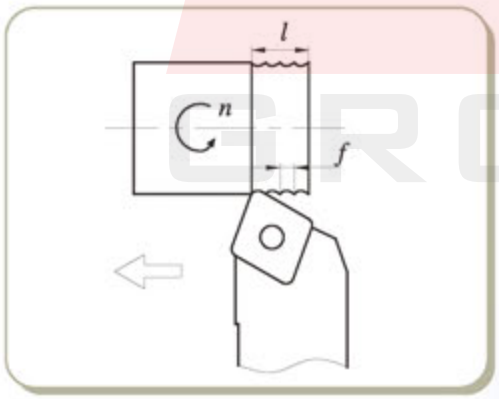
$$Vc=\frac{\pi \times D \times n}{1000}\ (m/min)$$

In the formula: Vc: Cutting speed (m/min)
n: Rotating speed of spindle (rev/min)
D: Diameter of workpiece (mm)

For example: When the rotating speed is 280rev/min and the diameter of workpiece is 150mm, the cutting speed should be:

$$Vc=\frac{\pi \times D \times n}{1000}\ (m/min)\ =132(m/min)$$

2 Calculation of feed rate



$$f=\frac{l}{n}\ (mm/rev)$$

In the formula: f: Feed rate per rotation (mm/rev)
l: Cutting length per minute (mm/min)
n: Rotating speed of spindle (rev/min)

For example: When the rotating speed of main axle is 500rev/min, and the cutting length per minute is 100mm/min, the feed rate per rotation should be:

$$f=\frac{l}{n}=\frac{100}{500}=0.2(mm/rev)$$

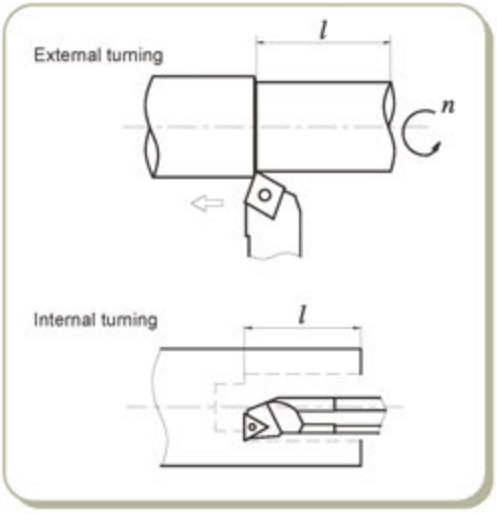
3 Cutting time calculation of external and internal turning

$$T=\frac{l}{f\times n}\ (min)$$

In the formula: T: Cutting time (min)
l: Length of machined areas (mm)
f: Feed rate (mm/rev)
n: Rotating speed of main axle (rev/min)

For example: When the rotating speed of main axle is 250rev/min, and the feed rate is 0.2mm/rev, the time needed for a cutting length of 150mm should be:

$$T=\frac{l}{f\times n}=\frac{150}{0.2\times 250}=3(min)$$

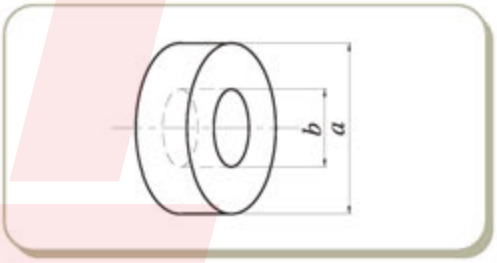


4 Time calculation for end surface turning (constant linear speed)

$$T=\frac{\pi\times(a^2-b^2)}{4000\times Vc\times f}\ (min)$$

In the formula: T: Cutting time (min)
Vc: Cutting speed (m/min)
f: Feed rate (mm/rev)

For end surface without hole, b=0, the formula is still valid.



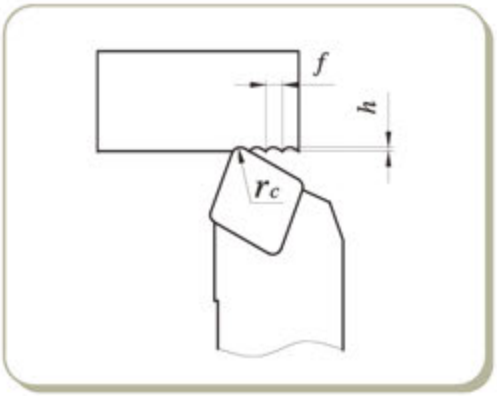
5 Theoretical value calculation of machined surface roughness

$$R=\frac{f^2}{8r_c}\times 1000\ (\mu m)$$

In the formula: R: Theoretical roughness value of machined surface
f: Feed rate (mm/rev)
rc: Nose radius (mm)

For example: When the feed rate is 0.2mm/rev, and the nose radius is 0.4mm, the theoretical roughness value of machined surface should be:

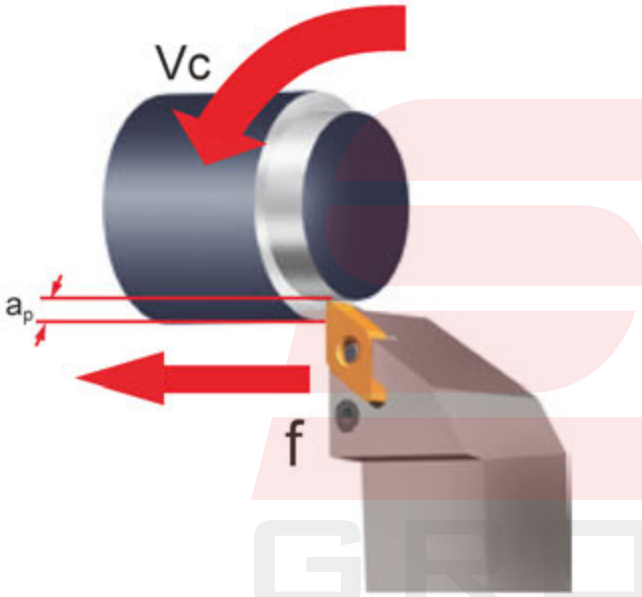
$$R=\frac{f^2}{8r_c}\times 1000=\frac{0.2^2}{8\times 0.4}\times 1000=12.5(\mu m)$$



Effect of three main turning parameters on machining

Effects of three main parameters

Normally, short machining time, long tool life and high machining precision are expected in machining, so the material quality, hardness, and shape of the workpiece, and properties of machine should be fully considered, and then we can select suitable tools and adopt high-efficiency cutting parameters, namely three parameters.



Cutting speed (Vc)

When the workpiece is rotating on the machine, the number of its rotation per minute is defined as Rotating speed of main axle (n). Because of its rotation, the cutting speed measured on the contacting point of diameter is defined as linear speed, m/min. Normally, linear speed is considered to measure the effect of cutting speed on machining.

Effect of cutting speed

Cutting speed has significant effect on tool life. When the cutting speed is increased, cutting temperature will increase and tool life will be shortened. Cutting speed varies according to the different types and hardness of workpiece. The below conclusions are reached after many cutting experiments:

(1) Normally tool life would be reduced to half when the cutting speed is increased by 20%. Tool life would be 20% of the original life if the cutting speed is raised by 50%.

(2) Low speed (20-40m/min) cutting could easily cause vibration and shorten tool life.

Feed rate (fn)

Feed rate is defined as the moving distance of tool after workpiece rotates for one circle, measured by mm/rotation.

Effect of feed rate

Feed rate is a key factor that determines surface quality. Meanwhile it also affect the range of chip forming and the thickness of chips during machining.

In term of the effect on tool life, small feed rate leads to serious abrasion on clearance face, greatly reducing tool life.

Cutting depth (ap)

Cutting depth is defined as the difference between machined surface and unmachined surface, measured by mm. It is half the difference value between the original diameter and machined diameter.

Effect of cutting depth

Cutting depth should be determined by the machining allowance and shape of workpiece, power and rigidity of machine, and tool rigidity.

The change of cutting depth has little effect on tool life. If the cutting depth is too low, the cutting nose only scrapes the hardened layer on the workpiece surface, reducing tool life. When there is hardened oxide layer on workpiece surface, higher cutting depth should be adopted within the possible range of machine's power to avoid cutting nose just cutting the hardened layer of workpiece.

Comparison table for turning insert chipbreaker

Negative inserts

ISO	Machining range	ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MITSUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
P	For extra finishing		QF LC	HU	FA FX	FP5	FF1 FF2	PK※ FH, FY FP, FS	FB FA, FL	FF		FE	01※, TF, ZF 11	DP※, GP, PP ,VF, XP XP-T, XF	F1
	For finishing	DF XF	PF XF	HF	FG FM	MP3, FV5 NF3, NF4	MF2	LP, C SA, SH	FE, SU, LU, SX, SE	LF, FN	PF, UR UA, UT	BE, CE B, BH	NS, 27 TSF, AS, TQ	HQ, CQ PQ	F2(2B), F5(5C)
	For finishing (Soft steel)	SF		HF	FC			SY					17	XQ, XS	
	For finishing (Wiper)		WL WF	HW	WS	NF	W-MF2	SW	LUW SEW	FW			AFW, ASW FW, SW	WF WP, WQ	
	For semi-finishing	DM PM XM	PM QM XM	HA HC HM	PC FT MT SM MP	MF3 MV5	MF3 MF5 M3 M5	MP MA MH	GU UG UX GE	P MN	PG UB	CT AB AY AE AH	NM, ZM TM, DM 37, AM 33, 38	PG, CJ, GS, PS HS, PT	F3, F4(8A), M2(2C), M3 M4, M5(5B), M6, M7, 55, M8
	For semi-finishing(Wiper)		WMX WM		WT	NM	W-M6 W-M3 W-MF5	MW	GUW	MW RW				WE	
	For light roughing	LR(Single-side) DR(Double-side)	PR, HM XMR		RT	NM6, RP5 NM9, RP7	MR7 MR6	RP GH	MU, MX ME, UZ	RN RP	UD, GG	Y, RE	TH	RH, GT	
	For heavy roughing	HDR HPR	QR PR HR MR	HR HH	RX, HD HY, HT RT, RH HZ, EH	NR6 NRF NRR	R5, R56 R4, R6 R7, PR9 R57, RR6 R8	HM, HL HZ, HX HV, HR	MP, HG HP, HU HW, HF	MR, RM RH	UC	TE, UE HX, HE H	TU, TRS TUS	PX	R3, R4, R6(9A) R7(9B), R9(9C)

※ Periphery grinding type

Comparison table for turning insert chipbreaker

Negative inserts

ISO	Machining range	ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MITSUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
M	For finishing	EF	MF	HA	SF	NF4, FM5	MF1	SH, LM	SU, EF	FP, LF※		MP, AB BH	SS	MQ GU	F1, F2(2B), F5(5C)
	For semi-finishing	EM	MM, QM XM, K	HS	ML, EM MM, VF	MM5 RM5 NM4	MF4	MS, ES GM, MM MA	EX, EG UP, GU HM	MP	SF, SG SZ	DE PV SE AH	SF, SA, SM, S	MS, MU SU, HU, ST, TK	F3, F4(8A), M2(2C), M3 M4, M5(5B), M6, M7, 55, M8
	For roughing	ER	MR	GS, HM	MT	NR4 NR5	M5, MR7 RR6	GH, HZ RM, HL	EM, MU MP	UP RP		AE	TH, SH		R3, R4, R6(9A) R7(9B), R9(9C)
K	For finishing	PM	KF			MK5	MF2, M3 MF5, M4	VA AH		FN		VA, AH	CF	KQ	F2(2B)
	For Semi-Finishing	PM	KM	Through chip-breaker, HM	MC	RK5 NM5	M5	V AE	UZ, GZ UX	RP, UN	PG	V, AE	CM	KG, C	M5(5B), M6, M8
	For roughing	Without chip-breaker	KR KRR	GR, HR GH	KT	RK7		RE			GG	RE		KH, GC	R3, R4, R7(9B)
S	For finishing	NF/NGF	SF SGF※		EA	NF4, NFT MS3	MF5, MF1 MF4	FJ※, LS MJ, MJ※	EF, SU※	FS, LF※ MS			HRF	MQ	F5(5C), M2(2C)
	For semi-finishing	NM	NGP※, SM			NMT, NMS	M1	MS	EG, EX SU※, UP	NGP※ UP, P		VI	HRM, SA HMM	SQ, MS MU, TK	M4, M5(5B), M7, 55
	For roughing	SNR	SR SMR		ET	NRS NRT	MR3 MR4	GJ RS	MU	RP				SG SX	

※ Periphery grinding type

Comparison table for turning insert chipbreaker

Positive inserts

ISO	Machining range	ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MITSUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
P	For finishing	SF, HF XF	PF, UF XF	HFP	FA, FG FX	PF4 FP4	FF1 F1	FV, SV FP, LP	FP, LU SU, SK	11, UF LF, FP		JQ	PF, PSF PS, PSS	GP, XP VF, PP	PF4 JQ, JZ
	For finishing (Wiper)		WF			PF2※ PF, PF5※	W-F1	SW	LUW SDW	FW				WP	
	For semi-finishing	HM, XM	UM, XM PM, PR XR	HMP C25	MT, PC	PS5 PM5 FP6	F2 MF2, M5	MV, MP	MU	MF, MP	FT	JE	PM 23, 24	HQ, XQ GK MF※	PM2 PM4
	For semi-finishing (Wiper)		WM		WT	PM	W-F2 W-M3	MW		MW					
M	For finishing	EF	MF	HFP		FM4	F1, F2	FM, LM	FC※, SI※ LU, SU	MF		MP	PF, PSF PS, PSS	CF※, CK※ GQ※, GF※ MQ, SK	1A, 2A
	For semi-finishing	EM	MM	HMP C25		MM4 RM4		MM	MU	MP			PM	HQ GK	PM2 PM4
K	For semi-finishing	HM, HR without chip-breaker	KF KM KR	HMP C25		FK6	F1 M3, M5	MK Without chip-breaker	MU Without chip-breaker	Without chip-breaker			CM Without chip-breaker	Without chip-breaker※	PM2 PM4
S	For finishing/ For semi-finishing	NGF						FS※, LS※ FJ※, FS-P※ LS-P※	SL※	LF※ HP※				MQ	PM2, 1A 2A
N	For general turning	LH	AL	TA AK MA	FL	PM2, FN2 MN2	AL※	AZ※	AG	HP※	ALU ACB ASF		AL※	AH※	1L, 1A 2A

※ Periphery grinding type