

## Pre-machining for thread rolling

Correct pre-machining of the workpieces is a prerequisite for successful application of the thread rolling process. The selection of the correct starting diameter and compliance with the pre-dimension tolerance ensure dimensionally accurate threads on single pieces and large series.

### Determination of the pre-dimension

$V_b$  = pre-machining diameter;  $d_o$  = pitch diameter ;  $p$  = pitch

ISO Standard Thread 6g  $V_b = d_o - 0,05 \sqrt{p}$

ISO Standard Thread 4h  $V_b = d_o - 0,033 \sqrt{p}$

ISO Standard Thread 6e  $V_b = d_o - 0,08 \sqrt{p}$

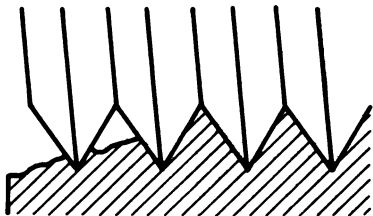
Does not apply to fine threads.

### Determination of the pre-dimension tolerance

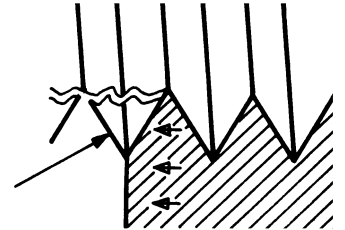
ISO standard and fine thread 6g minus tolerance of  
 $< 0,5p = 0,03$  mm;  $0,6$  bis  $2p = 0,05$  mm;  $> 2p = 0,08$  mm  
 provide for appropriate alignment with other tolerance zones.

### Correct chamfering

It is essential to note that chamfering in accordance with the rolling process has a decisive influence on the service life of the tools.



If chamfering is missing or too steep, axially flowing material will load the threads on one side and lead to chipping. Chamfering must also be provided for clearance groove on a shoulder.

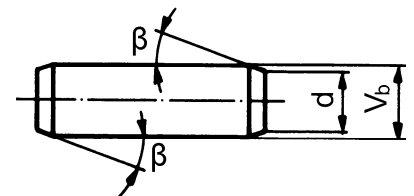
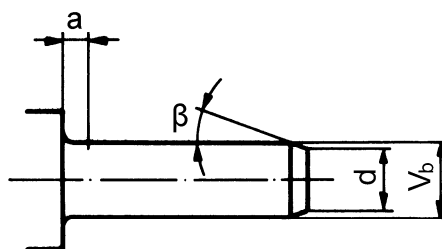
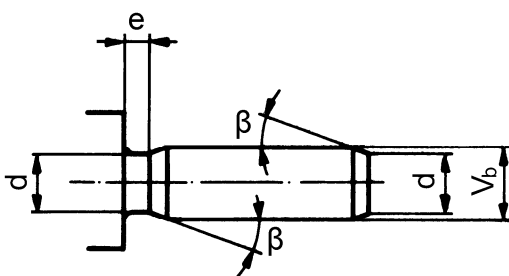


Runout e = Standard design 30° corresponds to approx. 1 x p; the groove width must be greater than the chamfer of the thread rolls!

Runout a = Standard design approx. 1.5 x p; short run-out approx. 1 x p

Chamfer angle depending on material strength

$< 500$ N/mm <sup>2</sup>	=	negligible
500 – 700 N/mm <sup>2</sup>	=	25°
700 – 1000 N/mm <sup>2</sup>	=	20°



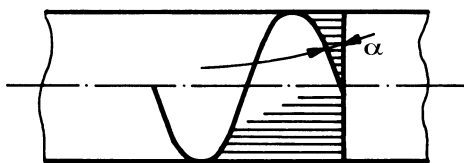
**Pre-machining diameters for ISO regular and fine thread 6g**

Ø	Steigung															
	0,35	0,5	0,7	0,75	0,8	1	1,25	1,5	1,75	2	2,5	3	3,5	4	4,5	5
3	2,75	<b>2,63</b>														
4	3,75	3,63	<b>3,50</b>													
5	4,75	4,63		4,47	<b>4,43</b>											
6	5,75	5,63		5,47		<b>5,30</b>										
7	6,75	6,63		6,47		<b>6,30</b>										
8	7,75	7,63		7,47		7,25	<b>7,13</b>									
9	8,75	8,63		8,47		8,25	<b>8,13</b>									
10	9,75	9,63		9,47		9,25	9,10	<b>8,97</b>								
11	10,75	10,63		10,47		10,25		<b>9,97</b>								
12	11,75	11,63		11,47		11,25	11,10	10,92	<b>10,79</b>							
14	13,75	13,63		13,47		13,25		12,92		<b>12,64</b>						
15	14,75	14,63		14,47		14,25		13,92								
16	15,75	15,63		15,47		15,25		14,92		<b>14,64</b>						
18	17,75	17,63		17,47		17,25		16,92		16,60	<b>16,30</b>					
20	19,75	19,63		19,47		19,25		18,92		18,60	<b>18,30</b>					
22	21,75	21,63		21,47		21,25		20,92		20,60	<b>20,30</b>					
24	23,75	23,63		23,47		23,25		22,92		22,60		<b>21,96</b>				
25	24,75	24,63		24,47		24,25		23,92		23,60						
26	25,75	25,63		25,47		25,25		24,92		24,60						
27	26,75	26,63		26,47		26,25		25,92		25,60		<b>24,96</b>				
28	27,75	27,63		27,47		27,25		26,92		26,60		25,96				
30	29,75	29,63		29,47		29,25		28,92		28,60		27,96	<b>27,62</b>			
32	31,75	31,63		31,47		31,25		30,92		30,60		29,96				
33	32,75	32,63		32,47		32,25		31,92		31,60		30,96	<b>30,62</b>			
36	35,75	35,63		35,47		35,25		34,92		34,60		33,96		<b>33,30</b>		
38	37,75	37,63		37,47		37,25		36,92		36,60		35,96				
39	38,75	38,63		38,47		38,25		37,92		37,60		36,96		<b>36,30</b>		
40	39,75	39,63		39,47		39,25		38,92		38,60		37,96		37,30		
42	41,75	41,63		41,47		41,25		40,92		40,60		39,96		39,30	<b>38,96</b>	
45	44,75	44,63		44,47		44,25		43,92		43,60		42,96		42,30	<b>41,96</b>	
48		47,63		47,47		47,25		46,92		46,60		45,96		45,30		<b>44,63</b>
52		51,63		51,47		51,25		50,92		50,60		49,96		49,30		<b>48,63</b>
56		55,63		55,47		55,25		54,92		54,60		53,96		53,30		
60		59,63		59,47		59,25		58,92		58,60		57,96		57,30		

The table values given are calculated according to DIN 13 - Metric ISO Threads - and have proven themselves in practice. A design or material-related adjustment may be necessary. For special profiles, the pre-machining diameter must be determined separately.

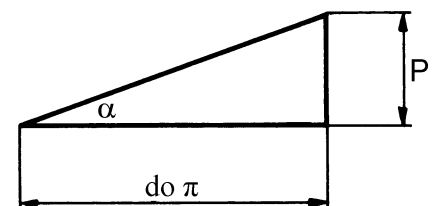
**Lead angle for ISO regular and fine pitch threads**

Ø	Steigung															
	0,35	0,5	0,7	0,75	0,8	1	1,25	1,5	1,75	2	2,5	3	3,5	4	4,5	5
3	2°18	<b>3°24</b>														
4	1°41	2°29	<b>3°36</b>													
5	1°20	1°57		3°02	<b>3°18</b>											
6	1°06	1°37		2°28		<b>3°24</b>										
7	0°56	1°22		2°06		<b>2°51</b>										
8	0°49	1°11		1°50		2°30	<b>3°10</b>									
9	0°43	1°03		1°38		2°11	<b>2°48</b>									
10	0°39	0°57		1°27		1°57	2°20	<b>3°02</b>								
11	0°35	0°51		1°21		1°46		<b>2°40</b>								
12	0°32	0°47		1°10		1°37	2°03	2°29	<b>2°56</b>							
14	0°27	0°40		1°00		1°22		2°06		<b>2°52</b>						
15	0°25	0°37		0°56		1°16		1°57								
16	0°24	0°35		0°54		1°12		1°49		<b>2°29</b>						
18	0°21	0°29		0°47		1°03		1°37		2°11	<b>2°47</b>					
20	0°19	0°28		0°42		0°57		1°26		1°57	<b>2°29</b>					
22	0°17	0°25		0°39		0°51		1°18		1°46	<b>2°12</b>					
24	0°16	0°23		0°35		0°47		1°11		1°36		<b>2°28</b>				
25	0°15	0°22		0°33		0°44		1°08		1°32						
26	0°14	0°21		0°32		0°43		1°05		1°28						
27	0°13	0°20		0°31		0°42		1°03		1°25		<b>2°12</b>				
28	0°12	0°19		0°29		0°40		1°		1°22		2°06				
30		0°18		0°28		0°38		0°57		1°17		1°58	<b>2°18</b>			
32		0°17		0°26		0°35		0°52		1°11		1°50				
33		0°16		0°25		0°34		0°51		1°08		1°46	<b>2°05</b>			
36		0°15		0°23		0°31		0°47		1°03		1°36	1°54	<b>2°11</b>		
38				0°22		0°29		0°45		0°59		1°31				
39				0°21		0°28		0°44		0°58		1°28		<b>2°</b>		
40				0°20		0°27		0°42		0°56		1°25		1°56		
42				0°19		0°26		0°40		0°54		1°22		1°51	<b>2°06</b>	
45				0°18		0°25		0°37		0°50		1°16		1°43	<b>1°57</b>	
48				0°17		0°23		0°35		0°47		1°11		1°36		<b>2°02</b>
52				0°16		0°21		0°32		0°43		1°05		1°28		<b>1°52</b>
56				0°15		0°20		0°30		0°40		1°01		1°22		
60						0°19		0°28		0°38		0°56		1°16		

**Determination of the lead angle:**


$$\tan \alpha = \frac{p}{d_o \pi}$$

$\alpha$  = lead angle  
 $p$  = pitch  
 $d_o$  = pitch diameter



**Pre-machining diameters for Ww and UN threads**

Whitworth BSW		
ø	/1"	Vb
1/8	40	2,73
5/32	32	3,42
3/16	24	4,04
7/32	24	4,83
1/4	20	5,49
5/16	18	6,98
3/8	16	8,45
7/16	14	9,89
1/2	12	11,28
5/8	11	14,33
11/16	11	15,89
3/4	10	17,35
7/8	9	20,34
1	8	23,29
1 1/8	7	26,16
1 1/4	7	29,34
1 1/2	6	35,30
1 3/4	5	41,10
2	5	47,07
2 1/4	4	52,97
2 1/2	4	59,32
3	4	71,43

Whitworth Fine BSF		
ø	/1"	Vb
7/32	28	4,95
1/4	26	5,68
9/32	26	6,48
5/16	22	7,15
3/8	20	8,66
7/16	18	10,16
1/2	16	11,63
9/16	16	13,22
5/8	14	14,66
11/16	14	16,25
3/4	12	17,63
13/16	12	19,22
7/8	11	20,68
1	10	23,71
1 1/8	9	26,70
1 1/4	9	29,87
1 3/8	8	32,82
1 1/2	8	35,99
1 5/8	8	39,17
1 3/4	7	42,05
2	7	38,40

UNC (NC)		
ø	/1"	Vb
Nr. 1	64	1,57
Nr. 2	56	1,86
Nr. 3	48	2,15
Nr. 4	40	2,40
Nr. 5	40	2,73
Nr. 6	32	2,95
Nr. 8	32	3,61
Nr. 10	24	4,10
Nr. 12	24	4,76
1/4	20	5,48
5/16	18	6,99
3/8	16	8,44
7/16	14	9,88
1/2	13	11,37
9/16	12	12,85
5/8	11	14,31
3/4	10	17,33
7/8	9	20,32
1	8	23,26
1 1/8	7	26,14
1 1/4	7	29,31
1 1/2	6	35,26

UNF		
ø	/1"	Vb
Nr. 1	72	1,60
Nr. 2	64	1,90
Nr. 3	56	2,19
Nr. 4	48	2,47
Nr. 5	44	2,77
Nr. 6	40	3,06
Nr. 8	36	3,68
Nr. 10	32	4,27
Nr. 12	28	4,86
1/4	28	5,72
5/16	24	7,21
3/8	24	8,80
7/16	20	10,24
1/2	20	11,83
9/16	18	13,32
5/8	18	14,91
3/4	16	17,97
7/8	14	20,99
1	12	23,97
1 1/8	12	27,14
1 1/4	12	30,32
1 1/2	12	36,67

Whitworth Rohr BSP		
ø	/1"	Vb
G 1/8	28	9,11
G 1/4	19	12,25
G 3/8	19	15,76
G 1/2	14	19,74
G 3/4	14	25,22
G 1	11	31,71
G 1 1/4	11	40,37
G 1 1/2	11	46,26
G 1 3/4	11	52,20

NPT		
ø	/1"	Vb
1/8	27	9,48
1/4	18	12,39
3/8	18	15,88
1/2	14	19,72
3/4	14	25,06
1	11,5	21,40
1 1/4	11,5	40,16
1 1/2	11,5	46,22
2	11,5	58,26



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