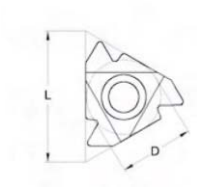
Threading Tools

CONTENT

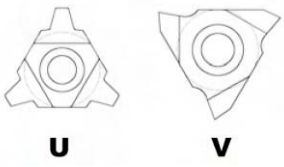
A THREADING & GROOVING TOOLS

1. Insert Size

L(mm)	D
06	5/32"
08	3/16"
11	1/4"
16	3/8"
22	1/2"
27	5/8"



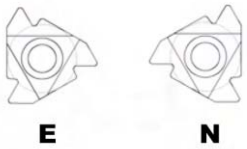
2. Insert Style



3. Type of Insert

E External

N Internal



4. RH/LH Inserts

R Right Hand Insert

L Left Hand Insert

16		E	R	L5	ISO		
1	2	3	4	5	6	7	8

5. Pitch

Full Profile Pitch Range

mm	TPI
0.5~6	48~4

Partial Profile Pitch Range

	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	4.5~4
V	6.0~10	4~2.5

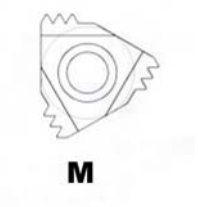
6. Thread Standard

60_____60°	Partial profile 60
55_____55°	Partial profile 55
ISO_____ISO	ISO Metric
UN_____60°	American UN
UNJ_____60°	Aviation thread
W _____55	Whitworth for BSW BSP
NPT_____60	NPT
NPTF_____60	NPTF
BSPT_____55	British Standard Pipe Thread
ACME____29°	American ACME
STACME__29°	American Stub ACME
TR _____30°	Trapez DIN 103
ABUT	Amcrican Buttress'
RD	Round DIN 405
Rd20400	Round DIN 20400
APIRD____API	API Round Casing & Tubing
BUT_____API	API Buttress Casing

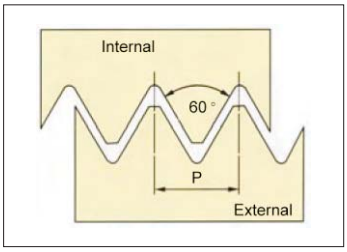
7. No. of Teeth (for Mulitooth Style)

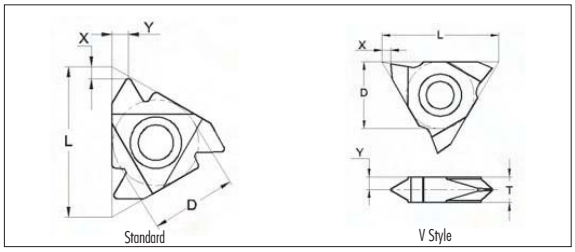
2 3 5 6 8

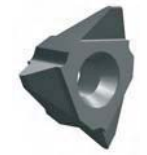
8. Insert Style of Multitooth



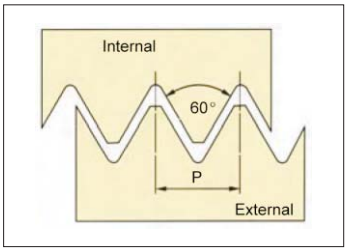
Partial Profile 60° External

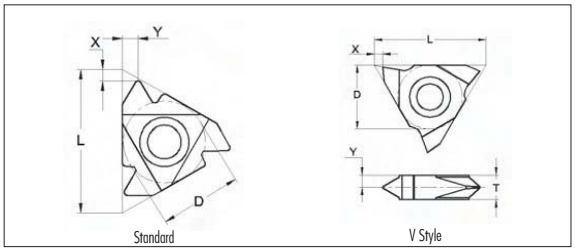




	D	Pitch		Designation		Dimension			
		mm	TPI	Right Hand	Left Hand	L	X	Y	T
Standard	1/4″	0.5~1.5	48~16	11ER A60	11EL A60	11	0.8	0.9	
	3/8″	0.5~1.5	48~16	16ER A60	16EL A60	16	0.8	0.9	
		0.5~3.0	48~8	16ER AG60	16EL AG60	16	1.2	1.7	
		1.75~3.0	14~8	16ER G60	16EL G60	16	1.2	1.7	
	1/2"	3.5~5.0	7~5	22ER N60	22EL N60	22	1.7	2.5	
	5/8″	5.5~6.0	4.5~4	27ER Q60	27EL Q60	27	2.1	3.1	
									
V Style	5/8"	6.0~10	4~2.5	27VER V60	27VEL V60	27	0.6	5.2	10
									
									

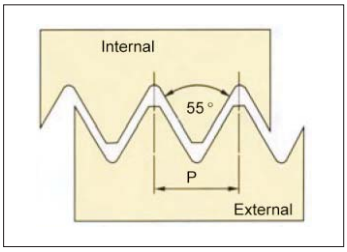
Partial Profile 60° Internal

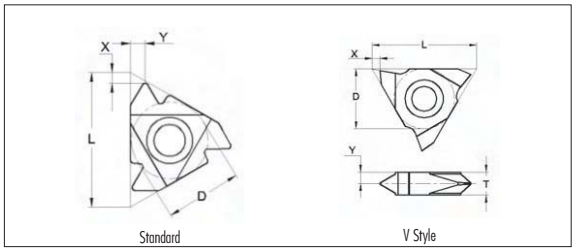




	D	Pitch		Designation		Dimension			
		mm	TPI	Right Hand	Left Hand	L	X	Y	T
Standard	5/32″	0.5~1.25	48~20	06NR A60	06NL A60	6	0.6	0.6	
	3/16"	0.5~1.5	48~16	08NR A60	08NL A60	8	0.6	0.7	
	1/4″	0.5~1.5	48~16	11NR A60	11NL A60	11	0.8	0.9	
	3/8 ″	0.5~1.5	48~16	16NR A60	16NL A60	16	0.8	0.9	
		0.5~3.0	48~8	16NR AG60	16NL AG60	16	1.2	1.7	
		1.75~3.0	14~8	16NR G60	16NL G60	16	1.2	1.7	
	1/2"	3.5~5.0	7~5	22NR N60	22NL N60	22	1.7	2.5	
	5/8″	5.5~6.0	4.5~4	27NR Q60	27NL Q60	27	1.8	2.7	
V Style	5/8″	6.0~10	4~2.5	27VNR V60	27VNL V60	27	0.6	5.2	8

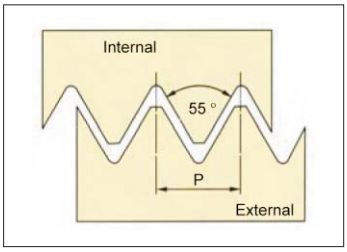
Partial Profile 55⁰ External

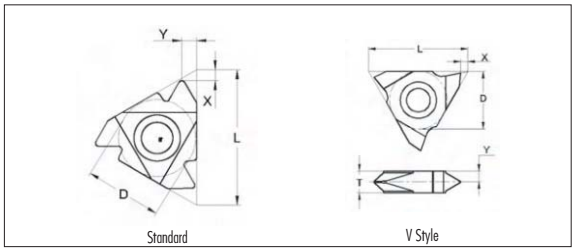




	D	Pitch		Designation		Dimension			
		mm	TPI	Right Hand	Left Hand	L	X	Y	T
Standard	1/4″	0.5~1.5	48~16	11ER A55	11EL A55	11	0.8	0.9	
	3/8 ″	0.5~1.5	48~16	16ER A55	16EL A55	16	0.8	0.9	3.65
		0.5~3.0	48~8	16ER AG55	16EL AG55	16	1.2	1.7	3.65
		1.75~3.0	14~8	16ER G55	16EL G55	16	1.2	1.7	3.65
	1/2″	3.5~5.0	7~5	22ER N55	22EL N55	22	1.7	2.5	4.76
	5/8"	5.5~6.0	4.5~4	27ER Q55	27EL Q55	27	2.0	2.9	6.75
									
V Style	5/8"	6~9	4~2.75	27VER V55	27VEL V55	27	1.0	4.3	8
									
									

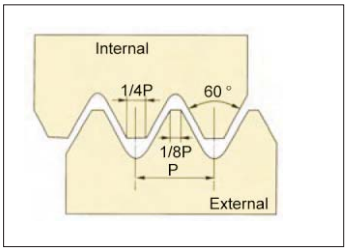
Partial Profile 55⁰ Internal

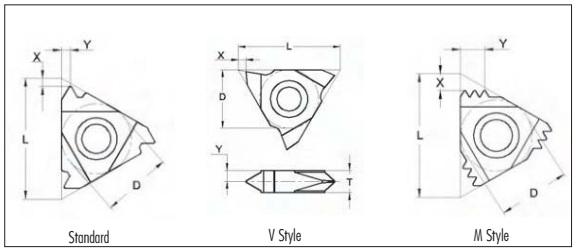




	D	Pitch		Designation		Dimension			
		mm	TPI	Right Hand	Left Hand	L	X	Y	T
Standard	5/32″	0.5~1.25	48~20	06NR A55	06NL A55	6	0.6	0.6	
	3/16"	0.5~1.5	48~16	08NR A60	08NL A55	8	0.6	0.7	
	1/4″	0.5~1.5	48~16	11NR A55	11NL A55	11	0.8	0.9	
	3/8 ″	0.5~1.5	48~16	16NR A55	16NL A55	16	0.8	0.9	
		0.5~3.0	48~8	16NR AG55	16NL AG55	16	1.2	1.7	
		1.75~3.0	14~8	16NR G55	16NL G55	16	1.2	1.7	
	1/2"	3.5~5.0	7~5	22NR N55	22NL N55	22	1.7	2.5	
	5/8″	5.5~6.0	4.5~4	27NR Q55	27NL Q55	27	2.0	2.9	
V Style	5/8″	6~9	4~2.75	27VNR V55	27VNL V55	27	1.0	4.3	8

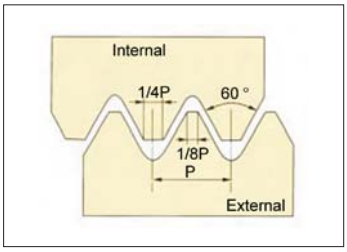
ISO METRIC Full Profile External

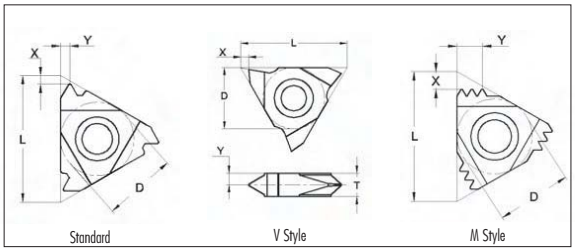




	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	1/4"	0.50	11ER0.50 ISO	11EL0.50 ISO	11	0.6	0.6
		0.75	11ER0.75 ISO	11EL0.75 ISO	11	0.6	0.6
		1.00	11ER1.00 ISO	11EL1.00 ISO	11	0.7	0.7
		1.25	11ER1.25 ISO	11EL1.25 ISO	11	0.8	0.9
		1.50	11ER1.50 ISO	11EL1.50 ISO	11	0.8	1.0
		1.75	11ER1.75 ISO	11EL1.75 ISO	11	0.8	1.1
	3/8 "	0.50	16ER0.50 ISO	16EL0.50 ISO	16	0.6	0.6
		0.75	16ER0.75 ISO	16EL0.75 ISO	16	0.6	0.6
		1.00	16ER1.00 ISO	16EL1.00 ISO	16	0.7	0.7
		1.25	16ER1.25 ISO	16EL1.25 ISO	16	0.8	0.9
		1.50	16ER1.50 ISO	16EL1.50 ISO	16	0.8	1.0
		1.75	16ER1.75 ISO	16EL1.75 ISO	16	0.9	1.2
		2.00	16ER2.00 ISO	16EL2.00 ISO	16	1.0	1.3
		2.50	16ER2.50 ISO	16EL2.50 ISO	16	1.1	1.5
		3.00	16ER3.00 ISO	16EL3.00 ISO	16	1.2	1.6
	1/2 "	3.50	22ER3.50 ISO	22EL3.50 ISO	22	1.6	2.3
		4.00	22ER4.00 ISO	22EL4.00 ISO	22	1.6	2.3
		4.50	22ER4.50 ISO	22EL4.50 ISO	22	1.7	2.4
		5.00	22ER5.00 ISO	22EL5.00 ISO	22	1.7	2.5
	5/8 "	5.50	27ER5.50 ISO	27EL5.50 ISO	27.5	1.9	2.7
		6.00	27ER6.00 ISO	27EL6.00 ISO	27.5	2.0	2.9

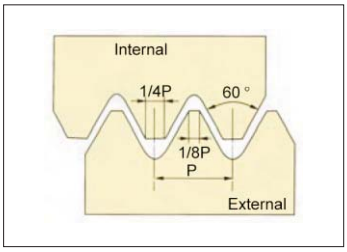
ISO METRIC Full Profile External

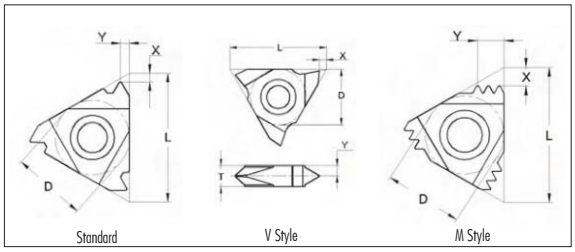




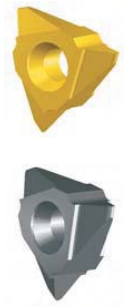
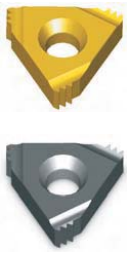
	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard		0.50	16VER0.50 ISO	16VEL0.50 ISO	16	16	3.0	3.6
		0.75	16VER0.75 ISO	16VEL0.75 ISO	16	16	3.0	3.6
		1.00	16VER1.00 ISO	16VEL1.00 ISO	16	16	2.9	3.6
		1.25	16VER1.25 ISO	16VEL1.25 ISO	16	16	2.7	3.6
	3/8 "	1.50	16VER1.50 ISO	16VEL1.50 ISO	16	16	2.6	3.6
		1.75	16VER1.75 ISO	16VEL1.75 ISO	16	16	2.45	3.6
		2.00	16VER2.00 ISO	16VEL2.00 ISO	16	16	2.3	3.6
		2.50	16VER2.50 ISO	16VEL2.50 ISO	16	16	2.1	3.6
		3.00	16VER3.00 ISO	16VEL3.00 ISO	16	16	2.0	3.6
		6.00	27VER6.00 ISO	27VEL6.00 ISO	27	27	3.3	6
	5/8 "	8.00	27VER8.00 ISO	27VEL8.00 ISO	27	27	4.3	8
		10.0	27VER10.0 ISO	27VEL10.0 ISO	27	27	5.2	10
M Style	3/8 "	1.00	16ER1.0ISO3M		16	16	2.6	3.6
		1.50	16ER1.5ISO2M		16	16	2.4	3.6
		1.50	22ER1.5ISO3M		22	22	3.8	4.75
	1/2 "	2.00	22ER2.0ISO2M		22	22	3.0	4.75
		2.00	22ER2.0ISO3M		22	22	4.9	4.75
	5/8 "	3.00	27ER3.0ISO2M		27	27	4.3	6.35

ISO METRIC Full Profile Internal

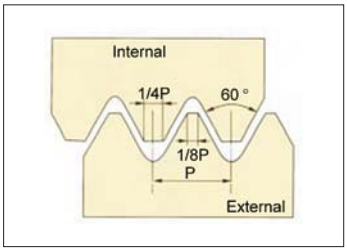


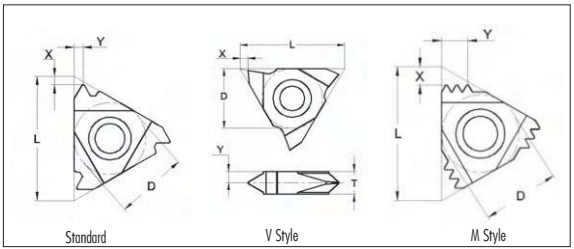


	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	5/32"	0.50	06NR0.50 ISO	06NL0.50 ISO	6	0.9	0.5
		0.75	06NR0.75 ISO	06NL0.75 ISO	6	0.8	0.5
		1.00	06NR1.00 ISO	06NL1.00 ISO	6	0.7	0.6
		1.25	06NR1.25 ISO	06NL1.25 ISO	6	0.6	0.6
	3/16 "	0.50	08NR0.50 ISO	08NL0.50 ISO	8	0.6	0.5
		0.75	08NR0.75 ISO	08NL0.75 ISO	8	0.6	0.5
		1.00	08NR1.00 ISO	08NL1.00 ISO	8	0.6	0.6
		1.25	08NR1.25 ISO	08NL1.25 ISO	8	0.6	0.7
		1.50	08NR1.50 ISO	08NL1.50 ISO	8	0.6	0.7
		1.75	08NR1.75 ISO	08NL1.75 ISO	8	0.6	0.8
	1/4 "	0.50	11NR0.50 ISO	11NL0.50 ISO	11	0.6	0.6
		0.75	11NR0.75 ISO	11NL0.75 ISO	11	0.6	0.6
		1.00	11NR1.00 ISO	11NL1.00 ISO	11	0.6	0.7
		1.25	11NR1.25 ISO	11NL1.25 ISO	11	0.8	0.9
		1.50	11NR1.50 ISO	11NL1.50 ISO	11	0.8	1.0
		1.75	11NR1.75 ISO	11NL1.75 ISO	11	0.9	1.1
		2.00	11NR2.00 ISO	11NL2.00 ISO	11	1.0	1.3
	3/8 "	0.50	16NR0.50 ISO	16NL0.50 ISO	16	0.6	0.6
		0.75	16NR0.75 ISO	16NL0.75 ISO	16	0.6	0.6
		1.00	16NR1.00 ISO	16NL1.00 ISO	16	0.6	0.7
		1.25	16NR1.25 ISO	16NL1.25 ISO	16	0.8	0.9
		1.50	16NR1.50 ISO	16NL1.50 ISO	16	0.8	1.0

	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard	3/8 "	1.75	16NR1.75 ISO	16NL1.75 ISO	16	0.9	1.2	
		2.00	16NR2.00 ISO	16NL2.00 ISO	16	1.0	1.3	
		2.50	16NR2.50 ISO	16NL2.50 ISO	16	1.1	1.5	
		3.00	16NR3.00 ISO	16NL3.00 ISO	16	1.1	1.5	
	1/2 "	3.50	22NR3.50 ISO	22NL3.50 ISO	22	1.6	2.3	
		4.00	22NR4.00 ISO	22NL4.00 ISO	22	1.6	2.3	
		4.50	22NR4.50 ISO	22NL4.50 ISO	22	1.6	2.4	
		5.00	22NR5.00 ISO	22NL5.00 ISO	22	1.6	2.5	
	5/8 "	5.50	27NR5.50 ISO	27NL5.50 ISO	27	1.9	2.7	
		6.00	27NR6.00 ISO	27NL6.00 ISO	27	2.0	2.9	
V Style 	3/8 "	0.50	16VNR0.50 ISO	16VNL0.50 ISO	16	1.1	3.0	3.6
		0.75	16VNR0.75 ISO	16VNL0.75 ISO	16	1.1	3.0	3.6
		1.00	16VNR1.00 ISO	16VNL1.00 ISO	16	1.1	2.9	3.6
		1.25	16VNR1.25 ISO	16VNL1.25 ISO	16	1.1	2.7	3.6
		1.50	16VNR1.50 ISO	16VNL1.50 ISO	16	1.1	2.6	3.6
		1.75	16VNR1.75 ISO	16VNL1.75 ISO	16	1.1	2.45	3.6
		2.00	16VNR2.00 ISO	16VNL2.00 ISO	16	1.1	2.3	3.6
		2.50	16VNR2.50 ISO	16VNL2.50 ISO	16	1.1	2.1	3.6
		3.00	16VNR3.00 ISO	16VNL3.00 ISO	16	1.1	2.0	3.6
	5/8 "	6.00	27VNR6.00 ISO	27VNL6.00 ISO	27	1.0	3.3	6
		8.00	27VNR8.00 ISO	27VNL8.00 ISO	27	1.0	4.3	8
		10.0	27VNR10.0 ISO	27VNL10.0 ISO	27	1.0	5.2	10
M Style 	3/8 "	1.00	16NR1.0ISO3M		16	1.8	2.6	3.6
		1.50	16NR1.5ISO2M		16	1.6	2.4	3.6
	1/2 "	1.50	22NR1.5ISO3M		22	2.5	3.8	4.7
		2.00	22NR2.0ISO2M		22	2.1	3.1	4.7
		2.00	22NR2.0ISO3M		22	3.2	5.1	4.7
	5/8 "	3.00	27NR3.0ISO2M		27	3.0	4.6	6.3

American UN Full Profile
UNC UNF UNEF UNS
External

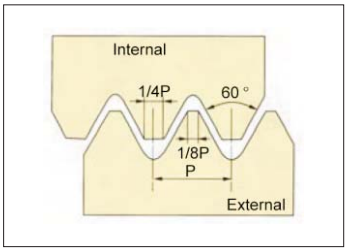


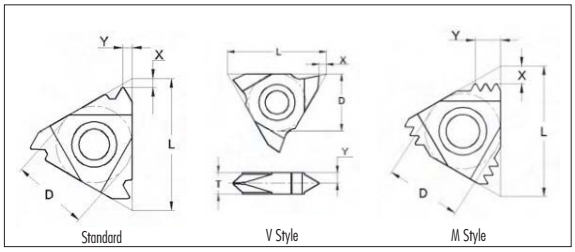


	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	1/4"	32	11ER32 UN	11EL32 UN	11	0.6	0.6
		28	11ER28 UN	11EL28 UN	11	0.6	0.7
		24	11ER24 UN	11EL24 UN	11	0.7	0.8
		20	11ER20 UN	11EL20 UN	11	0.8	0.9
		18	11ER18 UN	11EL18 UN	11	0.8	1.0
		16	11ER16 UN	11EL16 UN	11	0.9	1.1
	3/8"	32	16ER32 UN	16EL32 UN	16	0.6	0.6
		28	16ER28 UN	16EL28 UN	16	0.6	0.7
		24	16ER24 UN	16EL24 UN	16	0.7	0.8
		20	16ER20 UN	16EL20 UN	16	0.8	0.9
		18	16ER18 UN	16EL18 UN	16	0.8	1.0
		16	16ER16 UN	16EL16 UN	16	0.9	1.1
		14	16ER14 UN	16EL14 UN	16	1.0	1.2
		13	16ER13 UN	16EL13 UN	16	1.1	1.3
		12	16ER12 UN	16EL12 UN	16	1.1	1.4
		11.5	16ER11.5 UN	16EL11.5 UN	16	1.1	1.4
		11	16ER11 UN	16EL11 UN	16	1.1	1.5
		10	16ER10 UN	16EL10 UN	16	1.1	1.5
		9	16ER9 UN	16EL9 UN	16	1.2	1.7
		8	16ER8 UN	16EL8 UN	16	1.2	2.0
	1/2"	7	22ER7 UN	22EL7 UN	22	1.6	2.3
		6	22ER6 UN	22EL6 UN	22	1.6	2.3

	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
V Style	1/2 "	5	22ER5 UN	22EL5 UN	22	1.7	2.5	3.6
	5/8 "	4.5	27ER4.5 UN	27EL4.5 UN	27	1.9	2.7	3.6
		4	27ER4 UN	27EL4 UN	27	2.1	3.0	3.6
	3/8 "	32	16VER32 UN	16VEL32 UN	16	1.1	3.0	3.6
		28	16VER28 UN	16VEL28 UN	16	1.1	3.0	3.6
		24	16VER24 UN	16VEL24 UN	16	1.1	2.9	3.6
		20	16VER20 UN	16VEL20 UN	16	1.1	2.7	3.6
		18	16VER18 UN	16VEL18 UN	16	1.1	2.6	3.6
		16	16VER16 UN	16VEL16 UN	16	1.1	2.5	3.6
		14	16VER14 UN	16VEL14 UN	16	1.1	2.4	3.6
		12	16VER12 UN	16VEL12 UN	16	1.1	2.2	4.7
		10	16VER10 UN	16VEL10 UN	16	1.1	2.1	
		8	16VER8 UN	16VEL8 UN	16	1.1	2.0	
	1/2 "	7	22VER7 UN	22VEL7 UN	22	1.1	2.5	
M Style	3/8 "	16	16ER16UN2M	16	1.7	2.5		
	1/2 "	16	22ER16UN3M	22	2.6	4.1		
		12	22ER16UN2M	22	2.1	3.2		
		12	22ER16UN3M	22	3.4	5.3		
	5/8 "	8	27ER8UN2M	27	3.2	5.0		
								

American UN Full Profile
UNC UNF UNEF UNS
Internal

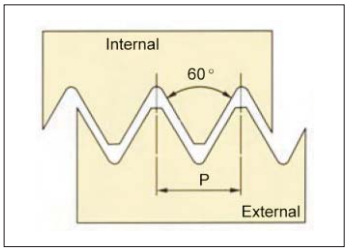


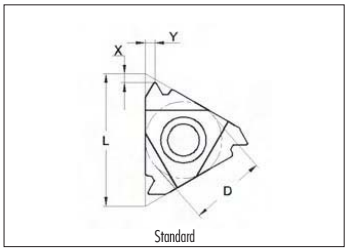


	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	5/32"	32	06NR32 UN	06NL32 UN	6	0.8	0.5
		28	06NR28 UN	06NL28 UN	6	0.8	0.6
		24	06NR24 UN	06NL24 UN	6	0.7	0.6
		20	06NR20 UN	06NL20 UN	6	0.6	0.6
		18	06NR18 UN	06NL18 UN	6	0.6	0.7
	3/16"	32	08NR32 UN	08NL32 UN	8	0.6	0.5
		28	08NR28 UN	08NL28 UN	8	0.6	0.6
		24	08NR24 UN	08NL24 UN	8	0.6	0.6
		20	08NR20 UN	08NL20 UN	8	0.6	0.7
		18	08NR18 UN	08NL18 UN	8	0.6	0.7
		16	08NR16 UN	08NL16 UN	8	0.6	0.7
		14	08NR14 UN	08NL14 UN	8	0.6	0.8
	1/4"	32	11NR32 UN	11NL32 UN	11	0.6	0.6
		28	11NR28 UN	11NL28 UN	11	0.6	0.7
		24	11NR24 UN	11NL24 UN	11	0.7	0.8
		20	11NR20 UN	11NL20 UN	11	0.8	0.9
		18	11NR18 UN	11NL18 UN	11	0.8	1.0
		16	11NR16 UN	11NL16 UN	11	0.9	1.1
	3/8″	32	16NR32 UN	16NL32 UN	16	0.6	0.6
		28	16NR28 UN	16NL28 UN	16	0.6	0.7
		24	16NR24 UN	16NL24 UN	16	0.7	0.8
		20	16NR20 UN	16NL20 UN	16	0.8	0.9

	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard	3/8"	18	16NR18 UN	16NL18 UN	16	0.8	1.0	
		16	16NR16 UN	16NL16 UN	16	0.9	1.1	
		14	16NR14 UN	16NL14 UN	16	1.0	1.2	
		13	16NR13 UN	16NL13 UN	16	1.0	1.3	
		12	16NR12 UN	16NL12 UN	16	1.1	1.4	
		11	16NR11 UN	16NL11 UN	16	1.1	1.5	
		10	16NR10 UN	16NL10 UN	16	1.1	1.5	
		9	16NR9 UN	16NL9 UN	16	1.2	1.7	
		8	16NR8 UN	16NL8 UN	16	1.2	2.0	
	1/2"	7	22NR7 UN	22NL7 UN	22	1.6	2.3	
		6	22NR6 UN	22NL6 UN	22	1.6	2.3	
		5	22NR5 UN	22NL5 UN	22	1.7	2.5	
	5/8"	4.5	27NR4.5UN	27NL4.5 UN	27	1.9	2.7	
		4	27NR4 UN	27NL4 UN	27	2.1	3.0	
V Style	5/8"	4	27VNR4 UN	27VNL4 UN	27	1.0	3.3	6
		3	22VNR3 UN	27VNL3 UN	27	1.0	4.3	8
M Style	3/8"	16	16NR16UN2M		16	1.7	2.4	
	1/2"	16	22NR16UN3M		22	2.5	4.0	
		12	22NR12UN2M		22	2.1	3.2	
		12	22NR12UN3M		22	3.3	5.2	
	5/8″	8	27NR8UN2M		27	3.0	4.8	

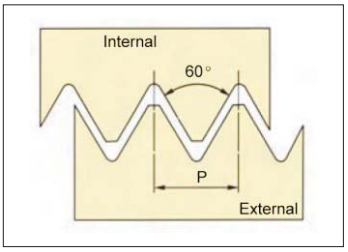
Aviation Thread
UNIC UNJF UNJEF UNJS
External

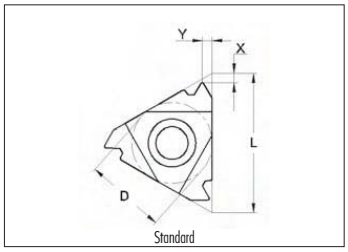


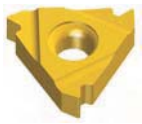


	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	1/4"	28	11ER 28 UNJ	11EL 28 UNJ	11	0.7	0.7
		24	11ER 24 UNJ	11EL 24 UNJ	11	0.7	0.8
		20	11ER 20 UNJ	11EL 20 UNJ	11	0.8	0.9
		18	11ER 18 UNJ	11EL 18 UNJ	11	0.8	1.0
		16	11ER 16 UNJ	11EL 16 UNJ	11	0.9	1.1
		14	11ER 14 UNJ	11EL 14 UNJ	11	1.0	1.2
	3/8"	28	16ER 28 UNJ	16EL 28 UNJ	16	0.7	0.7
		24	16ER 24 UNJ	16EL 24 UNJ	16	0.7	0.8
		20	16ER 20 UNJ	16EL 20 UNJ	16	0.8	0.9
		18	16ER 18 UNJ	16EL 18 UNJ	16	0.8	1.0
		16	16ER 16 UNJ	16EL 16 UNJ	16	0.9	1.1
		14	16ER 14 UNJ	16EL 14 UNJ	16	1.0	1.2
		13	16ER 13 UNJ	16EL 13 UNJ	16	1.0	1.3
		12	16ER 12 UNJ	16EL 12 UNJ	16	1.1	1.3
		11	16ER 11 UNJ	16EL 11 UNJ	16	1.2	1.5
		10	16ER 10 UNJ	16EL 10 UNJ	16	1.2	1.5
		9	16ER 9 UNJ	16EL 9 UNJ	16	1.3	1.7
		8	16ER 8 UNJ	16EL 8 UNJ	16	1.2	1.6
	1/2"	7	22ER 7 UNJ	22EL 7 UNJ	22	1.7	2.3
		6	22ER 6 UNJ	22EL 6 UNJ	22	1.6	2.3
		5	22ER 5 UNJ	22EL 5 UNJ	22	1.8	2.5
	5/8″	4.5	27ER 4.5 UNJ	27EL 4.5 UNJ	27	2.0	2.7
		4.5	27ER 4.5 UNJ	27EL 4.5 UNJ	27	2.2	3.0

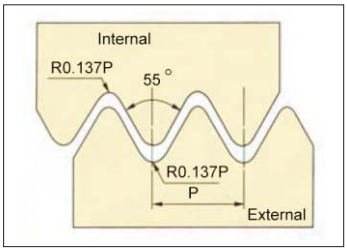
Aviation Thread
UNIC UNJF UNJEF UNJS
Internal

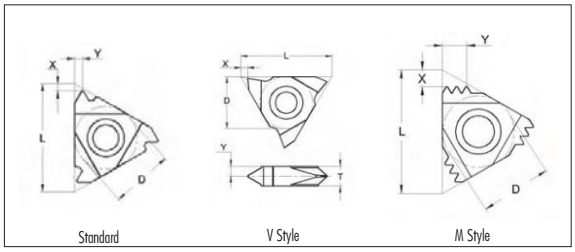




	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	1/4"	28	11NR 28 UNJ	11NL 28 UNJ	11	0.7	0.7
		24	11NR 24 UNJ	11NL 24 UNJ	11	0.7	0.8
		20	11NR 20 UNJ	11NL 20 UNJ	11	0.8	0.9
		18	11NR 18 UNJ	11NL 18 UNJ	11	0.8	1.0
		16	11NR 16 UNJ	11NL 16 UNJ	11	0.9	1.1
		14	11NR 14 UNJ	11NL 14 UNJ	11	1.0	1.2
	3/8"	28	16NR 28 UNJ	16NL 28 UNJ	16	0.7	0.7
		24	16NR 24 UNJ	16NL 24 UNJ	16	0.7	0.8
		20	16NR 20 UNJ	16NL 20 UNJ	16	0.8	0.9
		18	16NR 18 UNJ	16NL 18 UNJ	16	0.8	1.0
		16	16NR 16 UNJ	16NL 16 UNJ	16	0.9	1.1
		14	16NR 14 UNJ	16NL 14 UNJ	16	1.0	1.2
		13	16NR 13 UNJ	16NL 13 UNJ	16	1.0	1.3
		12	16NR 12 UNJ	16NL 12 UNJ	16	1.1	1.3
		11	16NR 11 UNJ	16NL 11 UNJ	16	1.2	1.5
		10	16NR 10 UNJ	16NL 10 UNJ	16	1.2	1.5
		9	16NR 9 UNJ	16NL 9 UNJ	16	1.3	1.7
		8	16NR 8 UNJ	16NL 8 UNJ	16	1.2	1.6
	1/2"	7	22NR 7 UNJ	22NL 7 UNJ	22	1.7	2.3
		6	22NR 6 UNJ	22NL 6 UNJ	22	1.6	2.3
		5	22NR 5 UNJ	22NL 5 UNJ	22	1.8	2.5
	5/8″	4.5	27NR 4.5 UNJ	27NL 4.5 UNJ	27	2.0	2.7
		4.5	27NR 4.5 UNJ	27NL 4.5 UNJ	27	2.2	3.0

55° Whitworth Full Profile
BSW BSF BSP BSB
External

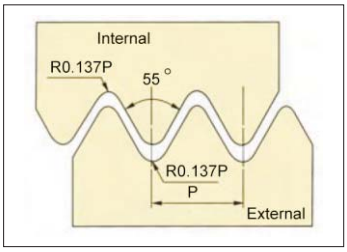


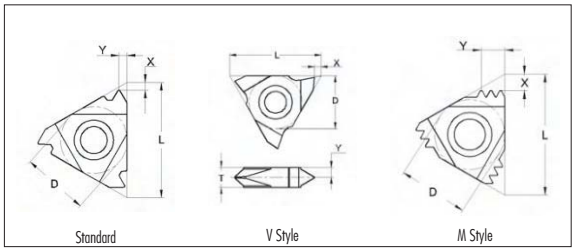


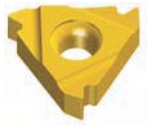
	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	1/4"	28	11ER28 W	11EL28 W	11	0.6	0.7
		26	11ER26 W	11EL26 W	11	0.7	0.8
		20	11ER20 W	11EL20 W	11	0.8	0.9
		19	11ER19 W	11EL19 W	11	0.8	1.0
		18	11ER18 W	11EL18 W	11	0.8	1.0
		16	11ER16 W	11EL16 W	11	0.9	1.1
		14	11ER14 W	11EL14 W	11	1.0	1.2
	3/8"	28	16ER28 W	16EL28 W	16	0.6	0.7
		26	11ER26 W	16EL26 W	16	0.7	0.8
		20	16ER20 W	16EL20 W	16	0.8	0.9
		19	16ER19 W	16EL19 W	16	0.8	1.0
		18	16ER18 W	16EL18 W	16	0.8	0.9
		16	16ER16 W	16EL16 W	16	0.9	1.1
		14	16ER14 W	16EL14 W	16	1.0	1.2
		12	16ER12 W	16EL12 W	16	1.1	1.4
		11	16ER11 W	16EL11 W	16	1.1	1.5
		10	16ER10 W	16EL10 W	16	1.1	1.5
		9	16ER9 W	16EL9 W	16	1.2	1.5
		8	16ER8 W	16EL8 W	16	1.2	1.7
	1/2"	7	22ER 7 W	22EL 7 W	22	1.6	2.3
		6	22ER 6 W	22EL 6 W	22	1.6	2.3
		5	22ER 5 W	22EL 5 W	22	1.7	2.4

	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
	5/8″	4.5	27ER4.5 W	27EL4.5 W	27	1.8	2.6	
		4	27ER 4 W	27EL 4 W	27	2.0	2.9	
V Style	3/8″	19	16VER19 W	16VEL19 W	16	1.1	2.7	3.6
		18	16VER18 W	16VEL18 W	16	1.1	2.6	3.6
		16	16VER16 W	16VEL16 W	16	1.1	2.6	3.6
		14	16VER14 W	16VEL14 W	16	1.1	2.4	3.6
		12	16VER12 W	16VEL12 W	16	1.1	2.4	3.6
		11	16VER11 W	16VEL11 W	16	1.1	2.1	3.6
	5/8″	4	27VER4 W	27VEL4 W	27	1.0	3.3	6
		3	27VER3 W	27VEL3 W	27	1.0	4.3	8
		2.5	27VER2.5 W	27VEL2.5 W	27	1.0	5.2	10
M Style	3/8″	14	16ER14W2M		16	1.9	2.8	
	1/2″	14	22ER14W3M		22	2.9	4.6	
		11	22ER11W2M		22	2.3	3.5	

55° Whitworth Full Profile
BSW BSF BSP BSB
Internal

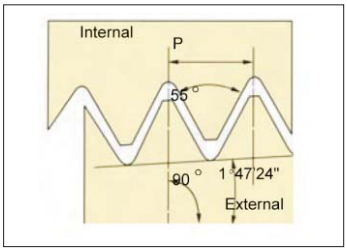


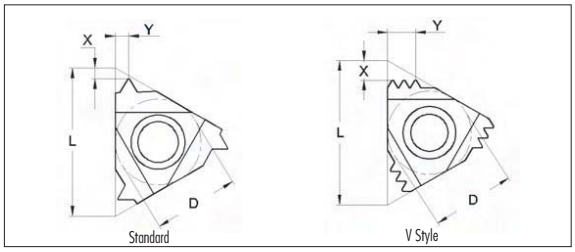


	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	5/32"	26	06NR26 W	06NL26 W	6	0.7	0.6
		22	06NR22 W	06NL22 W	6	0.6	0.6
		20	06NR20 W	06NL20 W	6	0.6	0.7
		18	06NR18 W	06NL18 W	6	0.6	0.7
	3/16"	28	08NR28 W	08NL28 W	8	0.6	0.6
		24	08NR24 W	08NL24 W	8	0.6	0.6
		20	08NR20 W	08NL20 W	8	0.6	0.7
		19	08NR19 W	08NL19 W	8	0.6	0.7
		18	08NR18 W	08NL18 W	8	0.6	0.7
		16	08NR16 W	08NL16 W	8	0.6	0.7
	1/4"	28	11NR28 W	11NL28 W	11	0.6	0.6
		26	11NR26 W	11NL26 W	11	0.6	0.7
		20	11NR20 W	11NL20 W	11	0.7	0.9
		19	11NR19 W	11NL19 W	11	0.8	1.0
		18	11NR18 W	11NL18 W	11	0.8	1.0
		16	11NR16 W	11NL16 W	11	0.9	1.1
		14	11NR14 W	11NL14 W	11	1.0	1.2
	3/8″	28	16NR28 W	16NL28 W	16	0.6	0.7
		26	16NR26 W	16NL26 W	16	0.7	0.8
		20	16NR20 W	16NL20 W	16	0.8	0.9
		19	16NR19 W	16NL19 W	16	0.8	1.0
		18	16NR18 W	16NL18 W	16	0.8	1.0

	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
	3/8"	16	16NR16 W	16NL16 W	16	0.9	1.1	
		14	16NR14 W	16NL14 W	16	1.0	1.2	
		12	16NR12 W	16NL12 W	16	1.1	1.4	
		11	16NR11 W	16NL11 W	16	1.1	1.5	
		10	16NR10 W	16NL10 W	16	1.1	1.5	
		9	16NR 9 W	16NL 9 W	16	1.2	1.5	
		8	16NR 8 W	16NL 8 W	16	1.2	1.7	
	1/2"	7	22NR 7 W	22NL 7 W	22	1.6	2.3	
		6	22NR 6 W	22NL 6 W	22	1.6	2.3	
		5	22NR 5 W	22NL 5 W	22	1.7	2.4	
	5/8"	4.5	27NR4.5 W	27NL4.5 W	27	1.8	2.6	
		4	27NR 4 W	27NL 4 W	27	2.0	2.9	
V Style 	5/8"	4	27VNR4 W	27VNL4 W	27	1.0	3.3	6
		3	27VNR3 W	27VNL3 W	27	1.0	4.3	8
		2.5	27VNR2.5 W	27VNL2.5 W	27	1.0	5.2	10
M Style 	3/8″	14	16NR14W2M		16	1.9	2.8	
		14	22NR14W3M		22	2.9	4.6	
	1/2″	11	22NR11W2M		22	2.3	3.5	

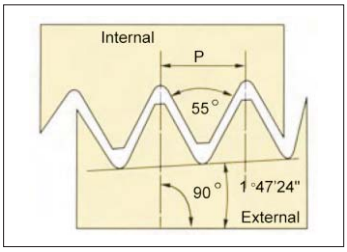
NPTF
External

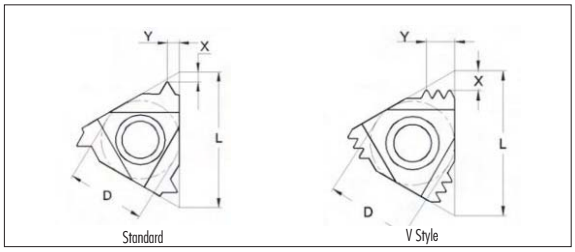




	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	1/4"	27	11ER 27 NPTF	11NL 27 NPTF	11	0.7	0.8
		18	11ER 18 NPTF	11NL 18 NPTF	11	0.8	1.0
		14	11ER 14 NPTF	11NL 14 NPTF	11	0.8	1.0
	3/8"	27	16ER 27 NPTF	16NL 27 NPTF	16	0.7	0.8
		18	16ER 18 NPTF	16NL 18 NPTF	16	0.8	1.0
		14	16ER 14 NPTF	16NL 14 NPTF	16	0.9	1.2
		11.5	16ER 11.5NPTF	16NL 11.5 NPTF	16	1.1	1.5
		8	16ER 8 NPTF	16NL 8 NPTF	16	1.3	1.8
M Style	1/2″	11.5	22ER11.5 NPTF2M		22	3.4	2.2

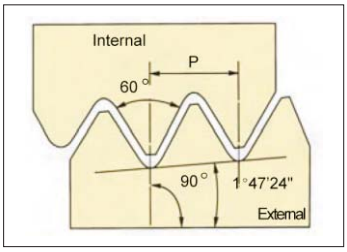
NPTF
Internal

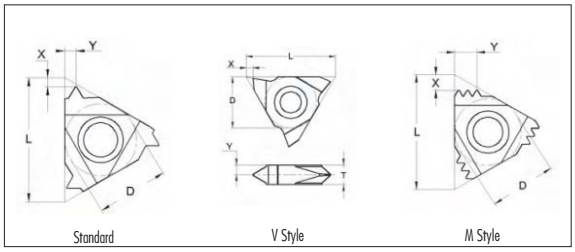


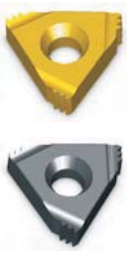


	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	5/32"	27	06NR27NPTF	06NL27 NPTF	6	0.7	0.6
	3/16″	27	08NR27NPTF	08NL27NPTF	8	0.6	0.6
		18	08NR18 NPTF	08NL18NPTF	8	0.6	0.6
	1/4″	27	11NR 27 NPTF	11NL 27 NPTF	11	0.7	0.8
		18	11NR 18 NPTF	11NL 18 NPTF	11	0.8	1.0
		14	11NR 14 NPTF	11NL 14 NPTF	11	0.8	1.0
	3/8″	27	16NR 27 NPTF	16NL 27 NPTF	16	0.7	0.8
		18	16NR 18 NPTF	16NL 18 NPTF	16	0.8	1.0
		14	16NR 14 NPTF	16NL 14 NPTF	16	0.9	1.2
		11.5	16NR 11.5NPTF	16NL 11.5 NPTF	16	1.1	1.5
		8	16NR 8 NPTF	16NL 8 NPTF	16	1.3	1.8
M Style	1/2"	11.5	22NR11.5NPTF2M		22	3.4	2.2
	5/8"	11.5	27NR 11.5NPTF3M		27	3.5	2.2

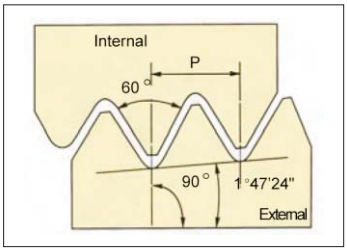
National Pipe Threads External

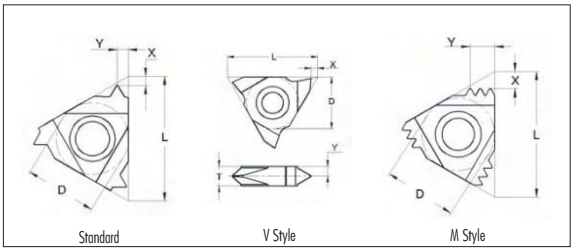




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard 	1/4 "	27	11ER27 NPT	11EL27 NPT	11	0.7	0.8	
		18	11ER18 NPT	11EL18 NPT	11	0.8	1.0	
		14	11ER14 NPT	11EL14 NPT	11	0.8	1.0	
	3/8 "	27	16ER27 NPT	16EL27 NPT	16	0.7	0.8	
		18	16ER18 NPT	16EL18 NPT	16	0.8	1.0	
		14	16ER14 NPT	16EL14 NPT	16	0.8	1.0	
		11.5	16ER11.5 NPT	16NL11.5 NPT	16	1.1	1.5	
		8	16ER 8 NPT	16EL 8 NPT	16	1.2	1.8	
V Style 	3/8 "	27	16VER27 NPT	16VEL27 NPT	16	1.1	2.9	3.6
		18	16VER18 NPT	16VEL18 NPT	16	1.1	2.6	3.6
		14	16VER14 NPT	16VEL14 NPT	16	1.1	2.3	3.6
		11.5	16VER11.5 NPT	16VEL11.5 NPT	16	1.1	2.1	3.6
M Style 	1/2 "	11.5	22ER11.5 NPT2M		22	3.4	2.2	
	5/8 "	11.5	27ER11.5 NPT3M		27	3.5	5.6	
		8	27ER8 NPT2M		27	2.9	4.7	

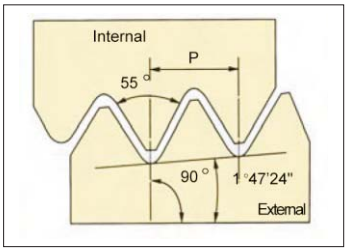
National Pipe Threads Internal

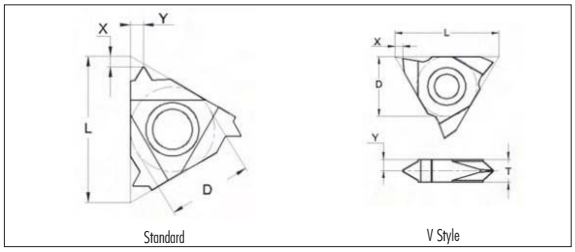




	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	5/32"	27	06NR27 NPT	06NL27 NPT	6	0.6	0.6
	3/16"	27	08NR27 NPT	08NL27 NPT	8	0.6	0.6
		18	08NR18 NPT	08NL18 NPT	8	0.6	0.6
	1/4"	27	11NR27 NPT	11NL27 NPT	11	0.7	0.8
		18	11NR18 NPT	11NL18 NPT	11	0.8	1.0
		14	11NR14 NPT	11NL14 NPT	11	0.8	1.0
	3/8"	27	16NR27 NPT	16NL27 NPT	16	0.7	0.8
		18	16NR18 NPT	16NL18 NPT	16	0.8	1.0
		14	16NR14 NPT	16NL14 NPT	16	0.8	1.0
		11.5	16NR11.5 NPT	16NL11.5 NPT	16	1.1	1.5
		8	16NR 8 NPT	16NL 8 NPT	16	1.2	1.8
M Style	1/2"	11.5	22NR11.5NPT2M		22	3.4	2.2
	5/8"	11.5	27NR11.5NPT3M		27	3.5	5.6
		8	27NR8NPT2M		27	2.9	4.7

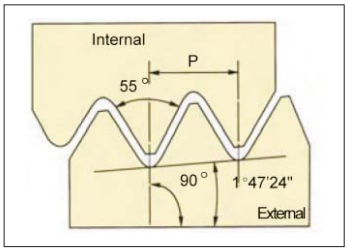
British Standard Pipe Full Profile External

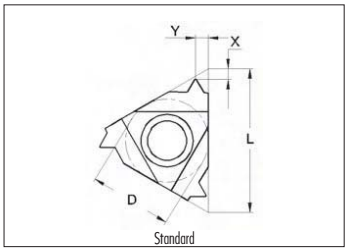




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard	1/4 "	28	11ER28 BSPT	11EL28 BSPT	11	0.6	0.6	
		19	11ER19 BSPT	11EL19 BSPT	11	0.8	0.9	
		14	11ER14 BSPT	11EL14 BSPT	11	0.9	1.0	
	3/8 "	28	16ER28 BSPT	16EL28 BSPT	16	0.6	0.6	
		19	16ER19 BSPT	16EL19 BSPT	16	0.8	0.9	
		14	16ER14 BSPT	16EL14 BSPT	16	1.0	1.2	
		11	16ER11 BSPT	16EL11 BSPT	16	1.1	1.5	
M Style	3/8 "	28	16VER28 BSPT	16VEL28 BSPT	16	1.1	3.0	3.6
		19	16VER19 BSPT	16VEL19 BSPT	16	1.1	2.7	3.6
		14	16VER14 BSPT	16VEL14 BSPT	16	1.1	2.4	3.6
		11	16VER11 BSPT	16VEL11 BSPT	16	1.1	2.1	3.6

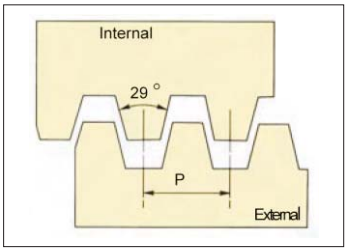
British Standard Pipe Full Profile Internal

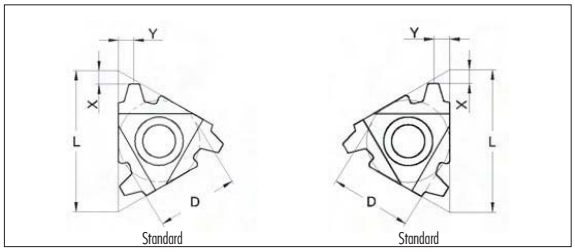




	D	Pitch	Designation		Dimension		
		mm	Right Hand	Left Hand	L	X	Y
Standard	5/32"	28	06NR28 BSPT	06NL28 BSPT	6	0.7	0.6
	3/16"	28	08NR28 BSPT	08NL28 BSPT	8	0.6	0.6
		19	08NR19 BSPT	08NL19 BSPT	8	0.6	0.6
	1/4"	28	11NR28 BSPT	11NL28 BSPT	11	0.6	0.8
		19	11NR19 BSPT	11NL19 BSPT	11	0.8	0.9
		14	11NR14 BSPT	11NL14 BSPT	11	0.9	1.0
	3/8"	28	16NR28 BSPT	16NL28 BSPT	16	0.6	0.6
		19	16NR19 BSPT	16NL19 BSPT	16	0.8	0.9
		14	16NR14 BSPT	16NL14 BSPT	16	1.0	1.2
		11	16NR11 BSPT	16NL11 BSPT	16	1.1	1.5

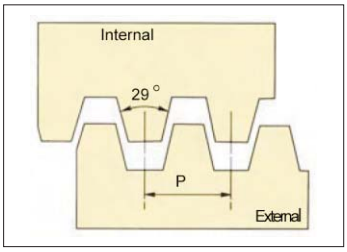
ACME Standard

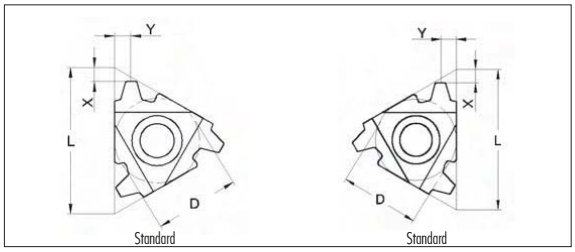




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
External		16	16ER16 ACME	16EL16 ACME	16	1.0	1.1	
		14	16ER14 ACME	16EL14 ACME	16	1.0	1.2	
	3/8 "	12	16ER12 ACME	16EL12 ACME	16	1.1	1.2	
		10	16ER10 ACME	16EL10 ACME	16	1.3	1.3	
		8	16ER 8 ACME	16EL 8 ACME	16	1.4	1.5	
	1/2 "	6	22ER6 ACME	22EL 6 ACME	22	1.8	2.1	
		5	22ER 5 ACME	22EL 5 ACME	22	2.0	2.3	
	5/8 "	4	27ER 4 ACME	27EL 4 ACME	27	2.4	2.7	
Internal		16	16NR16 ACME	16NL16 ACME	16	1.0	1.1	
		14	16NR14 ACME	16NL14 ACME	16	1.0	1.2	
	3/8 "	12	16NR12 ACME	16NL12 ACME	16	1.1	1.2	
		10	16NR10 ACME	16NL10 ACME	16	1.3	1.3	
		8	16NR 8 ACME	16NL 8 ACME	16	1.4	1.5	
	1/2 "	6	22NR 6 ACME	22NL 6 ACME	22	1.8	2.1	
		5	22NR5 ACME	22NL 5 ACME	22	2.0	2.3	
	5/8 "	4	27NR4 ACME	27NL 4 ACME	27	2.4	2.7	

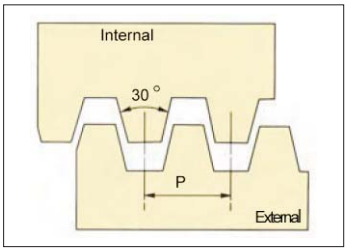
STUB ACME
Standard

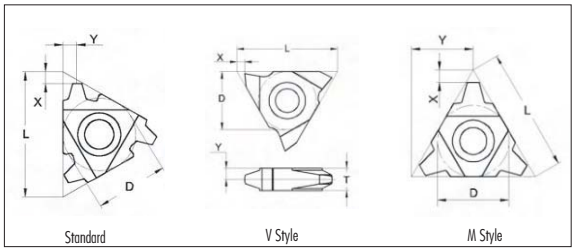




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
External		16	16ER16 STACME	16EL16 STACME	16	1.0	1.1	
		14	16ER14 STACME	16EL14 STACME	16	1.1	1.1	
	3/8 "	12	16ER12 STACME	16EL12 STACME	16	1.2	1.2	
		10	16ER10 STACME	16EL10 STACME	16	1.2	1.3	
		8	16ER 8 STACME	16EL 8 STACME	16	1.4	1.5	
		6	16ER 6 STACME	16EL 6 STACME	16	1.7	1.8	
	1/2 "	5	22ER 5 STACME	22EL 5 STACME	22	2.1	2.3	
	5/8 "	4	27ER 4 STACME	27EL 4 STACME	27	2.3	2.4	
		3	27ER 3 STACME	27EL 3 STACME	27	2.9	2.9	
Internal		16	16NR16 STACME	16NL16 STACME	16	1.0	1.1	
		14	16NR14 STACME	16NL14 STACME	16	1.1	1.1	
	3/8 "	12	16NR12 STACME	16NL12 STACME	16	1.2	1.2	
		10	16NR10 STACME	16NL10 STACME	16	1.2	1.3	
		8	16NR 8 STACME	16NL 8 STACME	16	1.4	1.4	
		6	16NR 6 STACME	16NL 6 STACME	16	1.7	1.8	
	1/2 "	5	22NR 5 STACME	22NL 5 STACME	22	2.1	2.3	
	5/8 "	4	27NR 4 STACME	27NL 4 STACME	27	2.3	2.4	
		3	27NR 3 STACME	27NL 3 STACME	27	2.9	2.9	

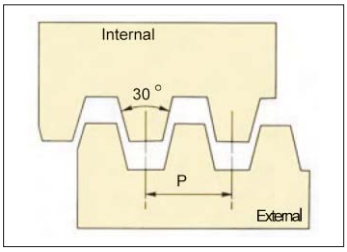
Trapeze DIN 103
External

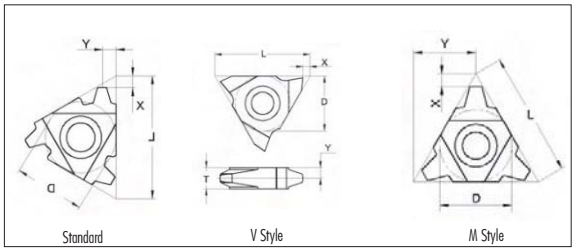




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard	3/8 "	1.5	16ER1.5 TR	16EL1.5 TR	16	1.0	1.1	
		2.0	16ER 2.0 TR	16EL 2.0 TR	16	1.1	1.3	
		3.0	16ER 3.0 TR	16EL 3.0 TR	16	1.3	1.5	
	1/2 "	4.0	22ER 4.0 TR	22EL 4.0 TR	22	1.7	1.9	
		5.0	22ER 5.0 TR	22EL 5.0 TR	22	2.1	2.5	
	5/8 "	6.0	27ER 6.0 TR	27EL 6.0 TR	27	2.2	2.6	
		7.0	27ER 7.0 TR	27EL 7.0 TR	27	2.3	2.7	
V Style	5/8 "	6.0	27VER6.0 TR	27VEL6.0 TR	27	1.0	3.3	6
		7.0	27VER7.0 TR	27VEL7.0 TR	27	1.0	3.3	6
		8.0	27VER8.0 TR	27VEL8.0 TR	27	1.0	3.3	6
		9.0	27VER9.0 TR	27VEL9.0 TR	27	1.0	4.3	8
		10	27VER10 TR	27VEL10 TR	27	1.0	4.3	8
		12	27VER12 TR	27VEL12 TR	27	1.0	5.2	10
U Style	5/8 "	8.0	27UE8.0 TR		27	2.6	13.7	
		9.0	27UE9.0 TR		27	3.0	13.7	

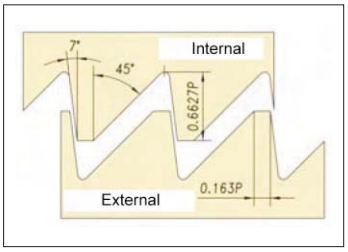
Trapeze DIN 103
Internal

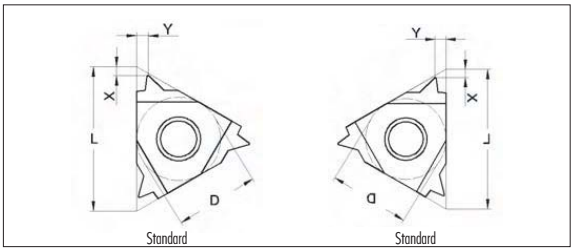




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard	3/8 "	1.5	16NR1.5 TR	16NL1.5 TR	16	1.0	1.1	
		2.0	16NR 2.0 TR	16NL 2.0 TR	16	1.1	1.3	
		3.0	16NR 3.0 TR	16NL 3.0 TR	16	1.3	1.5	
	1/2 "	4.0	22NR 4.0 TR	22NL 4.0 TR	22	1.7	1.9	
		5.0	22NR 5.0 TR	22NL 5.0 TR	22	2.1	2.5	
	5/8 "	6.0	27NR 6.0 TR	27NL 6.0 TR	27	2.2	2.6	
		7.0	27NR 7.0 TR	27NL 7.0 TR	27	2.3	2.7	
V Style	5/8 "	6.0	27VNR6.0 TR	27VNL6.0 TR	27	1.0	3.3	6
		7.0	27VNR7.0 TR	27VNL7.0 TR	27	1.0	3.3	6
		8.0	27VNR8.0 TR	27VNL8.0 TR	27	1.0	3.3	6
		9.0	27VNR9.0 TR	27VNL9.0 TR	27	1.0	4.3	8
		10	27VNR10 TR	27VNL10 TR	27	1.0	4.3	8
		12	27VNR12 TR	27VNL12 TR	27	1.0	5.2	10
U Style	5/8 "	8.0	27UN8.0 TR		27	2.6	13.7	
		9.0	27UN9.0 TR		27	3.0	13.7	

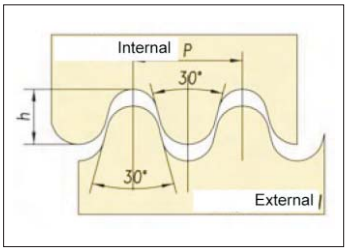
American Buttress Standard

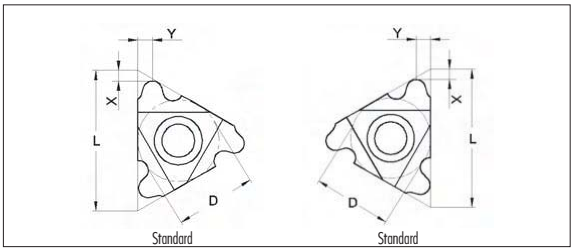




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
External		20	11ER 20 ABUT	11EL20 ABUT	11	1.0	1.4	
		16	11ER 16 ABUT	11EL 16 ABUT	11	1.3	1.9	
	1/4 "	20	16ER 20 ABUT	16EL 20 ABUT	16	1.0	1.4	
		16	16ER16 ABUT	16EL 16 ABUT	16	1.3	1.9	
		12	16ER 12 ABUT	16EL 12 ABUT	16	1.4	2.0	
	3/8 "	10	16ER 10 ABUT	16EL 10 ABUT	16	1.5	2.3	
	1/2 "	8	22ER 8 ABUT	22EL 8 ABUT	22	2.0	3.2	
		6	22ER 6 ABUT	22EL 6 ABUT	22	2.2	3.5	
Internal	1/4 "	20	11NR 20 ABUT	11NL 20 ABUT	11	1.0	1.4	
		16	11NR 16 ABUT	11NL 16 ABUT	11	1.3	1.9	
	3/8 "	20	16NR 20 ABUT	16NL 20 ABUT	16	1.0	1.4	
		16	16NR 16 ABUT	16NL 16 ABUT	16	1.3	1.9	
		12	16NR 12 ABUT	16NL 12 ABUT	16	1.4	2.0	
		10	16NR 10 ABUT	16NL 10 ABUT	16	1.5	2.3	
	1/2 "	8	22NR 8 ABUT	22NL 8 ABUT	22	2.0	3.2	
		6	22NR 6 ABUT	22NL 6 ABUT	22	2.2	3.5	

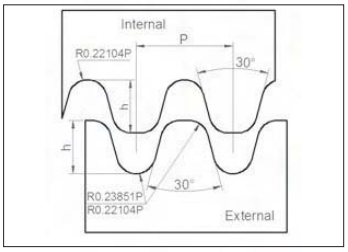
Round DIN 405
Standard

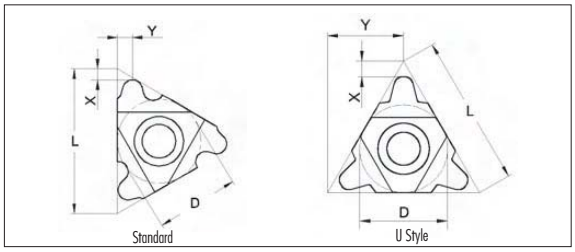




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
External	3/8 "	10	16ER 10 RD	16EL 10 RD	16	1.1	1.2	
		8	16ER 8 RD	16EL 8 RD	16	1.3	1.4	
		6	16ER 6 RD	16EL 6 RD	16	1.5	1.7	
	1/2 "	6	22ER 6 RD	22EL 6 RD	22	1.5	1.7	
		4	22ER 4 RD	22EL 4 RD	22	1.7	2.3	
	5/8 "	4	27ER 4 RD	27EL 4 RD	27	1.7	2.3	
Internal	3/8 "	10	16NR 10 RD	16NL 10 RD	16	1.1	1.2	
		8	16NR 8 RD	16NL 8 RD	16	1.3	1.4	
	1/2 "	6	16NR 6 RD	16NL 6 RD	16	1.5	1.7	
		6	22NR 6 RD	22NL 6 RD	22	1.5	1.7	
	5/8 "	4	22NR 4 RD	22NL 4 RD	22	1.7	2.3	
		4	27NR 4 RD	27NL 4 RD	27	1.7	2.3	

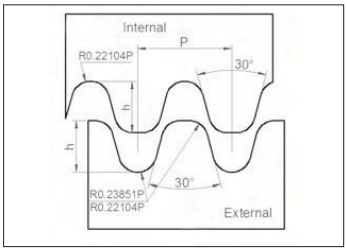
ROUND 20400
External

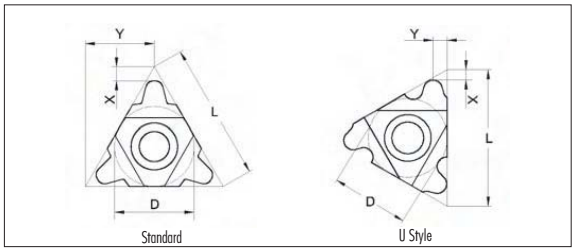




	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard	1/2 "	3.0	22ER 3.0 RD	22EL 3.0 RD	22	1.28	1.7	
		4.0	22ER 4.0 RD	22EL 4.0 RD	22	1.60	2.2	
		5.0	22ER 5.0 RD	22EL 5.0 RD	22	1.36	1.75	
		6.0	22ER 6.0 RD	22EL 6.0 RD	22	1.70	2.10	
U Style	5/8 "	8.0	27UE 8.0 RD		27	2.95	13.5	

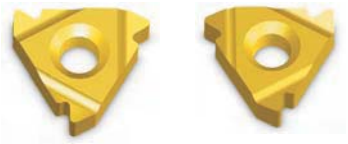
ROUND 20400
Internal





	D	Pitch	Designation		Dimension			
		mm	Right Hand	Left Hand	L	X	Y	T
Standard	1/2 "	3.0	22NR 3.0 RD	22NL 3.0 RD	22	1.28	1.7	
		4.0	22NR 4.0 RD	22NL 4.0 RD	22	1.60	2.2	
		5.0	22NR 5.0 RD	22NL 5.0 RD	22	1.36	1.75	
		6.0	22NR 6.0 RD	22NL 6.0 RD	22	1.70	2.10	
U Style	5/8 "	8.0	27UE 8.0 RD		27	2.95	13.5	

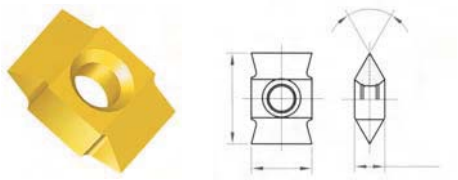
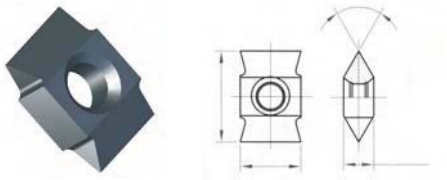
Insert for API oil Pipe

Dimension		Designation	TPI Pitch
	API round	16ER10APIRD	10
	API round	16NR10APIRD	10
	API round	16ER8APIRD	8
	API round	16NR8APIRD	8
	API Buttress	22ER5BUT	5
	API Buttress	22NR5BUT	5

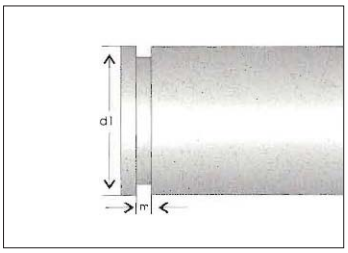
Partial Profile V Style Inserts

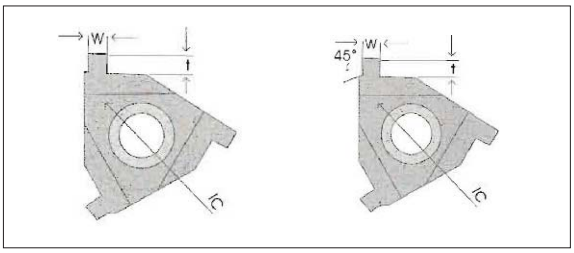
Dimension		Designation	Pitch (mm)	Re
	Partial Profile 60°	MTTR/L 436001	1.0~1.75	R0.1
		MTTR/L436002	2.0~2.5	R0.2
		MTTR/L436003	3.0~3.5	R0.3
		MTTR/L436004	4.0~4.5	R0.4
	Partial Profile 55°	MTTR/L 435501	1.0~1.75	R0.1
		MTTR/L435502	2.0~2.5	R0.2
		MTTR/L435503	3.0~3.5	R0.3
		MTTR/L435504	4.0~4.5	R0.4

Partial Profile Thread Milling insert

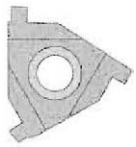
Dimension		Designation
	Partial Profile 60°	SV1906
	Partial Profile 55°	SV1604

Ring Grooving Inserts





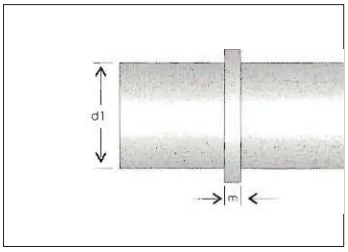
Standard (Partial Profile)

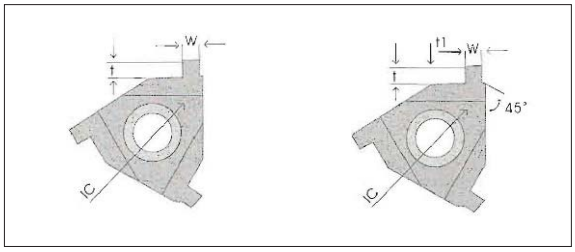
Diagram	IC	Order No.	Groove Std	Size (mm)	
			M (H13)	W	t
	3/8	16ER1.10-D471-1.30...	1.10	1.19	1.3
		16ER1.13-D471-1.50...	1.30	1.39	1.5
		16ER1.16-D471-1.85...	1.60	1.69	1.8
		16ER1.85-D471-2.00...	1.85	1.94	2.0

Standard (Full Profile)

Diagram	IC	Order No.	Groove Std		Size (mm)		
			M (H13)	d1	W	t1	t
	3/8	16ER1.10-D471-0.35...	1.10	15	1.10	0.33	0.33
		16ER1.10-D471-0.40...	1.10	16-17	1.10	0.36	0.36
		16ER1.30-D471-0.50...	1.30	18-22	1.30	0.44	0.44
		16ER1.30-D471-0.55...	1.30	24-26	1.30	0.45	0.45
		16ER1.60-D471-0.70...	1.60	28-30	1.60	0.60	0.60
		16ER1.60-D471-0.85...	1.60	32-34	1.60	0.75	0.75
		16ER1.60-D471-1.00...	1.60	35	1.60	0.85	0.85
		16ER1.85-D471-1.00...	1.85	36-38	1.85	0.85	0.85
		16ER1.85-D471-1.25...	1.85	40-48	1.85	1.10	1.10
		16ER2.15-D471-1.50...	2.15	50-63	2.15	1.35	1.35

Ring Grooving Inserts

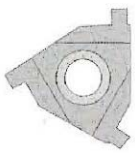




Standard (Partial Profile)

Diagram	IC	Order No.	Groove Std	Size (mm)	
			M (H13)	W	t
	3/8	16IR1.10-D471-1.30...	1.10	1.19	1.3
		16IR1.13-D471-1.50...	1.30	1.39	1.5
		16IR1.16-D471-1.85...	1.60	1.69	1.8
		16IR1.85-D471-2.00...	1.85	1.94	2.0

Standard (Full Profile)

Diagram	IC	Order No.	Groove Std		Size (mm)		
			M (H13)	d1	W	t1	t
	3/8	16IR1.10-D471-0.35...	1.10	15	1.10	0.33	0.33
		16IR1.10-D471-0.40...	1.10	16-17	1.10	0.36	0.36
		16IR1.30-D471-0.50...	1.30	18-22	1.30	0.44	0.44
		16IR1.30-D471-0.55...	1.30	24-26	1.30	0.45	0.45
		16IR1.60-D471-0.70...	1.60	28-30	1.60	0.60	0.60
		16IR1.60-D471-0.85...	1.60	32-34	1.60	0.75	0.75
		16IR1.60-D471-1.00...	1.60	35	1.60	0.85	0.85
		16IR1.85-D471-1.00...	1.85	36-38	1.85	0.85	0.85
		16IR1.85-D471-1.25...	1.85	40-48	1.85	1.10	1.10
		16IR2.15-D471-1.50...	2.15	50-63	2.15	1.35	1.35

Internal Grooving Inserts (Standard style)

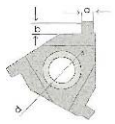
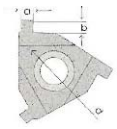
Diagram	Order No.	Size (mm)				
		a	b	d	d1	s
	16EL1.10	1.10	0.9	9.525	4.4	3.97
	16EL1.30	1.30	1.3	9.525	4.4	3.97
	16EL1.80	1.65	1.4	9.525	4.4	3.97
	16EL1.85	1.85	1.7	9.525	4.4	3.97
	16EL2.15	2.15	2.0	9.525	4.4	3.97
	16EL2.65	2.65	2.2	9.525	4.4	3.97

Diagram	Order No.	Size (mm)				
		a	b	d	d1	s
	16ER1.10	1.10	0.9	9.525	4.4	3.97
	16ER1.30	1.30	1.3	9.525	4.4	3.97
	16ER1.80	1.65	1.4	9.525	4.4	3.97
	16ER1.85	1.85	1.7	9.525	4.4	3.97
	16ER2.15	2.15	2.0	9.525	4.4	3.97
	16ER2.65	2.65	2.2	9.525	4.4	3.97

Internal Grooving Inserts (Standard style)

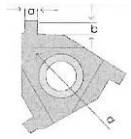
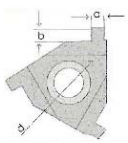
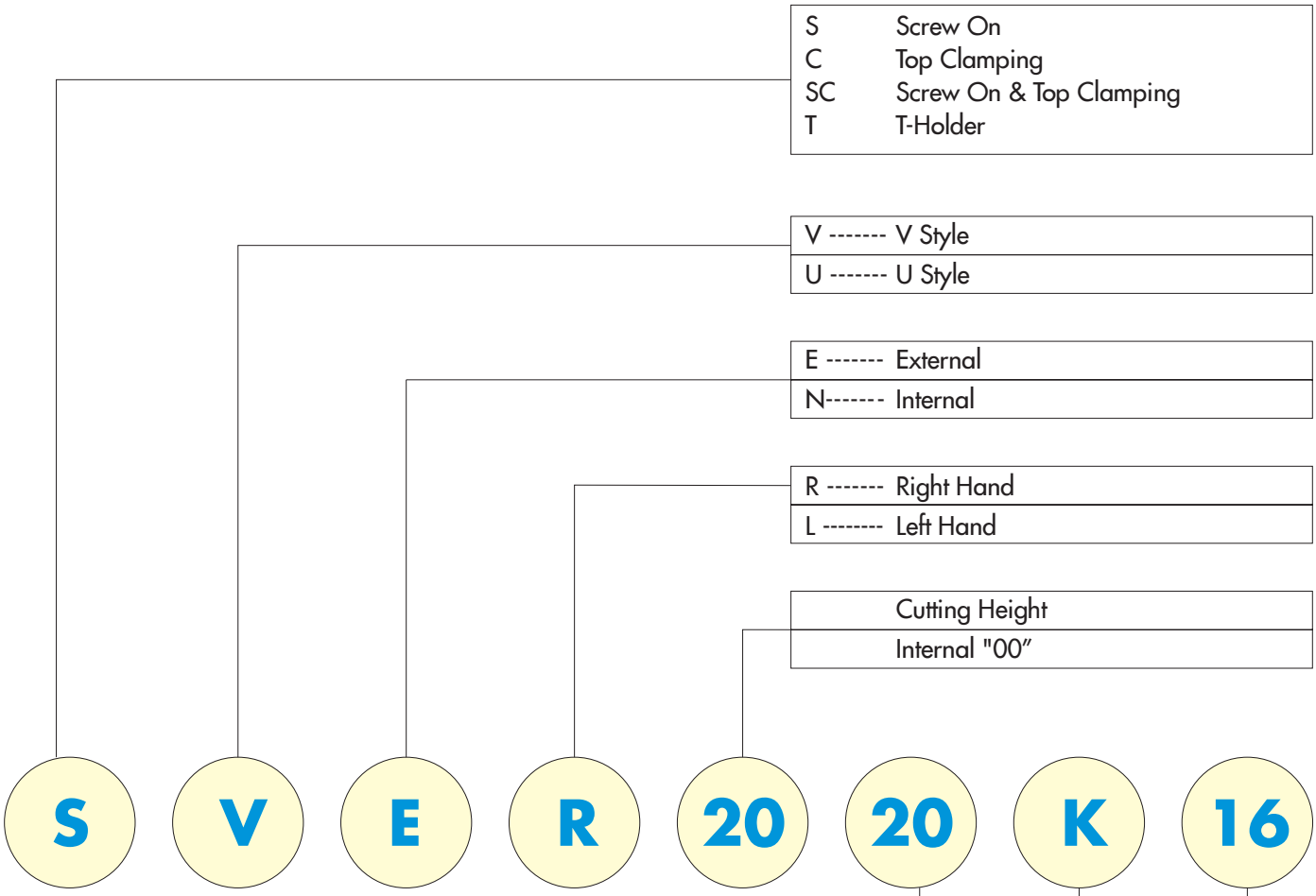
Diagram	Order No.	Size (mm)				
		a	b	d	d1	s
	111L1.10	1.10	0.7	6.35	2.8	2.38
	161L1.10	1.10	1.3	9.525	4.4	3.97
	161L1.30	1.30	1.6	9.525	4.4	3.97
	161L1.60	1.60	1.85	9.525	4.4	3.97
	161L1.85	1.85	1.85	9.525	4.4	3.97
	161L2.15	2.15	1.85	9.525	4.4	3.97

Diagram	Order No.	Size (mm)				
		a	b	d	d1	s
	111R1.10	1.10	0.7	6.35	2.8	2.38
	161R1.10	1.10	1.3	9.525	4.4	3.97
	161R1.30	1.30	1.6	9.525	4.4	3.97
	161R1.60	1.60	1.85	9.525	4.4	3.97
	161R1.85	1.85	1.85	9.525	4.4	3.97
	161R2.15	2.15	1.85	9.525	4.4	3.97

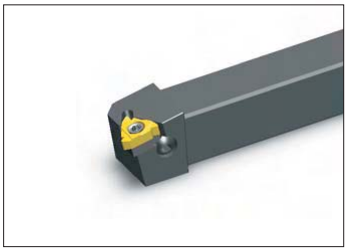


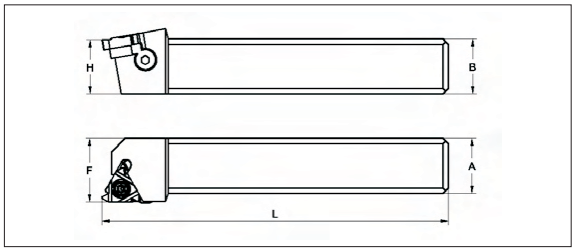
Shank Width for External
Diameter of Shank for internal

Length of Toolholder				
H ----- 100	M ----- 150	Q ----- 180	S ----- 250	U ----- 350
K ----- 125	P ----- 170	R ----- 200	T ----- 300	V ----- 400

Insert Dimension		
Code	Code	Insert Edge Length
06	3.969(5/12")	6
08	4.76(3/16")	8
11	6.305(1/4")	11
16	9.525(3/8")	16
22	12.70(1/2")	22
27	15.875(5/8")	27

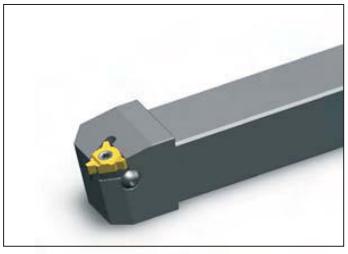
External Threading Tool Holders Standard

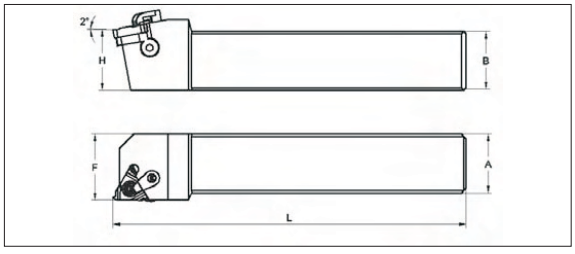




Order No.							Insert						
Right	Left	H	A	B	L	F		Screw	Torx Key	Anvil R	Anvil L	Anvil Screw	Wrench
SER 0808H06	SEL 0606H06	8	8	8	100	11	06ER/L	M2.2x6.3	T7				
SER 0808H08	SEL 0808H08	8	8	8	100	11	08ER/L	M2.5x6.5	T7				
SER 0808H11	SEL 0808H11	8	8	8	100	11	11ER 11EL	M3x7.2	T8				
SER 1010H11	SEL 1010H11	10	10	10	100	11							
SER 1212H11	SEL 1212H11	12	12	12	100	12							
SER 1616H16	SEL 1616H16	16	16	16	100	20	16ER 16EL	M3.5x12	T15	Y16E	Y16N	M3x5	S2.5
SER 2020K16	SEL 2020K16	20	20	20	125	25							
SER 2525M16	SEL 2525M16	25	25	25	150	32							
SER 3225P16	SEL 3225P16	32	32	25	170	32							
SER 3232P16	SEL 3232P16	32	32	32	170	40							
SER 2525M22	SEL 2525M22	25	25	25	150	32	22ER 22EL	M4x14	T15	Y22E	Y22N	M3x5	S2.5
SER 3225P22	SEL 3225P22	32	32	25	170	32							
SER 3232P22	SEL 3232P22	32	32	32	170	40							
SER 2525M27	SEL 2525M27	25	25	25	150	35	27ER 27EL	M6x16	T20	Y27E	Y27N	M3x5	S2.5
SER 3232P27	SEL 3232P27	32	32	32	170	40							
SER 4040R27	SEL 4040R27	40	40	40	200	40							
SER 5050S27	SEL 5050S27	50	50	50	250	40							

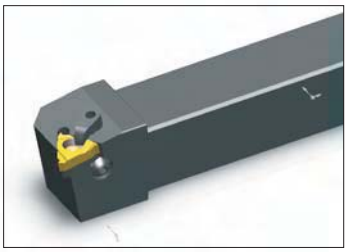
External Threading Tool Holders Standard with Clamp

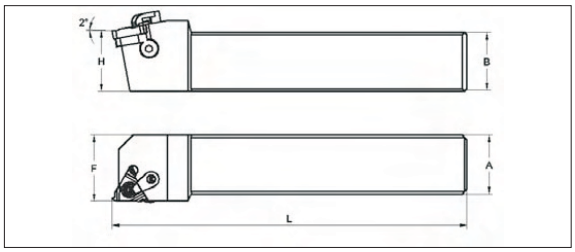




Order No.							Insert							
Right	Left	H	A	B	L	F		Clamp	Torx Key	Screw	Anvil R	Anvil L	Anvil Screw	Wrench
CER 2020K16	CEL 2020K16	20	20	20	125	25	16ER 16EL	CL-20	T15	XNS-48	Y16E	Y16N	M3x5	1/8
CER 2525M16	CEL 2525M16	25	25	25	150	30								
CER 3232P16	CEL 3232P16	32	32	32	170	37								S2.5
CER 2525M22	CEL 2525M22	25	25	25	150	30	22ER 22EL	CL-12	T15	XNS-510	Y22E	Y22N	M3x5	5/32
CER 3232P22	CEL 3232P22	32	32	32	170	37								
CER 4040R22	CEL 4040R22	40	40	40	20	45								S2.5

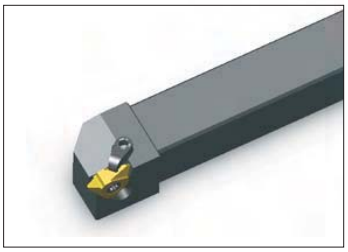
External Threading Tool Holders U-Style

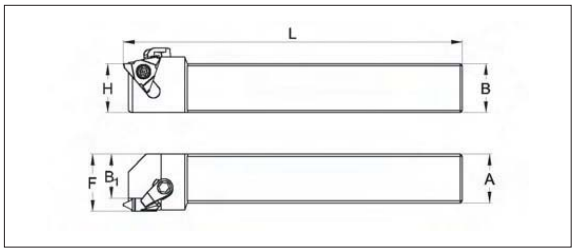




Order No.							Insert	Screw	Torx Key	Anvil	Anvil Screw	Wrench
Right	Left	H	A	B	L	F						
SUER 3232P22	SUEL 3232P22	32	32	32	170	37	22UE	M4 14	T15			
SUER 4040R22	SUEL 4040R22	40	40	40	200	45				Y22U	M3 5	S2.5
SUER 3232P27	SUEL 3232P27	32	32	32	170	37						
SUER 4040R27	SUEL 4040R27	40	40	40	200	45	27UE	M6 16	T20			
SUER 5050S27	SUEL 5050S27	50	50	50	250	55				Y27U	M3 5	S2.5

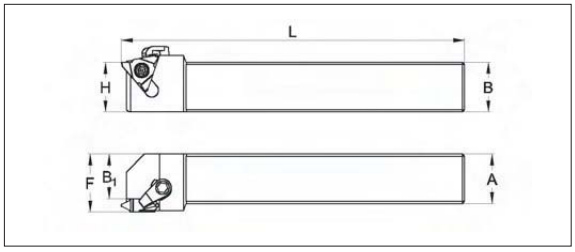
External Threading Tool Holders V-Style





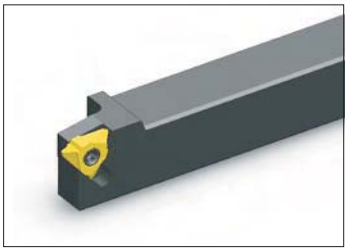
Order No.								Insert	Screw	Torx Key	Anvil	Anvil Screw	Wrench
Right	Left	H	A	B	L	F	B1						
SCVER3232P27-6	SCVEL3232P27-6	32	32	32	170	32	25.5	27VER 27VEL	M6x16	T20			
SCVER3232P27-8	SCVEL3232P27-8	32	32	32	170	34.1	25.5						
SCVER3232P27-10	SCVEL3232P27-10	32	32	32	170	35.8	25.5				CL-12	XNS-510	5/32
SCVER4040R27-6	SCVEL4040R27-6	40	40	40	200	40	33.5						
SCVER4040R27-8	SCVEL4040R27-8	40	40	40	200	42.1	33.5						
SCVER4040R27-10	SCVEL4040R27-10	40	40	40	200	43.8	33.5						

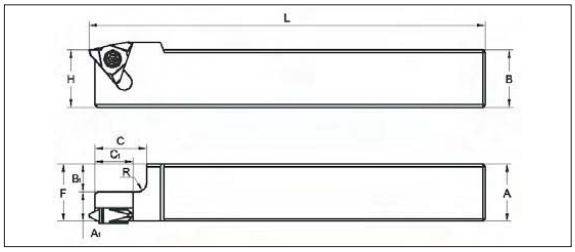
External Threading Tool Holders V-Style (Only for insert of MTTR)



Order No.							Insert	Screw	Torx Key	Clamp	Spring	Wrench
Right	Left	H	A	B	L	F						
MTHR2525M4	MTHL2525M4	25	25	25	150	30	MTTR43	M6x16	T15			
MTHR3232P4	MTHL3232P4	32	32	32	170	37				MTK1R	MES3	S4
MTHR4040R4	MTHL4040R4	40	40	40	200	45				MTK1L		

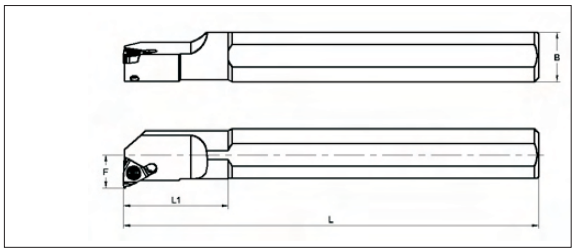
Internal Threading Tool Holders Slim Throat





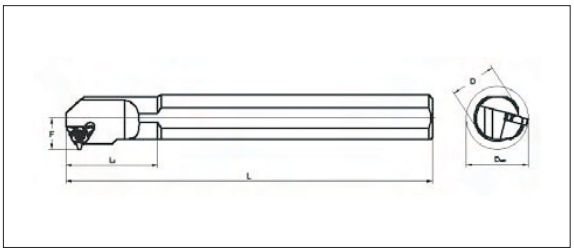
Order No.												Insert		
Right	Left	H	A	B	L	F	B1	C	C1	R	A1		Screw	Torx Key
SER 1010H16 S	SEL 1010H16 S	14	10	10	100	10	6.4	14.5	11.5	3	7	16VER 16VEL	M3.5x12	T15
SER 1212H16 S	SEL 1212H16 S	14	12	12	100	12	8.4	14.5	11.5	3	7			
SER 1616H16 S	SEL 1616H16 S	16	16	16	100	16	12.4	14.5	11.5	3	7			
SER 2020K16 S	SEL 2020K16 S	20	20	20	125	20	16.4	16.5	11.5	3	7			
SER 2525M16 S	SEL 2525M16 S	25	25	25	150	25	21.4	16.5	11.5	3	7			
SER 3232P16 S	SEL 3232P16 S	32	32	32	170	32	28.4	16.5	11.5	3	7			
SER 4040R16 S	SEL 4040R16 S	40	40	40	200	40	36.4	16.5	11.5	3	7			

Internal Threading Tool Holders Standard



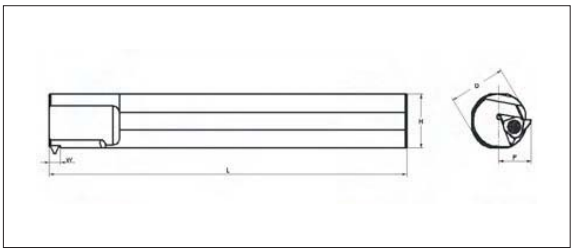
Order No.									Insert					
Right	Left	D	F	L	H	Dmin	B	L1		Screw	Torx Key	Anvil R	Anvil L	
SNR 0006H06	SNL 0006H06	6	3.3	100	5.8	7	6.0	10	06NR/L	M2.2x6.5	T7			
SNR 0008H08	SNL 0008H08	8	4.6	100	7.4	9	7.6	15	08NR/L	M2.5x6.5	T7			
SNR 0010H11	SNL 0010H11	10	7.2	100	9	12	9.5	25	11NR/L	M3x7.2	T8			
SNR 0012H11	SNL 0012H11	12	9	125	11	16	11.5	32	11NR/L	M3x7.2	T8			
SNR 0016M16	SNL 0016M16	16	12	150	15	20	15.5	32	16NR/L	M3.5x12	T15			
SNR 0020Q16	SNL 0020Q16	20	14	180	18	25	19	40	16NR/L	M3.5x12	T15	Y16N	Y16E	
SNR 0025R16	SNL 0025R16	25	17.5	200	23	30	24	50	16NR/L	M3.5x12	T15	Y16N	Y16E	
SNR 0032S16	SNL 0032S16	32	22	250	30	38	31	55	16NR/L	M3.5x12	T15	Y16N	Y16E	
SNR 0032S22	SNL 0032S22	32	22	250	30	38	31	55	22NR/L	M4x12	T15	Y22N	Y22E	
SNR 0032S27	SNL 0032S27	32	22.6	250	30	40	31	55	27NR/L	M6x16	T20	Y27N	Y27E	
SNR 0040T27	SNL 0040T27	40	26.6	300	38	48	39	60	27NR/L	M6x16	T20	Y27N	Y27E	

Internal Threading Tool Holders U-Style



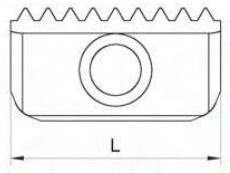
Order No.							Insert					
Right	Left	D	F	L	Dmin	L1		Screw	Torx Key	Anvil		
SUNR 0032S22	SUNL 0032S22	32	25.5	250	42	60	22UN	M4x14	T15	Y27U		
SUNR 0040T22	SUNL 0040T22	40	29.5	300	51	60	22UN	M4x14	T15			
SUNR 0032S27	SUNL 0032S27	32	24.7	250	42	60	27UN					
SUNR 0040T27	SUNL 0040T27	40	29.4	300	53	60	27UN	M6x16	T20	Y22U		
SUNR 0050U27	SUNL 0050U27	50	34.3	350	63	75	27UN					
SUNR 0060V27	SUNL 0060V27	60	39.3	400	74	75	27UN					

Internal Threading Tool Holders V-Style



Order No.							Insert					
Right	Left	H	A	B	L	F		Screw	Torx Key			
SVNR 0040T27	SVNL 0040T27	40	28.4	300	36	6.5	27VNR/L					
SVNR 0050U27	SVNL 0050U27	50	33.4	350	45	6.5	27VNR/L	M6x16	T20			
SVNR 0060V27	SVNL 0060V27	60	38.0	400	54	6.5	27VNR/L					

B | THREAD MILLING TOOLS

1. Insert Size
L=12mm L=14mm L=21mm L=30mm L=40mm 

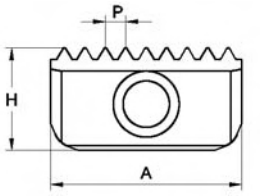
2. Application
E External **N** Internal - Same Insert for External or Internal

16	**E**	**1.50**	**ISO**
1	2	3	4

3. Pitch		
Full Profile Pitch Range		
mm 0.5~6	TPI 48~4	
Partial Profile Pitch Range		
	mm	TPI
A **AG** **G** **N** **Q** **V**	0.5~1.5 0.5~3.0 1.75~3.0 3.5~5.0 5.5~6.0 6.0~10	48~16 48~8 14~8 7~5 4.5~4 4~2.5

4. Thread Standard	
ISO_____ ISO	ISO Metric
UN_____ 60°	American UN
W_____ 55°	Whitworth for BSW BSP
NPT_____ 60°	NPT
NPTF_____ 60°	NPTF
BSPT_____ 55°	British Standard Pipe Thread

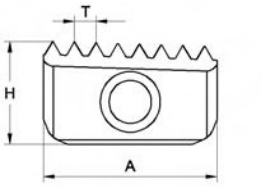
55° whitworth Full Profile



Pitch — Insert Size A

TPI	12mm	14mm	21mm	30mm	40mm
24		14 - 24W			
20		14 - 20W	21 - 20W		
19	* 12 - 19W	14 - 19W	21 - 19W		
16		14 - 16W	21 - 16W	30 - 16W	
14		14 - 14W	21 - 14W	30 - 14W	
11			21 - 11W	30 - 11W	40 - 11W
8					40 - 8W

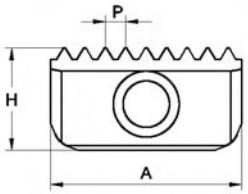
BSPT-55° British Standard Pipe Full Profile



Pitch — Insert Size A

TPI	12mm	14mm	21mm	30mm	40mm
19	* 12 - 19BSPT	14 - 19BSPT			
14		14 - 14BSPT	21 - 14BSPT		
11			21 - 11BSPT	30 - 11PSPT	40 - 11BSPT

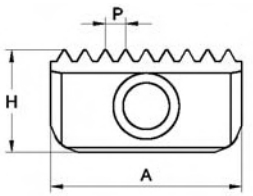
ISO METRIC full Profile

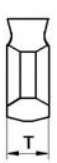


Insert Size A

TPI	Pitch	12mm	14mm	21mm	30mm	40mm
0.5	Ext					
	Int	*12N0.5 ISO	14N0.5 ISO			
0.75	Ext		14E0.75 ISO			
	Int	*12N0.75 ISO	14N0.75 ISO			
1.0	Ext		14E1.0 ISO	21E1.0ISO		
	Int	*12N1.0 ISO	14N1.0 ISO	21N1.0ISO		
1.25	Ext		14E1.25ISO			
	Int	*12N1.25 ISO	14N1.25 ISO			
1.5	Ext		14E1.5ISO	21E1.5ISO	30E1.5ISO	40E1.5ISO
	Int	*12N1.5 ISO	14N1.5 ISO	21N1.5ISO	30N1.5ISO	40N1.5ISO
1.75	Ext		14E1.75ISO			
	Int		14N1.75ISO	21N1.75ISO		
2.0	Ext		14E2.0ISO	21E2.0ISO	30E2.0ISO	40E2.0ISO
	Int		14N2.0ISO	21N2.0ISO	30N2.0ISO	40N2.0ISO
2.5	Ext		14E2.5 ISO	21E2.5ISO		
	Int		14N2.5 ISO	21N2.5ISO		
3.0	Ext			21E3.0ISO	30E3.0ISO	40E3.0ISO
	Int			21N3.0ISO	30N3.0ISO	40N3.0ISO
3.5	Ext				30E3.5ISO	
	Int			21N3.5ISO	30N3.5ISO	40N3.5ISO
4.0	Ext				30E4.0ISO	40E4.0ISO
	Int				30N4.0ISO	40N4.0ISO
4.5	Ext					
	Int				30N4.5 ISO	40N4.5ISO
5.0	Ext					40E5.0ISO
	Int					40N5.0ISO
5.5	Ext					
	Int					40N5.5ISO
6.0	Ext					40E6.0ISO
	Int					40N6.0ISO
	H	6.3	7.5	12	16	20
	T	2.9	3.1	4.7	5.5	6.3

American UN Full Profile

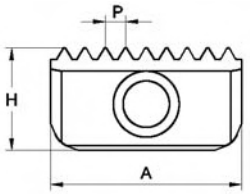




Insert Size A

TPI	Pitch	12mm	14mm	21mm	30mm	40mm
32	Ext		14E32 UN			
	Int	*12N32UN	14N32UN			
28	Ext		14E28UN			
	Int	*12N28UN	14N28UN			
27	Ext					
	Int		14N27UN			
24	Ext		14E24UN	21E24UN		
	Int	*12N24UN	14N24UN	21N24UN		
20	Ext		14E20UN	21E20UN	30E20UN	
	Int	*12N20UN	14N20UN	21N20UN	30N20UN	
18	Ext		14E18UN	21E18UN	30E18UN	
	Int	*12N18UN	14N18UN	21N18UN	30N18UN	
16	Ext		14E16UN	21E16UN	30E16UN	40E16UN
	Int	*12N16UN	14N16UN	21N16UN	30N16UN	40N16UN
14	Ext		14E14UN	21E14UN	30E14UN	40E14UN
	Int		14N14UN	21N14UN	30N14UN	40N14UN
12	Ext		14E12UN	21E12UN	30E12UN	40E12UN
	Int		14N12UN	21N12UN	30N12UN	40N12UN
10	Ext			21E10UN	30E10UN	40E10UN
	Int			21N10UN	30N10UN	40N10UN
8	Ext				30E8UN	40E8UN
	Int			21N8UN	30N8UN	40N8UN
6	Ext				30E6UN	40E6UN
	Int				30N6UN	40N6UN
4.5	Ext					
	Int					40N4.5UN
4	Ext					
	Int					40N4UN
	H	6.3	7.5	12	16	20
	T	2.9	3.1	4.7	5.5	6.3

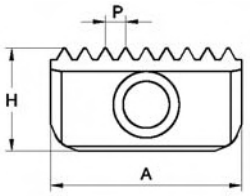
National Pipe Threads



Pitch — Insert Size A

TPI	12mm	14mm	21mm	30mm	40mm
18	* 12 - 18NPT	14 - 18NPT			
14		14 - 14NPT	21 - 14NPT		
11.5			21 - 11.5NPT	30 - 11.5NPT	40 - 11.5NPT
8				30 - 8NPT	40 - 8NPT

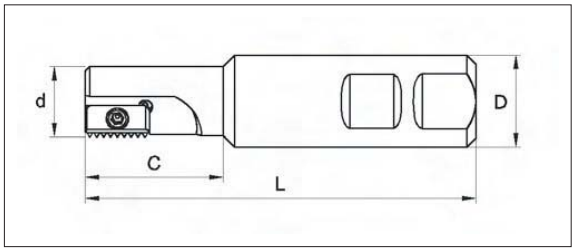
NPTF



Pitch — Insert Size A

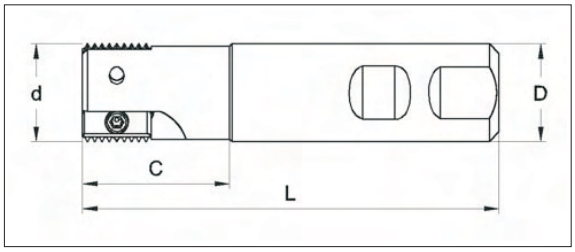
TPI	12mm	14mm	21mm	30mm	40mm
18	* 12 - 18NPTF	14 - 18NPTF			
14		14 - 14NPTF	21 - 14NPTF		
11.5			21 - 11.5NPTF	30 - 11.5NPTF	40 - 11.5NPTF
8				30 - 8NPTF	40 - 8NPTF

Threading Milling Toolholders



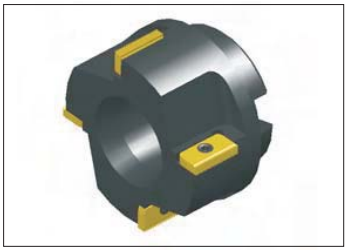
Order No.	Size					Insert	P			
	d	D	C	L	Z		mm	TPI	Anvil Screw	Wrench
ST90-9.5R1T12-B20	9.5	20	14	85	1	12	0.5~1.5	16~32	M3x8	T08
ST90-9.9R1T12-B20	9.9	20	16	85	1	12	0.5~1.5	16~32	M3x8	T08
ST90-12R1T14-B20	12	20	20	85	1	14	0.5~2.5	10~32	M3x8	T08
ST90-14.5R1T14-B20	14.5	20	25	85	1	14	0.5~2.5	10~32	M3x8	T08
ST90-17R1T14-B20	17	20	30	85	1	14	0.5~2.5	10~32	M3x8	T08
ST90-18R1T21-B20	18	20	30	85	1	21	1~3.5	7~24	M4x12	T15
ST90-21R1T21-B20	21	20	40	94	1	21	1~3.5	7~24	M4x12	T15
ST90-29R1T30-B25	29	25	50	110	1	30	1.5~5.0	6~20	M5x12	T20
ST90-48R1T40-B40	48	40	78	153	1	40	1.5~6.0	4~16	M5x12	T20
ST90-25R1T21-A20L125	25	20	30	125	1	21	1~3.5	7~24	M4x12	T15
ST90-31R1T30-A25L150	31	25	50	150	1	30	1.5~5.0	6~20	M4x12	T15
ST90-38R1T30-A32L150	38	32	50	150	1	30	1.5~5.0	6~20	M5x12	T20
ST90-48R1T40-A40L210	48	40	78	210	1	40	1.5~6.0	4~16	M5x12	T20

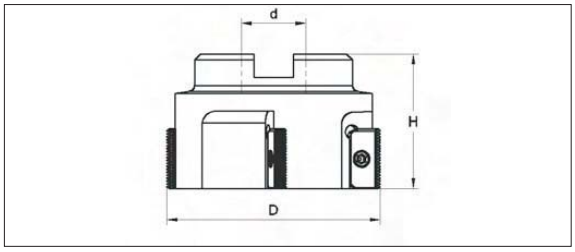
Threading Milling Toolholders



Order No.	Size					Insert	P			
	d	D	C	L	Z		mm	TPI	Anvil Screw	Wrench
ST90-20R2T14-B20	20	20	41	96	2	14	0.5~2.5	10~32	M3x8	T08
ST90-30R2T21-B25	30	25	52	113	2	21	1~3.5	7~24	M4x12	T15
ST90-40R2T30-B32	40	32	70	135	2	30	1.5~5.0	6~20	M5x12	T20
ST90-50R2T40-B40	50	40	78	153	2	40	1.5~6.0	4~16	M5x12	T20

Threading Milling Toolholders





Order No.	Size				Insert	P			
	D	d	H	Z		mm	TPI	Anvil Screw	Wrench
ST90-63R5T21-P22	63	22	50	5	21	1~3.5	7~24	M4x12	T15
ST90-63R4T30-P22	63	22	50	4	30	1.5~5.0	6~20	M5x12	T20
ST90-80R4T30-P27	80	27	55	4	30	1.5~5.0	6~20	M5x12	T20
ST90-100R4T30-S22	100	32	60	4	30	1.5~5.0	6~20	M5x12	T20
ST90-80R4T40-P27	80	27	65	4	40	1.5~6.0	4~16	M5x12	T20
ST90-100R4T40-S32	100	32	70	4	40	1.5~6.0	4~16	M5x12	T20

H	10	077	N	L5	ISO	
1	2	3	4	5	6	7

1. Flutes Style
H-- Helical Flutes **S–** Straight Flutes

2. Shank Dai	
04-- 4.0	12 12.0
06-- 6.0	16 16.0
08-- 8.0	20 20.0
10-- 10.0	

3. Cutting Dia
3.6 19.9

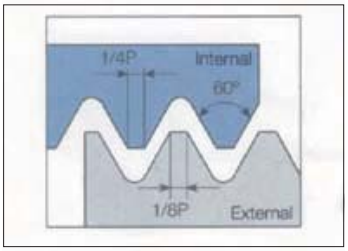
4. Type of Tool
E - External N - Internal EN - External+ Internal

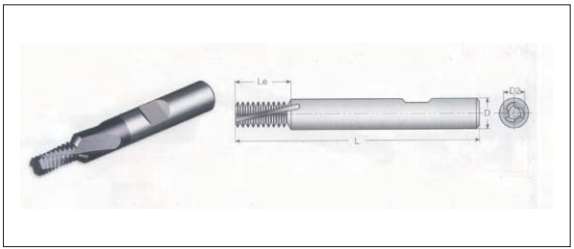
5. Pitch	
mm	tpi
0.05- 6	32 - 45

6. Standard	
ISO_____ISO	ISO Metric
UN_____ 60^0	American UN
W_____ 55^0	Whitworth for BSW BSP
BSPT_____ 55^0	British Standard Pipe Thread
NPT_____ 60^0	NPT
NPTF_____ 60^0	NPTF

7. No. of Flutes
3-- 3 Flutes 5-- 5 Flutes Only noted when two options are available

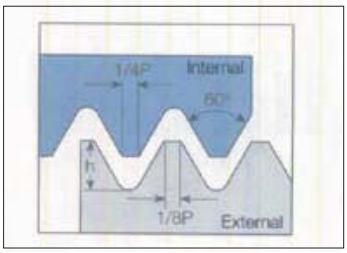
ISO METRIC Full Profile Internal

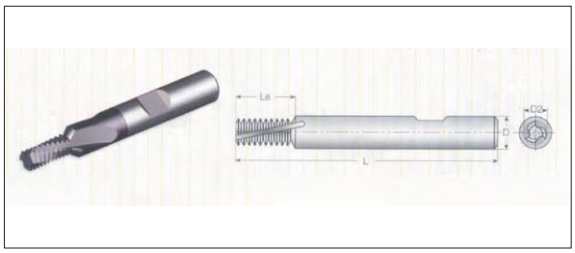




Thread		Pitch	Order No.	Dimensions mm				No. of Flutes	Teeth	Bore Dia
Coarse	Fine	mm	Internal	D	D2	L	Le*	z		mm
	M5x 0.75	0.75	H06036N0.75 ISO	6.0	3.6	57	10.5	3	14	4.2
M5x0.8		0.8	H06035N0.80 ISO	6.0	3.5	57	10.4	3	13	4.2
M6x1.0		1.00	H08041N1.0 ISO	8.0	4.1	63	12.0	3	12	5.0
	M8x 1.0	1.00	H10060N1.0 ISO	10.0	6.0	73	16.0	3	16	7.0
M8x1.25		1.25	H10058N1.25 ISO	10.0	5.8	73	16.3	3	13	6.8
	M10x1.0	1.00	H10079N1.0 ISO	10.0	7.9	73	20.0	3	20	9.0
	M10x 1.25	1.25	H10077N1.25 ISO	10.0	7.7	73	20.0	3	16	8.8
M10x1.5		1.50	H10077N1.5 ISO	10.0	7.7	73	21.0	3	14	8.5
	M12x 1.0	1.00	H12096N1.0 ISO	12.0	9.6	83	24.0	4	24	11.0
	M12x 1.25	1.25	H12094N1.25 ISO	12.0	9.4	83	25.0	4	20	10.8
	M12x 1.5	1.50	H12094N1.5 ISO	12.0	9.4	83	24.0	4	16	10.5
M12x1.75		1.75	H12087N1.75 ISO	12.0	8.7	83	24.5	4	14	10.2
	M14x 1.0	1.00	H16115N1.0 ISO	16.0	11.5	92	28.0	4	28	13.0
	M14x 1.5	1.50	H16112N1.5 ISO	16.0	11.2	92	28.5	4	19	12.5
M14x2.0		2.00	H16102N2.0 ISO	16.0	10.2	92	28.0	4	14	12.0
	M16x1.5	1.50	H16130N1.5 ISO	16.0	13.0	92	33.0	4	22	14.5
M16x2.0		2.00	H16122N2.0 ISO	16.0	12.2	92	32.0	4	16	14.0
	M18x 1.5	1.50	H16148N1.5 ISO	16.0	14.8	92	36.0	4	24	16.5
M18X2.50		2.50	H20129N2. 5 ISO	20.0	12.9	104	37.5	5	15	15.5
	M20x 1.5	1.50	H20165N1. 5 ISO	20.0	16.5	104	40.5	5	27	18.5
M20X2.5		2.50	H20148N2. 5 ISO	20.0	14.8	104	40.0	5	16	17.5
M24X3.0		3.00	H20162N3.0 ISO	20.0	16.2	104	42.0	4	14	21.0

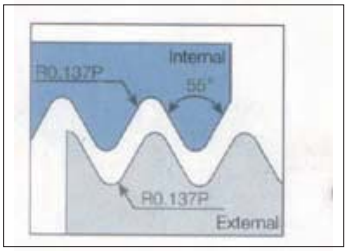
American UN Full Profile Internal

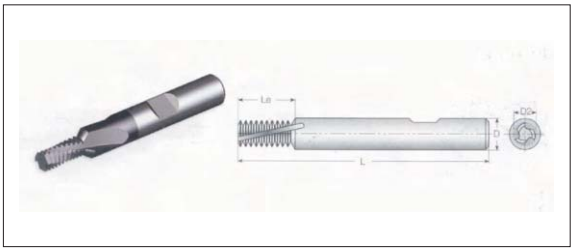




Thread		Pitch	Order No.	Dimensions mm				No. of Flutes	Teeth	Bore Dia
Coarse	Fine	mm	Internal	D	D2	L	Le*	z		mm
	No.10 32	32	H06033N32UNF	6.0	3.3	57	10.3	3	13	4.0
No.10 24		24	H0629N24UNC	6.0	2.9	57	10.6	3	10	3.8
	No.12 28	28	H08038N28UNF	8.0	3.8	63	11.8	3	13	4.6
No.12 24		24	H08035N24UNC	8.0	3.5	63	11.6	3	11	4.5
	1/4 28	28	H08046N28UNF	8.0	4.6	63	12.7	3	14	5.5
1/4" 20		20	H08040N20UNC	8.0	4.0	73	12.7	3	10	5.2
	5/16 24	24	H10057N24UNF	10.0	5.7	73	15.9	3	15	6.8
5/16" 18		18	H10052N18UNC	10.0	5.2	73	16.9	3	12	6.5
	3/8 24	24	H10074N24UNF	10.0	7.4	73	19.1	3	18	8.5
3/8" 16		16	H10067N16UNC	10.0	6.7	83	19.1	3	12	8.0
7/16" 14		14	H12076N14UNC	12.0	7.6	83	23.6	4	13	9.3
	7/16 20	20	H12085N20UNF	12.0	8.5	83	22.9	4	18	9.8
1/2" 13		13	H12089N13UNC	12.0	8.9	83	25.4	4	13	10.8
	1/2 20	20	H12101N20UNF	12.0	10.1	92	25.4	4	20	11.5
9/16" 12		12	H16103N12UNC	16.0	10.3	92	29.6	4	14	12.3
	9/16 18	18	H16113N18UNF	16.0	]11.3	92	29.6	4	21	12.8
5/8" 11		11	H16110N11UNC	16.0	11.0	92	32.3	4	14	13.5
	5/8 18	18	H16128N18UNF	16.0	12.8	104	32.5	4	23	14.5
3/4" 10		10	H20135N10UNC	20.0	13.5	104	38.1	5	15	16.5
7/8" 9		9	H20152N9UNC	20.0	15.2	104	42.3	4	15	19.5
1" 8		8	H20170N8UNC	20.0	17.0	104	41.3	4	13	22.3

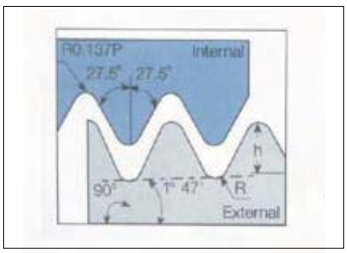
550 Whitworth Full Profile External + Internal

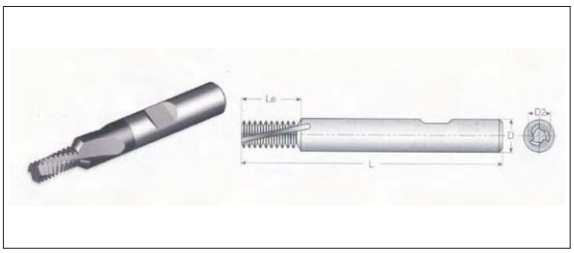




Thread		Pitch	Order No.	Dimensions mm				No. of Flutes	Teeth	Bore Dia
Coarse-UNC	Fine-UNF	TPI	Internal	D	D2	L	Le*	z		mm
	1/4" 26	26	H08042EN26BSF	8.0	4.2	63	12.7	3	13	5.2
1/4" 20		20	H08038EN20BSW	8.0	3.8	63	12.7	3	10	5.1
	5/16" 22	22	H10053EN22BSF	10.0	5.3	73	16.2	3	14	6.6
5/16" 18		18	H10050EN18BSW	10.0	5.0	73	16.9	3	12	6.5
	3/8" 20	20	H10066EN20BSF	10.0	6.6	73	19.1	3	15	8.1
3/8" 16		16	H10062EN16BSW	10.0	6.2	73	19.1	3	12	7.9
	7/16" 18	18	H12078EN18BSF	12.0	7.8	83	22.6	4	16	9.5
7/16" 14		14	H12071EN14BSW	12.0	7.1	83	23.6	4	13	9.2
	1/2" 16	16	H12091EN16BSF	12.0	9.1	83	25.4	4	16	11.0
1/2" 12		12	H12082EN12BSW	12.0	8.2	83	25.4	4	12	10.5
	9/16" 16	16	H16106EN16BSF	16.0	10.6	92	28	4	18	12.5
9/16" 12		12	H16096EN12BSW	16.0	9.6	92	29.6	4	14	12.0
	5/8" 14	14	H16111EN14BSF	16.0	11.1	92	32.7	4	18	14.0
5/8" 11		11	H16103EN11BSW	16.0	10.3	92	32.3	4	14	13.2
	11/16" 14	14	H20126EN14BSF	20.0	12.6	104	36.3	5	20	15.5
11/16" 11		11	H20117EN11BSW	20.0	11.7	104	36.9	5	16	14.8
	3/4" 12	12	H20140EN12BSF	20.0	14.0	104	38.1	5	18	16.5

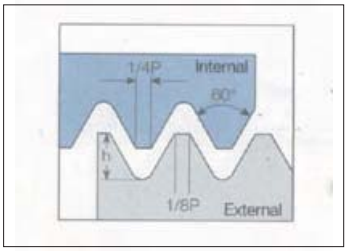
BSPT 55^0 External + Internal

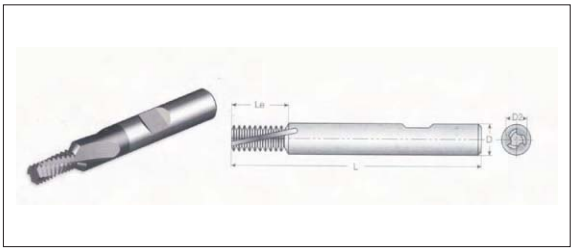




Thread	Pitch	Order No.	Dimensions mm				No. of Flutes	Bore Dia	
Coarse	TPI	Internal+ External	D	D2	L	Le*	z		mm
1/16"x28	28	H10058EN28BSPT	10.0	5.8	73	16.3	3	18	6.7
1/8"x28	28	H10077EN28BSPT	10.0	7.7	73	20.0	3	22	8.7
1/4"x19	19	H12102EN19BSPT	12.0	10.2	83	26.7	4	20	11.8
3/8"x19	19	H16134EN19BSPT	16.0	13.4	92	33.4	4	25	15.2
1/2"x14	14	H20157EN14BSPT	20.0	15.7	104	43.5	5	24	19.0
1"x11	11	H20199EN11BSPT	20.0	19.9	104	41.6	5	18	30.7

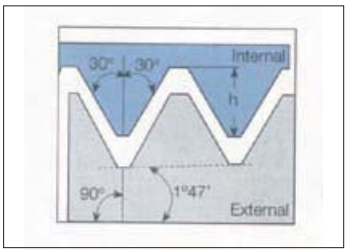
NPT-60^0
External + Internal

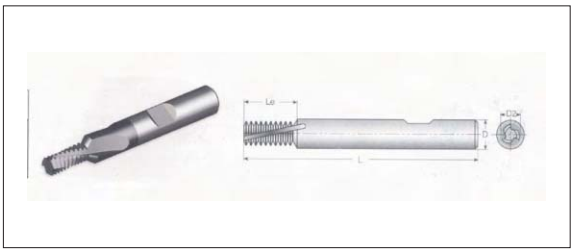




Thread	Pitch	Order No.	Dimensions mm				No. of Flutes	Teeth	Bore Dia
	TPI	Internal+External	D	D2	L	Le*	z		mm
1/16" 27	27	H10053EN27NPT	10.0	5.3	73	9.4	3	10	6.3
1/8" 27	27	H12075EN27NPT	12.0	7.5	83	9.4	4	10	8.5
1/4" 18	18	H16094EN18NPT	16.0	9.4	92	14.1	4	10	11.1
3/8" 18	18	H16127EN18NPT	16.0	12.7	92	14.1	4	10	14.5
1/2" 14,3/4" 14	14	H20155EN14NPT	20.0	15.5	104	25.4	5	14	17.7,23.0
1"-2" 11.5	11.5	H20199EN11.5NPT	20.0	19.9	104	33.1	5	15	29.0-56.0
21/2" 8	8	H20199EN8NPT	20.0	19.9	104	38.1	4	12	66.5

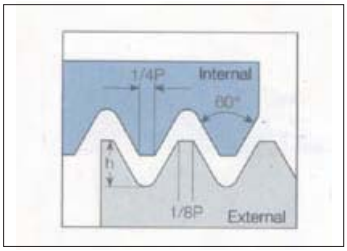
NPTF
External + Internal

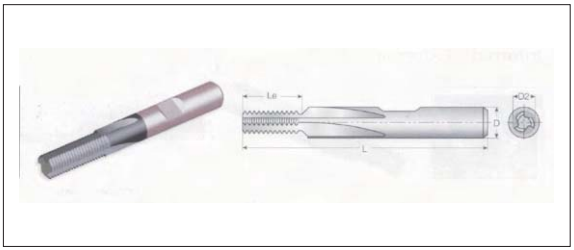




Thread	Pitch	Order No.	Dimensions mm				No. of Flutes	Teeth	Bora Dia
	TPI	Internal+External	D	D2	L	Le*	z		mm
1/16" 27	27	H10053EN27NPTF	10.0	5.3	73	9.4	3	10	6.3
1/8" 27	27	H12075EN27NPTF	12.0	7.5	83	9.4	4	10	8.4
1/4" 18	18	H16094EN18NPTF	16.0	9.4	92	14.1	4	10	11.1
3/8" 18	18	H16127EN18NPTF	16.0	12.7	92	14.1	4	10	14.7
1/2" 14,3/4" 14	14	H20155EN14NPTF	20.0	15.5	104	25.4	5	14	17.9,23.4
1"-2" 11.5	11.5	H20199EN11.5NPTF	20.0	19.9	104	33.1	5	15	29.4-56.2
21/2" 8	8	H20199EN8NPTF	20.0	19.9	104	38.1	4	12	67.0

ISO METRIC Full Profile
External, Standard-Straight Flute



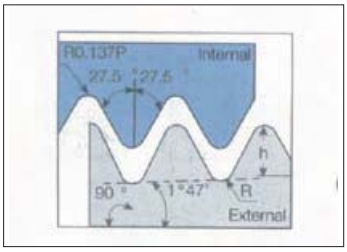


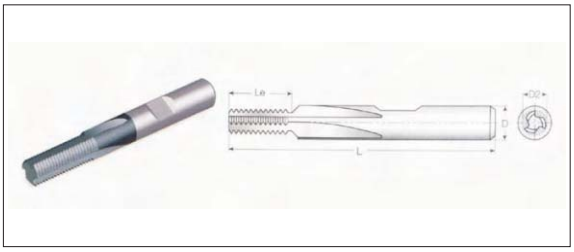
Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	
mm	Min. Dia		D	D2	L	Le*	z		h mm
0.5	M3	S06059E0.5 ISO	6.0	5.90	57	15.0	3	30	0.31
0.75	M4.5	S08079E0.75 ISO	8.0	7.90	63	19.5	3/5	26	0.46
1.00	M6	S10099E1.0 ISO	10.0	9.90	72	24.0	5	24	0.61
1.50	M10	S12119E1.5 ISO	12.0	11.90	83	30.0	5	20	0.92
2.00	M14	S12119E2.0 ISO	12.0	11.90	83	30.0	5	15	1.23
3.00	M24	S16159E3.0 ISO	16.0	15.90	92	36.0	5	12	1.84
4.00	M36	S16159E4.0 ISO	16.0	15.90	92	40.0	5	10	2.45
6.00	M64	S20199E6.0 ISO	20.0	19.9	104	36.0	5	6	3.68

ISO METRIC Full Profile
External, Standard-Straight Flute

Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	
mm	Min. Dia		D	D2	L	Le*	z		h mm
0.75	M4.5	S04030N0.75 ISO	4.0	3.0	42	6.7	3	9	0.43
	M8	S06059N0.75 ISO	6.0	5.9	57	15.0	3	20	0.43
0.8	M5	S04036N0.8 ISO	4.0	3.6	42	8.0	3	10	0.46
1.00	M6	S06040N1.0 ISO	6.0	4.0	57	9.0	3	9	0.58
	M12	S08079N1.0 ISO	8.0	7.9	63	20.0	3/5	20	0.58
1.25	M8	S06050N1.25 ISO	6.0	5.0	57	12.5	3	10	0.72
	M10	S06059N1.5 ISO	6.0	5.9	57	15.0	3	10	0.87
1.50	M14	SI0099N1.5 ISO	10.0	9.9	72	24.0	5	16	0.87
	M18	S12119N1.5 ISO	12.0	11.9	83	30.0	5	20	0.87
1.75	M12	S08079N1.75 ISO	8.0	7.9	63	19.2	3/5	11	1.01
2.00	M16	S10099N2.0 ISO	10.0	9.9	72	24.0	5	12	1.15
	M18	S12119N2.0 ISO	12.0	11.9	83	30.0	5	15	1.15
2.50	M20	S12119N2.5 ISO	12.0	11.9	83	30.0	5	12	1.44
3.00	M24	S16159N3.0 ISO	16.0	15.9	92	36.0	5	12	1.73
3.50	M30	S16159N3.5 ISO	16.0	15.9	92	38.5	5	11	2.02
4.00	M36	S16159N4.0 ISO	16.0	15.9	92	40.0	5	10	2.31
5.00	M48	S20199N5.0 ISO	20.0	19.9	104	40.0	5	8	2.89
6.00	M64	S20199N6.0 ISO	20.0	19.9	104	36.0	5	6	3.46

American UN Full Profile
External, Standard-Straight Flute

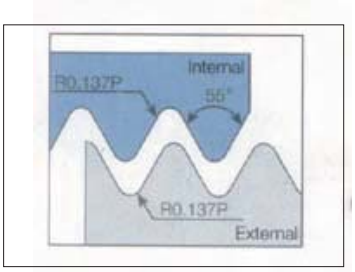


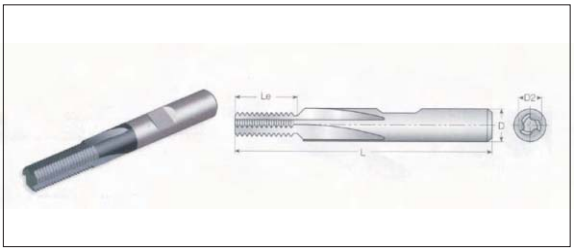


Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	
TPI	Min . Dia		D	D2	L	Le*			h mm
32	No.6	S06059E28UN	6.0	5.9	57	14.3	3	18	0.49
28	No.12	S08079E28UN	8.0	7.9	63	19.9	3/5	22	0.56
20	1/4"	S10099E20UN	10.0	9.9	72	22.9	5	18	0.78
18	5/16"	S10099E18UN	10.0	9.9	72	24.0	5	17	0.87
16	3/8"	S12119E16UN	12.0	11.9	83	28.6	5	18	0.97
12	9/16"	S12119E12UN	12.0	11.9	83	29.6	5	14	1.30
8	1"	S16159E8UN	16.0	15.9	92	38.1	5	12	1.95
6	1 3/8"	S20199E6UN	20.0	19.9	104	38.1	5	9	2.60

Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	
Coarse-UNC	Min.Dia		D	D2	L	Le			h mm
36	No.8	S04030N36UN	4.0	3.0	42	6.3	3	9	0.41
32	No.8	S04030N32UN	4.0	3.0	42	6.3	3	8	0.46
	5/16"	S06059N32UN	6.0	5.9	57	14.3	3	18	0.46
28	No.12	S04036N28UN	4.0	3.6	42	8.2	3	9	0.52
24	7/16"	S08079N28UN	8.0	7.9	63	19.9	3/5	22	0.52
	No.12	S06040N24UN	6.0	4.0	57	8.5	3	8	0.61
20	1/4"	S06040N20UN	6.0	4.0	57	10.2	3	8	0.73
	9/16"	S10099N20UN	10.0	9.9	72	22.9	5	18	0.73
18	5/16"	S06050N18UN	6.0	5.0	57	12.7	3	9	0.81
	9/16"	S10099N18UN	10.0	9.9	72	24.0	5	17	0.81
16	3/8"	S06059N16UN	6.0	5.9	57	14.3	3	9	0.92
	13/16"	S12119N16UN	12.0	11.9	83	28.6	5	18	0.92
14	7/16"	S08079N14UN	8.0	7.9	63	18.1	3/5	10	1.05
13	1/2"	S08079N13UN	8.0	7.9	63	19.5	3/5	10	1.13
12	9/16"	S10099N12UN	10.0	9.9	72	23.3	5	11	1.22
	1"	S12119N12UN	12.0	11.9	83	29.6	5	14	1.22
11	5/8"	S10099N11UN	10.0	9.9	72	23.1	5	10	1.33
10	3/4"	S12119N10UN	12.0	11.9	83	27.9	5	11	1.47
9	7/8"	S16159N9 UN	16.0	15.9	92	33.3	5	12	1.63
8	1"	S16159N8 UN	16.0	15.9	92	38.1	5	12	1.83
7	1 1/8"	S16159N7 UN	16.0	15.9	92	36.3	5	10	2.09
6	1 3/8"	S20199N6 UN	20.0	19.9	104	38.1	5	9	2.44
5	1 3/4"	S20199N5 UN	20.0	19.9	104	40.6	5	8	2.93
4.5	2"	S20199N4.5UN	20.0	19.9	104	39.5	5	7	3.26

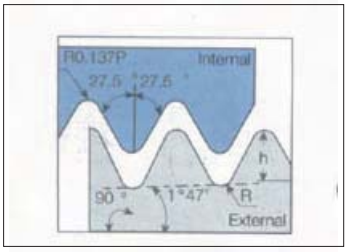
55° Whitwoth Full Profile External + Internal

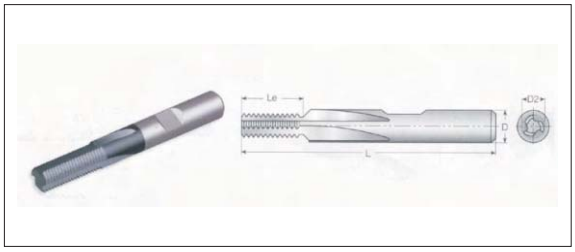




Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	Bore Dia
TPI	Min. Dia	Internal+External	D	D2	L	Le*			mm
20	1/4"	S06040EN20BSW	6.0	4.0	57	10.16	3	8	0.81
18	5/16"	S06050EN18BSW	6.0	5.0	57	11.29	3	8	0.90
16	3/8"	S06059EN16BSW	6.0	5.9	57	14.29	3	9	1.02
14	7/16"	S08079EN14BSW	8.0	7.9	63	18.14	3/5	10	1.16
12	1/2"	S08079EN12BSW	8.0	7.9	63	19.05	3/5	9	1.36
11	5/8"	S10099EN11BSW	10.0	9.9	72	23.09	5	10	1.48
10	3/4"	S12119EN10BSW	12.0	11.9	83	27.94	5	11	1.63
9	7/8"	S12119EN9BSW	12.0	11.9	83	28.22	5	10	1.81
8	1"	S16159EN8BSW	16.0	15.9	92	38.10	5	12	2.03
7	1 1/8"	S16159EN7BSW	16.0	15.9	92	36.29	5	10	2.32
6	1 3/8"	S16159EN6BSW	16.0	15.9	92	38.1	5	9	2.71
5	1 5/8"	S20199EN5BSW	20.0	19.9	104	40.64	5	8	3.25
4.5	1 7/8"	S20199EN4.5BSW	20.0	19.9	104	39.51	5	7	3.61

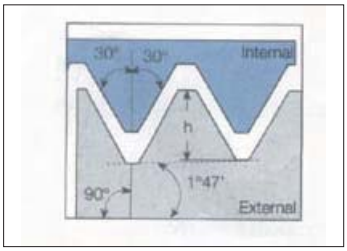
ISO METRIC Full Profile External

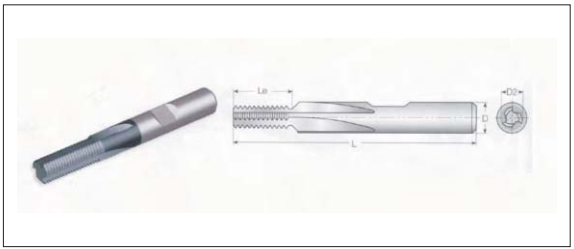




Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	Bore Dia
	Min.Dia	Internal+External	D	D2	L	Le			h mm
28	1/16"	S06059EN28BSPT	6.0	5.90	57	9.98	3	11	0.58
19	1/4"	S08079EN19BSPT	8.0	7.90	63	14.71	3/5	11	0.86
14	1/2"	S12119EN14BSPT	12.0	11.90	83	19.96	5	11	1.16
11	1"	S16159EN11BSPT	16.0	15.90	92	39.25	5	17	1.48

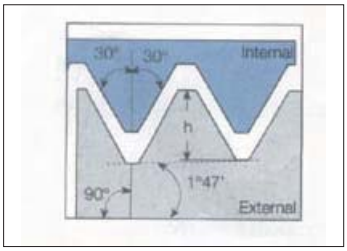
British Standard Pipe Full Profile External + Internal

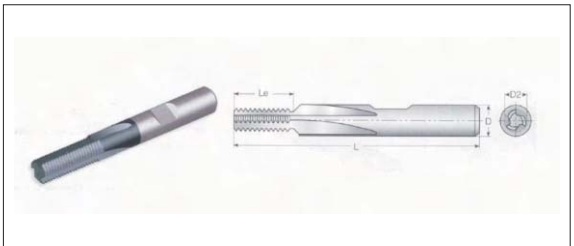




Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	
TPI	Min.Dia		D	D2	L	Le*	z		h mm
27	1/16	S06059EN27NPT	6.0	5.9	57	9.41	3	10	0.66
18	1/4	S08079EN18 NPT	8.0	7.9	63	14.11	3/5	10	1.01
14	1/2	S12119EN14 NPT	12.0	11.9	83	19.96	5	11	1.33
11. 5	1	S16159EN11.5 NPT	16.0	15.9	92	26.51	5	12	1.64
8	21/2	S16159EN8 NPT	16.0	15.9	92	38.10	5	12	2.42

National Pipe Thread External + Internal





Pitch	Thread	Order No.	Dimensions mm				No. of Flutes	Teeth	
TPI	Min. Dia	Internal+External	D	D2	L	Le*	z		h mm
27	1/16″	S06059EN27NPTF	6.0	5.9	57	9.41	3	10	0.64
18	1/4″	S08079EN18NPTF	8.0	7.9	63	14.11	3/5	10	1.0
14	1/2″	S12119EN14NPTF	12.0	11.9	83	19.96	5	11	1.35
11.5	1″	S16159EN11.5 NPTF	16.0	15.9	92	26.51	5	12	1.63
8	21/2″	S16159EN8 NPTF	16.0	15.9	92	38.10	5	12	2.38

C TECHNICAL INFORMATION

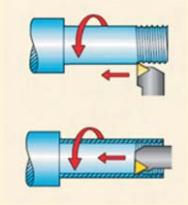
Production Methods

The Choice of production method is influenced by :

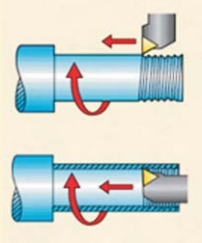
- Workpiece
  External or Internal thread
  Right or Left hand thread
- Machine (Turret/tool post position)
  Right or Left hand tool

Threading towards the chuck

Right-hand thread - Right-hand tool

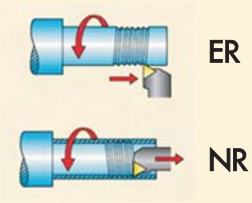


Left-hand thread - Left-hand tool

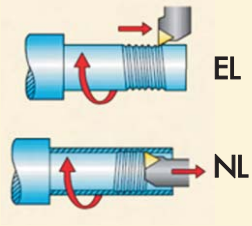


Threading away from the chuck

Left-hand thread - Right-hand tool



Right-hand thread - Left-hand tool



Cutting formulae

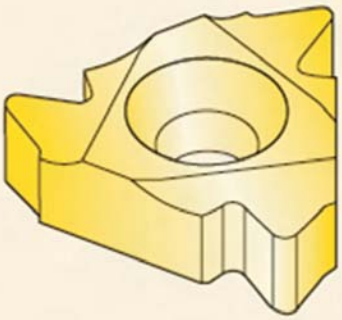
Revolutions per minute	$n = \frac{V_c \times 1000}{\pi \times D}$	(rev/min)
Conversion of ptich to TPI	$P = \frac{25.4}{TPI}$	(mm)
Helix angle	$\lambda = \arctan \frac{Ph}{D_2 \times \pi}$	(^{0})
Lead	$Ph = P \times$ number of starts	(mm)
Slide velocity	$S_v = n \times Ph$	(mm/min)
Cutting speed	$V_c = \frac{\pi \times D \times n}{1000}$	(mm/min)

n	RPM	(rev/min)
D	Wrokpiece diameter	(mm)
V_c	Cutting speed	(mm/min)
S_v	Slide velocity (feed rate)	(mm/min)
P_h	Lead	(mm)
P	Pitch	(mm)
D_2	Pitch diameter (mean diameter)	(mm)
λ	Helix angle	(^{0})
TPI	Number of threads per inch	

Note: Internal thread inserts must be used for machining of internal thread and external thread inserts for external thread.

Insert Types

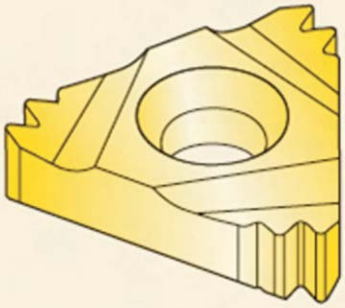
Single-tooth insert



First choice, can be sued for application in variety of materials.

Low cutting forces.

Multi-tooth insert

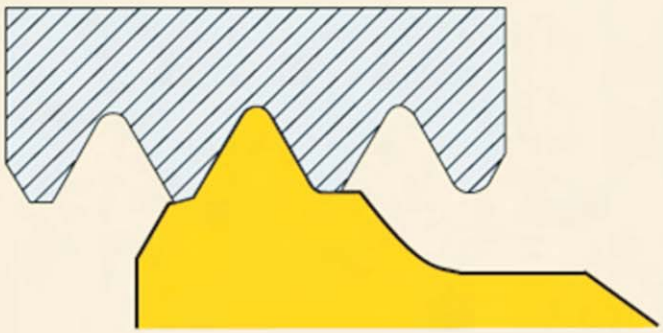


First choice for mass production, since fewer passes are necessary.

Only for radial infeed.

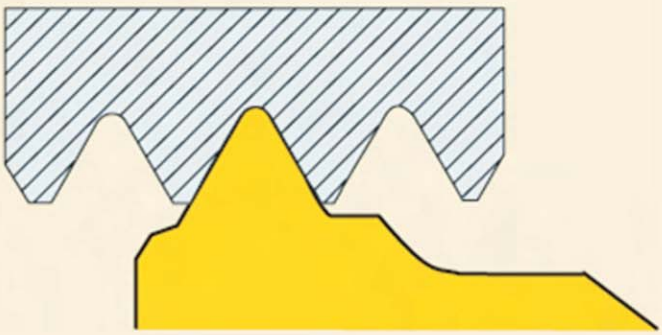
M = 2, 3, 5, 6 & 8

Full Profile



By topping the thread, the workpiece need not be pre-machined to the exact diameter and may be a little oversized. The threading operation is simplified since only one tool is needed for the entire thread (no subsequent deburring is needed).

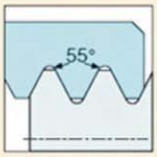
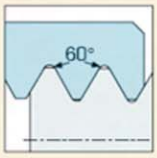
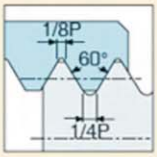
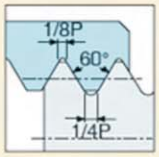
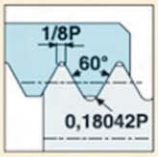
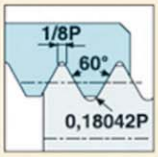
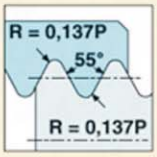
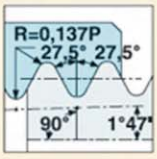
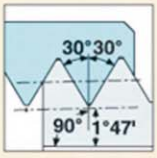
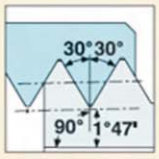
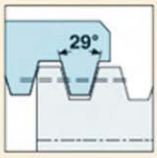
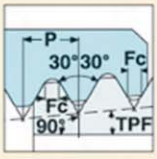
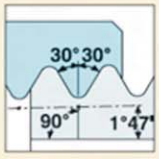
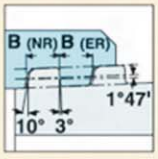
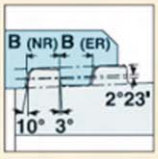
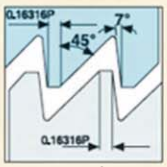
Partial Profile



Covers a wide range of thread pitches, which simplifies stock-keeping. Requires a correct workpiece diameter prior to threading. The nose radius of the insert is sized to sit the smallest profile within the pitch range of the insert.

Application Overview - Threding Inserts

Insert Program

55° V-profile  Partial profile insert. Reusable threaded joints.	**60° V-profile**  Partial profile insert. Reusable threaded joints.	**ISO metric**  Full profile insert. Reusable threaded joints.	**UN**  Full profile insert. Reusable threaded joints.	**UNJ**  For the aerospace industry. Reusable threaded joints.	**MJ**  For the aerospace industry. Reusable threaded joints.
Whitworth, BSW  Permanent threaded joints for pipe mountings and couplings.	**BSPT**  Permanent threaded joints for pipe mountings and couplings.	**NPT**  Permanent threaded joints for pipe mountings and couplings.	**NPTF**  Permanent threaded joints for pipe mountings and couplings.	**Round-DIN 405**  Permanent threaded joints for pipe mountings and couplings.	**TR-DIN 103**  Motion-transmitting threads.
ACME  Motion-transmitting threads.	**Stub-ACME**  Motion-transmitting threads.	**API**  Threads for oil industry.	**API RD**  Threads for oil industry.	**VAM-API-Buttress 2.5**  Threads for oil industry.	**API-Buttress 2.6**  Threads for oil industry.
American Buttress  Threads for oil industry.					

Insert Grades & Cutting Data

Choose a suitable insert from the table in the catalog.

- Pitch
- Insert size
- External / Internal threading
- Right / Left hand version
- Thread type
- Grade

GRADES

	Grade	Coated (PVD)	Machine Materials
Choice of grade of thread turning inserts	WS400	TIALN	Stainless steel, Cast steel
	WS300	TIALN	General Purpose
	BS200	TIALN	Steel

CUTTING DATA

Choice of Cutting speed			BS200	W300	WS400	W07	W15	W08	W16	W100
After choosing proper grade of insert, The cutting speed should be decided by the data in right form. On the right form, The cutting speed is a range. On most circumstance, the choice is a average of range at the beginning.	Metric, British, American System Thread inserts	Low, medium carbon steel	60~100	80~140						
		High carbon steel	60~110	60~120						
		Alloy steel or quenched and tempered steel	60~110	60~120						
		Stainless steel			60~120					
		Cast steel		60~120	100~120					
		Cast iron			60~120					
		Aluminium alloy, Copper alloy								90~280
	Thread inserts of oil Pipe	Low grade steel pipe J55, H40, K55, M65						140~180	160~200	
		Subhigh grade steel pipe N80, C75, L80				120~160	140~180			
		High grade steel pipe P110, C90, J95				100~140	120~160			

Choice of Cutting Passes And Cutting Depth

For machining of Metric,British,American system thread

- The datum in the form were taken from machining of medium grade material with good cutting conditions.
- When cutting harder materials , Should add more pass. Especially it is important to reduce cutting depth of the first pass.
- The datum in the form are just for Metric(ISO) thread . The datum of W,NPT,UN,BSPT etc. thread can be chosen with referring these datum.

External Thread METRIC ISO

Pitch (mm)

Pass No.	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	5.0
14											0.07	0.07	0.08
13											0.07	0.10	0.10
12									0.06	0.07	0.08	0.10	0.10
11									0.06	0.07	0.10	0.10	0.15
10								0.06	0.07	0.08	0.10	0.10	0.15
9								0.06	0.10	0.10	0.10	0.15	0.20
8						0.06	0.06	0.07	0.10	0.15	0.15	0.20	0.20
7						0.06	0.07	0.10	0.10	0.20	0.20	0.20	0.25
6				0.06	0.06	0.10	0.10	0.10	0.15	0.20	0.20	0.20	0.25
5			0.06	0.10	0.10	0.10	0.15	0.15	0.15	0.20	0.20	0.25	0.25
4	0.03	0.05	0.10	0.10	0.12	0.10	0.15	0.20	0.20	0.25	0.25	0.30	0.30
3	0.06	0.10	0.15	0.12	0.20	0.20	0.20	0.25	0.25	0.25	0.30	0.35	0.35
2	0.10	0.15	0.17	0.20	0.25	0.25	0.25	0.30	0.30	0.30	0.35	0.35	0.40
1	0.15	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35	0.35	0.35	0.40	0.40

Internal Thread METRIC ISO

Pitch (mm)

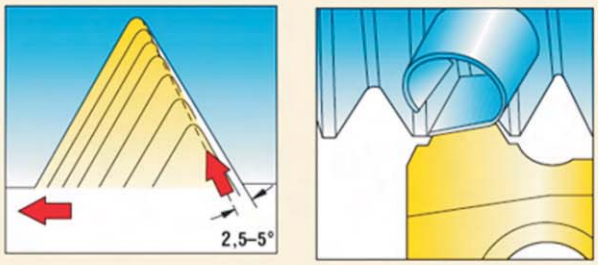
Pass No.	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	5.0
14											0.06	0.06	0.06
13											0.06	0.07	0.09
12									0.06	0.06	0.07	0.07	0.10
11									0.06	0.07	0.10	0.10	0.15
10								0.06	0.07	0.08	0.10	0.10	0.15
9								0.06	0.10	0.10	0.10	0.15	0.20
8						0.06	0.06	0.08	0.10	0.15	0.15	0.20	0.20
7						0.07	0.06	0.10	0.10	0.15	0.20	0.20	0.25
6				0.06	0.06	0.07	0.10	0.10	0.15	0.15	0.20	0.20	0.25
5			0.06	0.07	0.06	0.08	0.10	0.15	0.15	0.20	0.20	0.25	0.25
4	0.03	0.05	0.07	0.10	0.15	0.10	0.15	0.20	0.20	0.25	0.20	0.25	0.25
3	0.06	0.08	0.15	0.15	0.15	0.20	0.20	0.20	0.25	0.25	0.25	0.3	0.30
2	0.08	0.15	0.15	0.15	0.25	0.25	0.25	0.25	0.25	0.30	0.30	0.35	0.35
1	0.15	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.30	0.35	0.35	0.40	0.40

Cutting Data

Infeed method : The choice of infeed method is most important for long chipping.

Modified flank infeed

For CNC machines and conventional machines



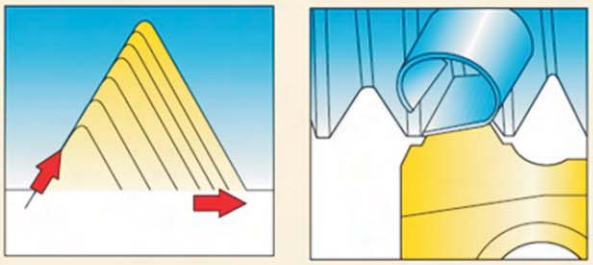
First choice for CNC machines

The infeed angle should be 2-1/2-5 degrees less than the flank angle.

- Good chip control (important for internal threading).
- Good surface finish on thread.
- Long tool life.

Flank infeed

For CNC and conventional machines

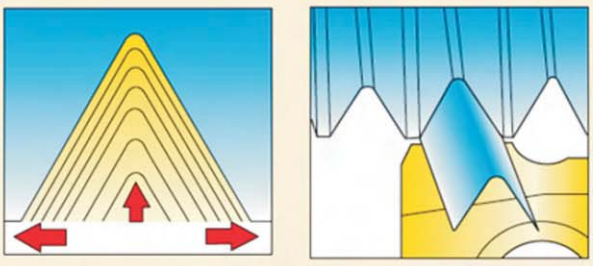


Choose flank infeed when modified flank infeed cannot be used

- Good chip control.
- Can result in bad surface on thread.
- Not suitable for work hardening materials.

Radial Infeed

For conventional machines and multi-tooth inserts

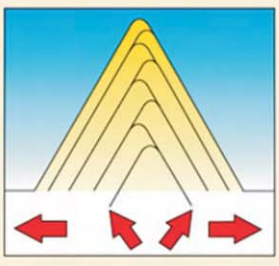


Multitooth inserts demand radial infeed First choice for work hardening materials

- Difficult to control the chip.
- High cutting forces.

Alternate flank infeed

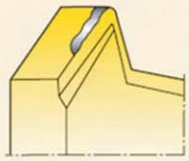
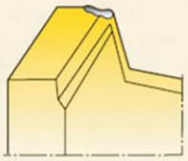
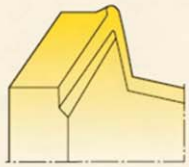
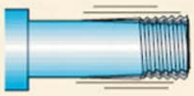
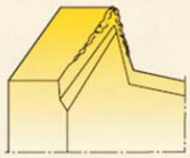
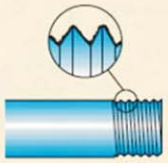
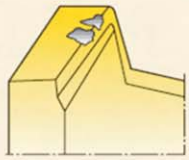
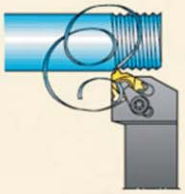
For conventional machines and multi-tooth inserts



First choice for large coarse threads

- Long tool life.
- Chipbreaking problems can arise.

Troubleshooting

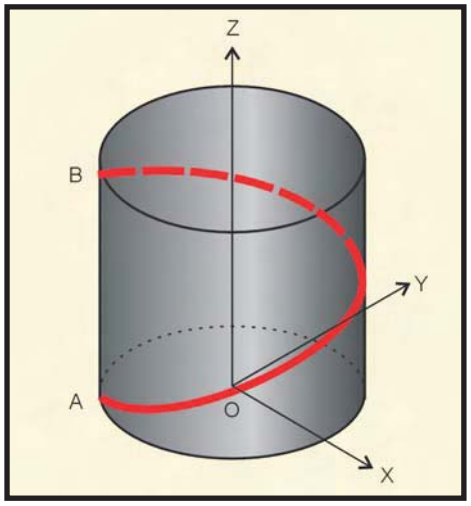
Rapid flank wear 	• Reduce the cutting speed. • Increase the infeed per pass. • Use modified flank infeed. • Select a more wear-resistant grade. • Check theat the correct anvil has been selected.	Insert fracture 	• Increase the number of passes. • Select a tougher grade. • Check the workpiece mounting. • Check the center height of the cutting edge. • Check for built-up edge.
Plastic deformation 	• Select a grade with better resistance to plastic deformation. • Reduce the cutting speed. • Increase the number of passes. • Increase the coolant supply. • Check that the workpiece diameter is correct prior to cutting the thread.	Vibrations 	• Change the cutting speed. • Reduce the overhang and use the most stable toolholder. • Check the center height of the cutting edge. • Check that the workpiece diameter is correct.
Built-up edge 	• Increase the cutting speed. • Do not use coolant.	Poor finish 	• Increase the cutting speed. • Check that the right anvil has been selected. • Use modified flank infeed or radial infeed.
Edge chipping 	• Select a tougher grade. • Check the workpiece mounting. • Check the cutting speed. • Use modified flank infeed.	Poor chip control 	• Reduce the number of passes. • Increase the cutting speed. • Use modified flank infeed. • Increase the coolant supply. • Select A1, A2 or G1 chipbreaker.

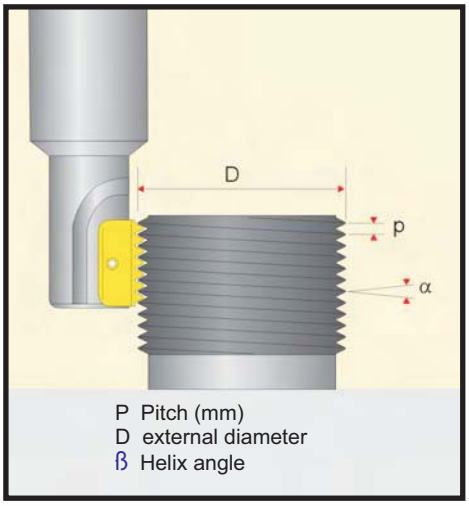
Thread Milling

In order to perform a thread milling operation ,a milling machine with three-axis control capable of helical interpolation is required.Helical interpolation is a CNC function producing tool movement along a helical path. This helical motion combines circular movement in one plane with a simultaneous linear motion in a plane perpendicular to the first. For example, the path from point A to point B (Fig.A) on the envelope of the cylinder combines a circular movement in the XY plane with a linear displacement in the Z direction.

On most CNC systems this function can be executed in two different ways:

GO2: Helical interpolation in a clockwise direction
GO3: Helical interpolation in a counter-clockwise direction





The thread milling operation (Fig.B)consists of circular rotation of the tool around its own axis together with an orbiting motion along the bore or workpiece circumference.

During one such orbit , the tool will shift vertically one pitch length. These movements combined with the insert geometry create the required thread form.

There are three acceptable ways of approaching the workpiece with the tool to initiate production of the thread:

1.Tangential Arc Approach
2.Radial Approach
3.Tangential Line Approach

Thread Milling

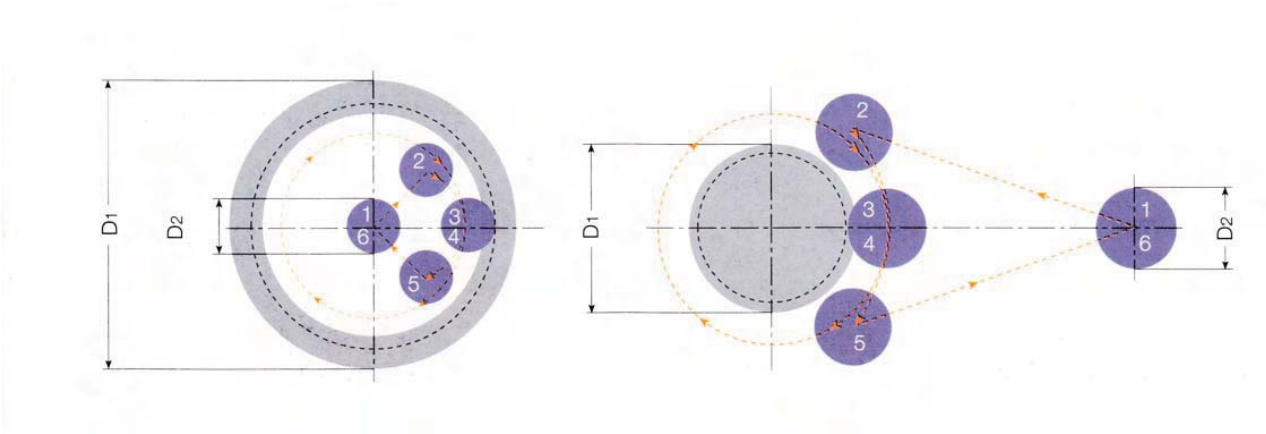
Grade	Application	Diagram
WTM100	Excellent for general use. A tough micron substrate with TiAlN coating. Provides good fracture toughness and excellent wear resistance.	
BTM200	Excellent for general use with medium cutting speed. A tough micron substrate with TiAlN coating, Provides excellent wear resistance and good toughness.	
WTM300	Excellent for general use with high cutting speed. A tough micron substrate from Germany with TiAlN coating, Provides excellent wear resistance and good toughness.	

Thread Milling

1. Tangential Arc Approach

With this method ,the tool enters and exits the workpiece smoothly . No marks are left on the workpiece and there is no vibration, even with harder materials.

Although it requires slightly more complex programming than the radial approach (see below),this is the method recommended for machining the highest quality threads.

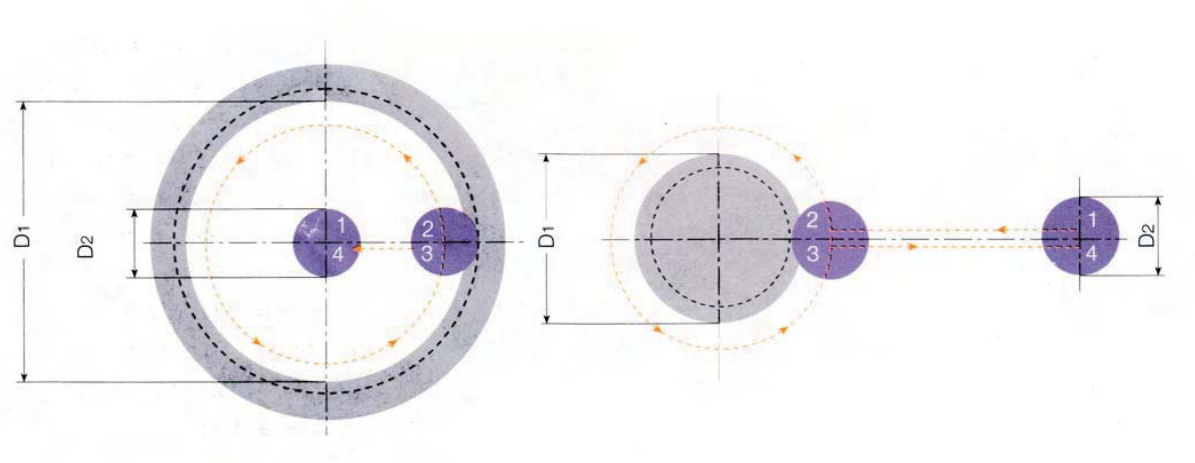


1-2: Rapid approach
2-3: Tool entry along tangential arc ,with simultaneous feed along z-axis
3-4: Helical movement during one full orbit (360^0).
4-5: Tool exit along tangential arc ,with continuing feed along z-axis
5-6: Rapid return

Thread Milling

2. Radial Approach

This is the simplest method.There are two characteristics worth noting about the radial approach;
A. a small vertical mark may be left at the entry (and exit)point.This is of no significance to the thread itself.
B. when using this method with very hard materials, there may be a tendency of the tool to vibrate as it approaches the full cutting depth.
Note: Radial feed during entry to the full profile depth should only be 1/3 of the subsequent circular feed !

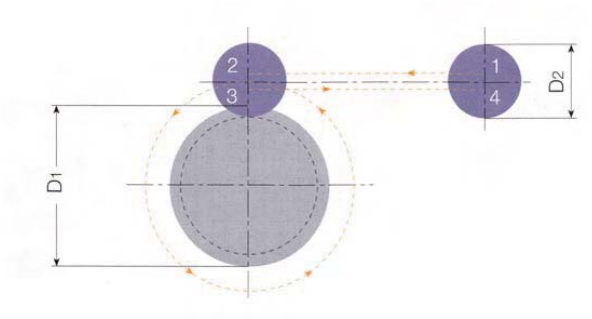


1-2: Rapid approach
2-3: Helical movement during one full orbit (360^0).
3-4: Rapid return

Thread Milling

3. Tengential Line Approach

This method is very simple, and has all of advantages of tangential arc method. However ,it is applicable only with external threads.



1-2: Radial entry with simultaneous feed along z axis

2-3: Helical movement during one full orbit(360)

3-4: Radial exit

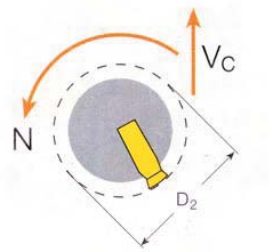
1. Calculation of rotational velocity and feed at the cutting edge

$$N = \frac{1000 \times V}{\pi \times D_2}$$

$$V = \frac{N \times \pi \times D_2}{1000}$$

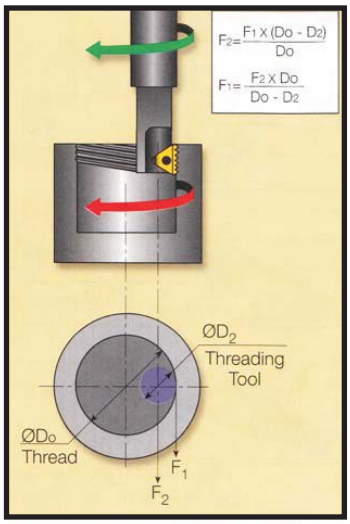
$$F_1 = N \times z \times f$$

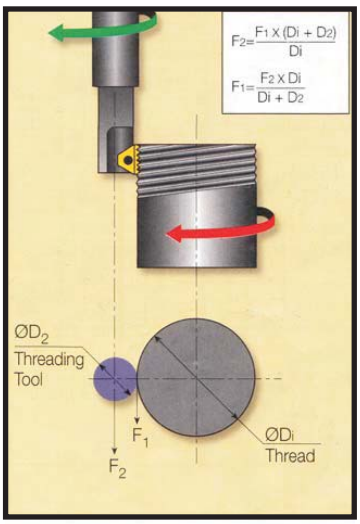
N - Rotational Velocity[R.P.M]
V - Cutting speed [m\min]
D2 - Toolholder Cutting Dia[mm]
F1 - Tool Feed Rate at the cutting Edge [mm\min]
Z - No.of Cutting Edges
f - Feed per tooth per rotation[mm\rev]



2. Calculation of feed rates at the tool center line

On most CNC machines, the feed rate required for programming is that of the center-line of the tool.When dealing with linear tool movement , the feed rate at the cutting edge and the center line are identical ,but with circular tool movement such is not the case.The equations define the relationship between feed rates at the cutting edge and at the tool center line.





Thread Milling - Cutting Data

Vc[m/min] Feed (mm/tooth)

Material			Hardness Brinell HB	Indexable Inserts WTM100	Solid Carbide WTM200	Solid Carbide WTM300	Indexable Inserts	Solid Helical Flute	Solid Straight Flute
P	Unalloyed steel	low carbon [C=0.1-0.25%]	125	90-180	80-250	50-180	0.05-0.3	0.03-0.15	0.01-0.1
		Medium carbon [C=0.25-0.55%]	150	90-170	80-230	50-140	0.05-0.25	0.03-0.1	0.01-0.08
		High carbon[C=0.55-0.85%]	170	90-160	80-200	50-120	0.05-0.2	0.03-0.08	0.01-0.05
	Low alloy steel	Non hardened	180	90-155	60-180	60-170	0.05-0.25	0.03-0.1	0.03-0.07
		Hardened	275	80-160	60-170	60-160	0.05-0.2	0.03-0.07	0.03-0.07
		Hardened	350	70-150	60-160	60-150	0.05-0.15	0.01-0.03	0.005-0.01
	High alloy steel	Annealed	200	70-115	40-100	40-90	0.05-0.2	0.03-0.05	0.01-0.03
		Hardened	325	60-100	30-80	30-70	0.05-0.1	0.01-0.03	0.005-0.01
	Cast steel	Low alloy (alloying elements<5%)	200	100-170	80-250	70-200	0.05-0.15	0.03-0.1	0.01-0.03
		High alloy(alloying elements>5%)	225	70-130	60-170	60-150	0.05-0.1	0.01-0.03	0.005-0.01
M	Stainless steel feritic	Non hardened	200	120-180	60-150	50-140	0.05-0.15	0.04-0.1	0.01-0.05
		Hardened	330	120-180	60-120	50-110	0.05-0.1	0.01-0.05	0.005-0.01
	Stainless steel Austenitic	Austenitic	180	100-140	60-140	60-130	0.05-0.15	0.04-0.1	0.007-0.02
		Super austenitic	200	100-140	60-130	50-120	0.05-0.1	0.04-0.1	0.007-0.02
	Stainless steel Cast feritic	Non hardened	200	100-140	60-160	50-150	0.05-0.15	0.04-0.1	0.01-0.03
		Hardened	330	100-140	60-110	50-100	0.05-0.1	0.03-0.05	0.005-0.01
	Stainless steel Cast Austenitic	Austenitic	200	100-120	60-150	50-140	0.05-0.15	0.04-0.1	0.01-0.03
		Hardened	330	100-120	60-100	50-90	0.05-0.1	0.03-0.05	0.005-0.01
	High temperature alloys	Annealed (Iron based)	200	20-40	30-60	30-50	0.05-0.1	0.04-0.1	0.007-0.02
		Aged (Iron based)	280	20-30	20-50	20-40	0.02-0.05	0.01-0.03	0.005-0.01
		Annealed(Nickel or Cobalt based)	250	15-20	15-35	15-30	0.02-0.05	0.01-0.03	0.005-0.01
		Aged (Nickel or Cobalt Based)	350	10-15	15-30	15-25	0.02-0.05	0.01-0.03	0.005-0.01
	Titanium alloys	Pure 99.5 Ti	400Rm	70-120	40-80	30-70	0.02-0.05	0.03-0.05	0.007-0.02
		a+b alloys	1050Rm	20-50	20-50	20-45	0.02-0.05	0.03-0.05	0.007-0.02
K	Extra hard steel	Hardened	55HRC	20-45	15-45	15-35	0.01-0.03	0.005-0.01	0.003-0.006
	Malleable cast iron	Ferritic (short chips)	130	60-130	70-160	60-150	0.02-0.08	0.01-0.03	0.007-0.02
		Pearlitic (long chips)	230	60-120	60-150	100	0.02-0.05	0.03-0.05	0.005-0.01
	Grey cast iron	Low tensile strength	180	60-130	70-160	50-140	0.05-0.15	0.05-0.1	0.007-0.02
		High tensile strength	260	60-100	40-120	40-110	0.05-0.1	0.03-0.05	0.005-0.01
	Nodular SG iron	Ferritic	160	60-125	40-110	40-100	0.05-0.15	0.05-0.1	0.007-0.02
		Pearlitic	260	50-90	40-100	40-90	0.05-0.1	0.03-0.05	0.005-0.01
	Aluminium alloys wrought	Non aging	60	100-250	200-300	150-250	0.1-0.4	0.1-0.25	0.05-0.15
		Aged	100	100-180	150-250	100-220	0.1-0.3	0.1-0.2	0.03-0.1
	Aluminium alloys	Cast	75	150-400	100-200	80-150	0.1-0.3	0.1-0.2	0.05-0.15
		Cast & aged	90	150-280	120-220	90-160	0.05-0.25	0.1-0.15	0.03-0.1
	Aluminium alloys	Cast Si 13-22%	130	80-150	200-300	150-250	0.1-0.3	0.1-0.2	0.05-0.15
	Copper and copper alloys	Brass	90	120-210	200-300	150-250	0.1-0.3	0.1-0.25	0.05-0.15
		Bronze and non leaded copper	100	120-210	150-250	100-220	0.05-0.25	0.1-0.2	0.03-0.1

About Helix Angle of Thread Machining

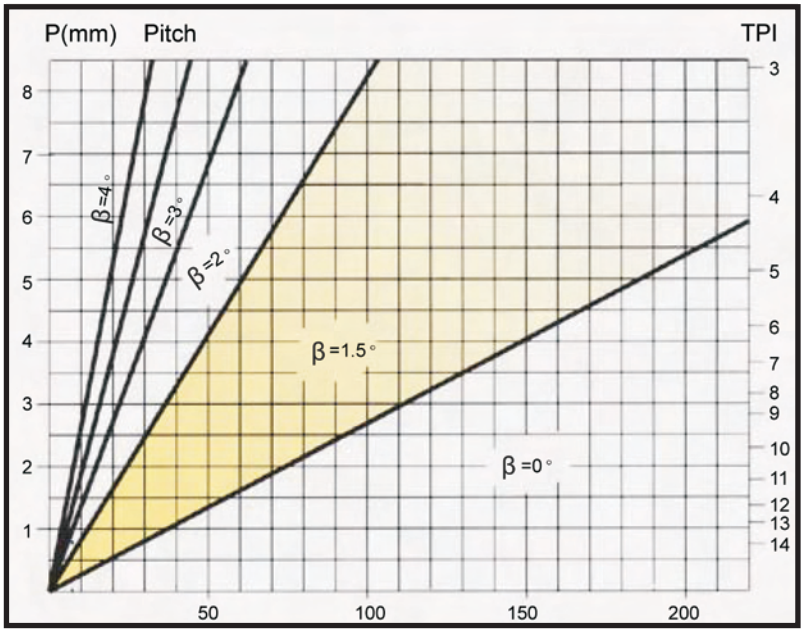


fig 1

Helix angle ß depends on pitch and pitch diameter

$$\tan\beta = \frac{P}{\pi d}$$

P Pitch (mm)
d Pitch diameter(mm)
ß Helix angle

In machining thread, the thread inserts must be fixed at an angle in the toolholder along helix angle as fig 2. In order to improve life of the insert, 1 equals 2 as far as possible.

Generally thread toolholders have 1.5 helix angle, It can be satisfied with most applications as yellow area in fig 1. But if helix angle of workpiece thread is much more than 1.5 or much less than 1.5, the solution can be got by ordering special toolholder with corresponding helix angle or changing the shim with corresponding helix angle.

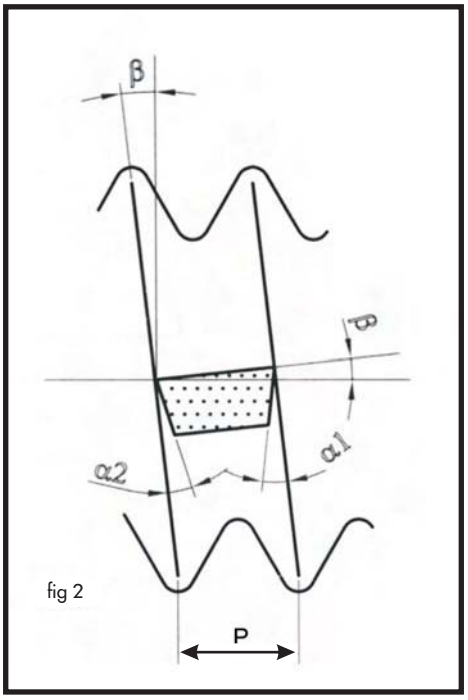
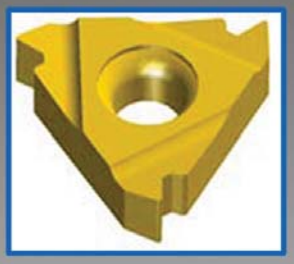
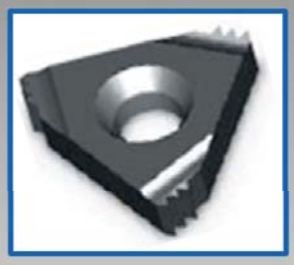


fig 2



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