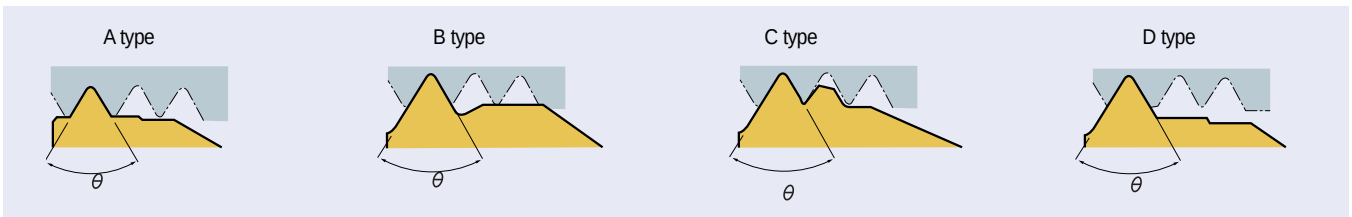
Threading Insert

Ref	for External	Pitch	for Internal	Pitch
Metric Thread (Metric Thread) 60°	**3000type** ECTR3100~3300 ECTR3150F ECTR3300F **4000type** ECTR4350~4500 ECTR4500F	1.0~3.0mm 0.5~1.5mm 1.5~3.0mm 3.5~5.0mm 3.5~5.0mm	**2000type** ICTR2050~2200 ICTR2150F **3000type** ICTR3100~3300 ICTR3150F ICTR3300F **4000type** ICTR4350~4500 ICTR4500F	0.5~2.0mm 0.5~1.5mm 1.0~3.0mm 0.5~1.5mm 1.5~3.0mm 3.5~5.0mm 3.5~5.0mm
Unified Thread (Unified Thread) 60°	**3000type** ECTR3028UN~3008UN ECTR3028UNF ECTR3014UNF **4000type** ECTR4007UN~4005UN ECTR4007UNF	28~08 pitch/Inch 28~14 pitch/Inch 14~08 pitch/Inch 07~05 pitch/Inch 07~05 pitch/Inch	**2000type** ICTR2032UN~2014UN ICTR2048UNF **3000type** ICTR3028UN~3008UN ICTR3028UNF ICTR3014UNF **4000type** ICTR4007UN~4005UN ICTR4007UN	24~14 pitch/Inch 48~16 pitch/Inch 28~08 pitch/Inch 28~14 pitch/Inch 14~08 pitch/Inch 07~05 pitch/Inch 07~05 pitch/Inch
Whitworth Thread (Whitworth Thread) 55°	**3000type** ECTR3028W~3008W ECTR3028WF ECTR3014WF **4000type** ECTR4007W~4005W ECTR4007WF	28~08 pitch/Inch 28~14 pitch/Inch 14~08 pitch/Inch 07~05 pitch/Inch 07~05 pitch/Inch	**2000type** ICTR2020W~2014W ICTR2048UNF **3000type** ICTR3028W~3008W ICTR3028WF ICTR3014WF **4000type** ICTR4007W~4005W CTR4007WF	20~14 pitch/Inch 48~16 pitch/Inch 28~08 pitch/Inch 28~14 pitch/Inch 14~08 pitch/Inch 07~05 pitch/Inch 07~05 pitch/Inch

Work-piece	Recommended Grade & Cutting Speed(sfm)			
	Coated Grade	Uncoated		Cermet
	PM30P	ST10	PTM30U	PM20S
Carbon Steel	400(250-500)	325(300-400)	300(250-325)	450(400-550)
Alloy Steel	325(250-425)	300(250-375)	250(225-325)	375(325-425)
Hardened Steel	100(25-175)	75(25-100)		
Heat Resisting Alloys	125(75-200)	100(25-125)		
Stainless Steel	300(225-375)	125(100-175)	225(200-300)	325(300-400)
Cast Iron	400(325-425)	250(225-300)		
Non-ferrous Metal (Copper Alloy•Plastic)	975(325-1975)	825(325-1650)		

Cutting edge type



Effective Inclination Angle and Relief Angle of Threading

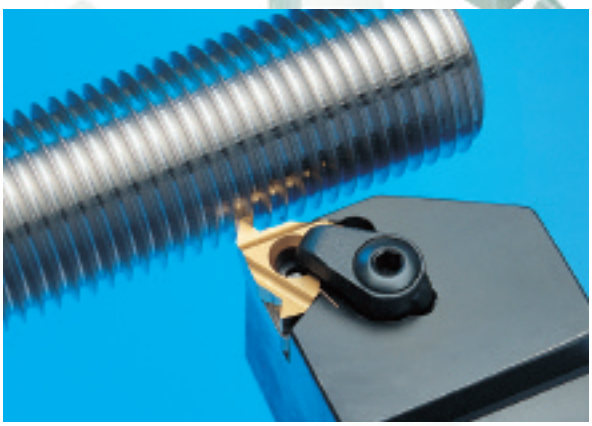
Inclination angle of the Thread (β) in the figure is decided by effective diameter (d) and lead (ℓ) of thread

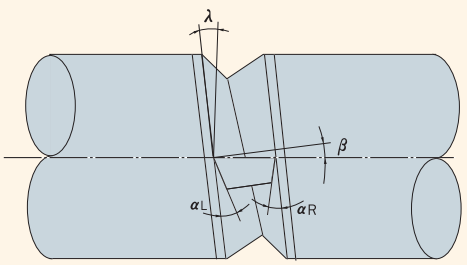
The angle of inclination of the Thread (β) is calculated by using the formula.

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

ℓ : lead

n:No.of Pitch, p:Pitch, d:Effective Diameter of Thread

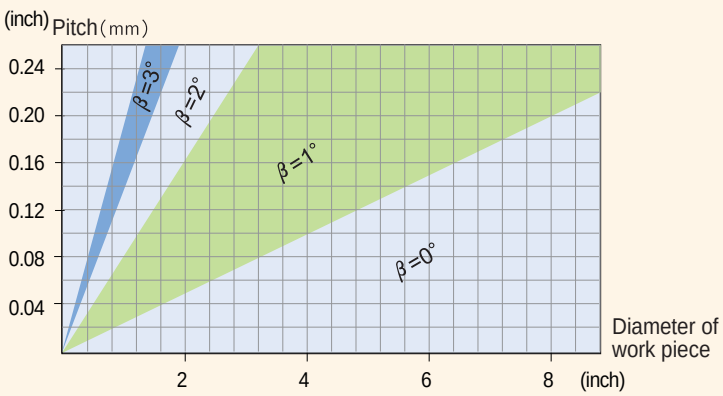




α - Side Relief Angle (αL = αR)

λ - Helix Angle

β - Angle of Inclination

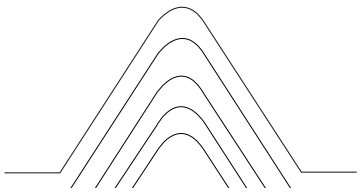
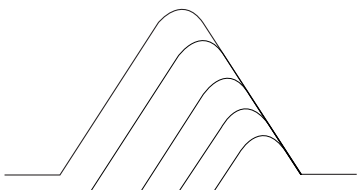
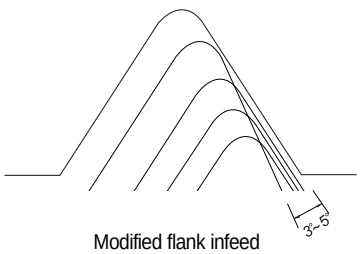
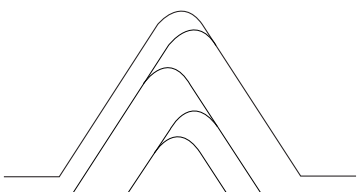


Effective Angle of Inclination of Each Cutting Condition

Revision Method of Effective Inclination Angle

Threading holders (ETH, ITH) are drawn with revision of inclination angle, 1°~ 2° to be used for detailed threading.
But, shims are produced without revision of inclination angle (ST32C1, ST42C1).
If pitch of thread is bigger or diameter of thread is smaller,inclination angle of thread will be bigger and bigger inclination angle will make Insert relief angle (L, R) smaller.
This effects to shape of thread crest and tool life but revising inclination angle can solve it.

Choosing Type of Infeed for Threading Operation

Type of Infeed	Features
 Radial infeed	• Most commonly used. • Suitable for relatively small pitch threading on soft material. • Chattering may occur easily because of longer chip touch length and bigger load on nose of the insert. • Bad chip control due to V type chip is produced.
 Flank infeed	• Suitable for bigger pitch thread or mild material. It can reduce chattering. • Bigger wear may occur on right cutting edge • Good chip control either direction.
 Modified flank infeed	• Modified type of flank infeed • Suitable for bigger pitch thread or mild material. This method can reduce chattering. • Good chip control with either way of chip flow • Wear can be reduced with infeeding right cutting edge. • Recommended for 2 pitches thread
 incremental infeed	• Suitable for bigger pitch thread or mild material. It can reduce chattering. • This method gives the insert even wear and longer tool life with using both side of cutting edge by turns. • Coiling of chip from right and left may be occurred due to the chip flow in turn.

Cutting Depth And Passes

ISO Metric 60° External

Pitch	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.75	1.5	1.25	1.0	0.75	0.5
Infeed Value(mm)	3.83	3.52	3.19	2.87	2.53	2.23	1.92	1.60	1.25	1.13	0.93	0.81	0.65	0.48	0.33
Pass 1	0.46	0.43	0.41	0.37	0.34	0.34	0.28	0.27	0.24	0.22	0.22	0.21	0.18	0.16	0.11
2	0.43	0.40	0.39	0.34	0.32	0.31	0.26	0.24	0.22	0.20	0.20	0.17	0.16	0.14	0.09
3	0.35	0.32	0.32	0.28	0.25	0.25	0.21	0.20	0.18	0.17	0.17	0.14	0.12	0.11	0.07
4	0.30	0.28	0.27	0.24	0.22	0.21	0.18	0.17	0.16	0.14	0.14	0.11	0.11	0.07	0.06
5	0.29	0.26	0.24	0.22	0.20	0.18	0.16	0.15	0.14	0.12	0.12	0.10	0.08		
6	0.26	0.24	0.24	0.22	0.18	0.18	0.15	0.15	0.12	0.10	0.08	0.08			
7	0.24	0.21	0.22	0.20	0.17	0.16	0.14	0.12	0.11	0.10					
8	0.23	0.20	0.20	0.18	0.15	0.15	0.13	0.11	0.08	0.08					
9	0.22	0.19	0.19	0.17	0.14	0.14	0.12	0.11							
10	0.19	0.18	0.18	0.16	0.13	0.12	0.11	0.08							
11	0.18	0.17	0.16	0.14	0.12	0.11	0.10								
12	0.16	0.15	0.15	0.13	0.12	0.08	0.08								
13	0.15	0.14	0.12	0.12	0.11										
14	0.14	0.13	0.10	0.10	0.08										
15	0.13	0.12													
16	0.10	0.10													

ISO Metric 60° Internal

Pitch	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.75	1.5	1.25	1.0	0.75	0.5
Infeed Value(mm)	3.54	3.25	2.96	2.65	2.33	2.05	1.78	1.48	1.17	1.05	0.85	0.75	0.60	0.46	0.31
Pass 1	0.46	0.43	0.42	0.37	0.34	0.32	0.28	0.26	0.23	0.22	0.20	0.17	0.17	0.16	0.10
2	0.43	0.40	0.40	0.34	0.31	0.30	0.26	0.25	0.21	0.20	0.18	0.17	0.15	0.13	0.08
3	0.35	0.33	0.32	0.28	0.24	0.24	0.21	0.18	0.17	0.15	0.15	0.14	0.11	0.10	0.07
4	0.30	0.26	0.26	0.23	0.21	0.19	0.16	0.15	0.15	0.13	0.13	0.10	0.09	0.07	0.06
5	0.26	0.22	0.22	0.21	0.18	0.17	0.14	0.13	0.12	0.11	0.11	0.09	0.08		
6	0.22	0.20	0.20	0.19	0.15	0.15	0.13	0.12	0.11	0.09	0.08	0.08			
7	0.20	0.18	0.17	0.16	0.14	0.14	0.12	0.11	0.10	0.08					
8	0.19	0.17	0.16	0.15	0.13	0.13	0.11	0.10	0.08	0.08					
9	0.18	0.16	0.16	0.14	0.12	0.12	0.10	0.10							
10	0.16	0.15	0.15	0.12	0.13	0.11	0.10	0.08							
11	0.15	0.14	0.14	0.12	0.11	0.10	0.09								
12	0.15	0.14	0.14	0.12	0.10	0.08	0.08								
13	0.14	0.13	0.12	0.11	0.10										
14	0.13	0.12	0.10	0.10	0.08										
15	0.12	0.12													
16	0.10	0.10													

ISO Metric 60° Internal

Pitch	5	6	7	8	9	10	11	12	14	16	18	19	20	26	28
Infeed Value(mm)	3.44	2.90	2.50	2.17	1.93	1.76	1.58	1.45	1.20	1.13	1.01	0.96	0.92	0.72	0.69
	0.45	0.38	0.37	0.32	0.30	0.29	0.28	0.28	0.24	0.24	0.23	0.22	0.21	0.19	0.18
	0.43	0.36	0.35	0.30	0.28	0.27	0.26	0.26	0.22	0.22	0.22	0.22	0.21	0.18	0.17
	0.38	0.30	0.29	0.24	0.23	0.22	0.22	0.22	0.18	0.19	0.19	0.18	0.17	0.15	0.14
	0.32	0.26	0.25	0.21	0.20	0.19	0.18	0.15	0.16	0.16	0.16	0.14	0.14	0.12	0.12
	0.28	0.22	0.22	0.19	0.18	0.17	0.16	0.16	0.13	0.13	0.13	0.12	0.11	0.08	0.08
	0.25	0.21	0.19	0.17	0.15	0.15	0.14	0.14	0.11	0.11	0.08	0.08	0.08		
	0.22	0.19	0.18	0.15	0.14	0.14	0.13	0.13	0.09	0.08					
	0.20	0.17	0.16	0.14	0.13	0.13	0.12	0.08	0.08						
	0.19	0.16	0.15	0.13	0.12	0.12	0.08								
	0.18	0.15	0.14	0.12	0.12	0.08									
	0.17	0.14	0.12	0.12	0.08										
	0.15	0.14	0.08	0.08											
	0.12	0.12													
	0.10	0.10													

Cutting Depth And Passes

Unified 60° External

Pitch	5	6	7	8	9	10	11	12	14	16	18	19	20	24	28	32
Infeed Value(mm)	0.130	0.107	0.092	0.082	0.072	0.065	0.060	0.055	0.051	0.047	0.041	0.037	0.033	0.028	0.024	0.021
Pass 1	0.017	0.014	0.014	0.012	0.011	0.011	0.011	0.011	0.010	0.00	0.009	0.009	0.008	0.007	0.007	0.007
2	0.016	0.013	0.013	0.011	0.010	0.010	0.010	0.010	0.009	0.009	0.008	0.008	0.007	0.007	0.006	0.006
3	0.014	0.011	0.010	0.010	0.008	0.008	0.008	0.008	0.007	0.007	0.006	0.006	0.006	0.006	0.004	0.005
4	0.012	0.009	0.009	0.008	0.008	0.007	0.007	0.007	0.007	0.0066	0.006	0.006	0.005	0.005	0.004	0.003
5	0.010	0.009	0.008	0.007	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.004	0.003	0.003	
6	0.009	0.008	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.004	0.004	0.003	0.003			
7	0.007	0.006	0.006	0.005	0.005	0.005	0.004	0.003	0.003	0.003	0.003					
8	0.007	0.006	0.006	0.005	0.005	0.005	0.004	0.003	0.003	0.003						
9	0.007	0.006	0.006	0.005	0.005	0.004	0.003									
10	0.007	0.006	0.005	0.005	0.004	0.003										
11	0.007	0.005	0.004	0.004	0.003											
12	0.006	0.005	0.003	0.003												
13	0.005	0.004														
14	0.004	0.004														

Unified 60° Internal

Pitch	5	6	7	8	9	10	11	12	13	14	16	18	20	24	28	32
Infeed Value(mm)	0.118	0.097	0.084	0.074	0.065	0.059	0.054	0.049	0.045	0.042	0.037	0.033	0.030	0.025	0.022	0.019
Pass 1	0.017	0.014	0.013	0.012	0.011	0.011	0.011	0.011	0.010	0.009	0.009	0.009	0.008	0.007	0.007	0.007
2	0.015	0.013	0.013	0.011	0.010	0.010	0.009	0.009	0.008	0.007	0.007	0.007	0.006	0.006	0.006	0.006
3	0.013	0.010	0.009	0.009	0.007	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.004	0.004
4	0.011	0.008	0.008	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005	0.004	0.004	0.003	0.003
5	0.009	0.007	0.007	0.006	0.006	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.003	0.003	
6	0.008	0.006	0.006	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.003	0.003			
7	0.007	0.006	0.006	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.006					
8	0.007	0.006	0.005	0.004	0.004	0.004	0.004	0.003	0.003	0.003						
9	0.006	0.005	0.005	0.004	0.004	0.004	0.006									
10	0.006	0.005	0.005	0.004	0.004	0.003										
11	0.006	0.005	0.004	0.004	0.003											
12	0.006	0.004	0.003	0.003												
13	0.005	0.004														
14	0.004	0.004														

Note

1) Above conditions are calculated upon using PM30P and PM20S grade.
2) Total D.O.C is based on C+ 0.05 ~ +0.08mm and no more excess is necessary
3) D.O.C, 0.05 ~ 0.1mm is recommended for pass
4) To avoid breakage of the insert at the first pass, make chamfer of 0.3~0.5 on the corner of work-piece.
5) Using coolant helps improve insert tool life and surface finish.