



Eichenberger Gewinde



Rolled Threads

Tables of Dimensions



State-of-the-art production methods, extensive product expertise and access to more than 1000 machine tools, enable us to meet each and every demand for rolled threads – however exotic they may be:

What is thread rolling?

Thread rolling (often also referred to as thread milling) is the cold forming of the surface of round workpieces. The thread form is produced by causing a radial dynamic force to be exerted between the two rotating rolling dies that form the workpiece. As the roll die profile penetrates the workpiece surface, the material in cold state is pressed all the way down into the root diameter of the thread roll die and is therefore rolled according to nominal value.

Advantages of thread rolling:

- significant increase in hardness through cold forming
- excellent surface smoothness on thread flanks and in ground radius
- reduced notch sensitivity
- no interrupted swalfe as in machine-ground threads
- excellent dimensional accuracy
- rational manufacturing process
- extremely cost-effective especially in large production batches



- pitches up to 6 x diameter
- spindle length up to 6 m
- spindle diameter from 2 to 160 mm
- high-helix thread profiles
- ball screw thread profiles
- all standard profiles (M, Tr, UNC, UNF, UNEF, Whitworth)
- multiple start threads including left-hand/right-hand threads
- special profiles
- worm gears (quality and price advantages)
- serrations and knurlings.

Quality Management ISO 9001:2000

What materials are suitable?

- all metals that feature an extension of at least 6 % and do not exceed a tensile strength of 1300 N/mm²
 - high-alloy, corrosion and acid-resistant steel
 - special aluminium alloys
 - riveting-quality brass
 - copper alloys
 - threads can be rolled on hollow bodies and tubes only if wall thickness is sufficient; this wall thickness depends upon the type and depth of intended profile as well as material used.
- Please call or write for assistance.

What materials are not suitable?

- extremely brittle material such as Ms58, cast iron, etc.
- extremely soft materials such as lead
- synthetics
- wood.

We look forward to your challenge!

Tables of dimensions for:

	page(s)
– Metric threads	4/5
– UNC/UNF/UNEF threads (60°)	6
– Whitworth / Whitworth pipe thread (55°)	7

Please note that these tables list dimensions, not available thread dies in stock.

Important notes for premachining

In order to ensure a perfect rolling process, it is important for workpieces to be properly premachined. Please refer to the tables on the following pages for dimensions a and b. The shaded green areas identify the four different tolerances for these dimensions.

Tolerance	0 -0.03 mm	Green 1
Tolerance	0 -0.05 mm	Green 2
Tolerance	0 -0.08 mm	Green 3
Tolerance	0 -0.12 mm	Green 4

If no special tolerances are required, please refer to tables for pre-machining and chamfer diameters and assign proper tolerance (color-coded).

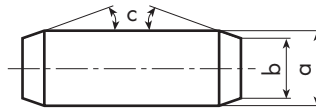
Standard threads are shown in the black areas of the metric thread table.

Caution: If parts are scheduled for additional surface or heat treatment after rolling, this may have to be taken into consideration when premachining the workpiece.

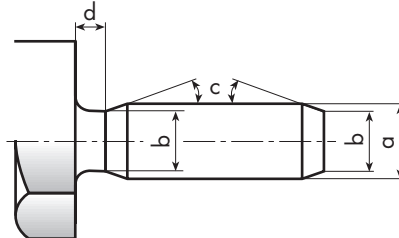
Experience has shown that threads produced in continuous operation, i.e. longer than approx. 120 mm, must be below listed values prior to rolling. Please take advantage of our experience and inquire about the appropriate premachining diameter.

If new profiles are required, especially narrow tolerances or extreme pitches, tests will be conducted to obtain premachining diameter.

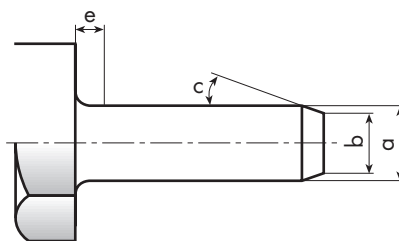
Threads over entire length



Conforming threads



Non-conforming threads



Dimension a [mm]: Premachining diameter (rolling diameter). Machining tolerance as per color code.

Dimension b [mm]: Chamfer, intake or pass diameter (theoretical root diameter); without prescribed tolerance.

Value in table = maximum dimension.

Dimension c: Chamfer or intake angle

· 20° to 1000 N/mm²

· approx. 15° over 1000 N/mm²

Dimension d [mm]: Pass width

· at least 1,5 x pitch

Dimension e [mm]: Thread runout

· approx. 1,5 x pitch

(shorter runouts on request).

Effects of non-compliance with premachining measurements:

• Rolling diameter exceeds prescribed tolerance

When the die is filled with the engaged material of the blank during rolling (see cutout Fig. 1), the flank diameter cannot be further influenced in the minus range (not even by further feeding the rolling dies). The result is that the flank diameter becomes too big, the tolerance gauge will jam and the counterpart will not fit on the thread.

A massive oversize of the blank may endanger the rolling die and often causes the workpiece to burst thus breaking the die. Therefore it is very important to premachine all parts of the same series with prescribed tolerances.

• Rolling diameter is below prescribed tolerance

If the rolling diameter is below the required tolerance, the flank diameter may be rolled true to tolerance but the outer diameter crest may be below the required tolerance.

• Chamfering

Since the workpiece material exerts axial flow properties in the areas of thread intake or runout, there is enough room to prevent any damage to the rolling die if chamfering has been done properly (Fig. 1). In the event of non-compliance with prescribed intake angle (chamfering), the material with axial flow will inevitably strain the dies to the breaking point (Fig. 2).

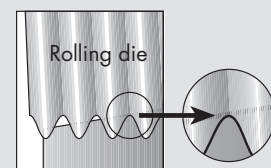


Fig. 1:
correct
chamfering

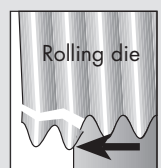


Fig. 2:
incorrect
chamfering

UNC/UNF/UNEF threads (60°)



UNC thread (60°)						
Designation	outer Ø	Ø a	Ø b	p [mm]	Tolerance	
No 1-64 UNC	1,83	1,57	1,30	0,39	0 -0.03	
No 2-56 UNC	2,16	1,86	1,60	0,45		
No 3-48 UNC	2,49	2,14	1,80	0,52		
No 4-40 UNC	2,82	2,40	2,00	0,63		
No 5-40 UNC	3,15	2,73	2,30	0,63		
No 6-32 UNC	3,48	2,95	2,50	0,79		
No 8-32 UNC	4,14	3,61	3,10	0,79		
No 10-24 UNC	4,80	4,09	3,50	1,05		
No 12-24 UNC	5,46	4,75	4,10	1,05		
¼-20 UNC	6,32	5,47	4,70	1,27		
⅜-18 UNC	7,90	6,97	6,10	1,41	0 -0.05	
½-16 UNC	9,49	8,44	7,50	1,58		
⅞-14 UNC	11,07	9,87	8,80	1,81		
1-13 UNC	12,66	11,37	10,20	1,95		
1 ⅛-12 UNC	14,24	12,85	11,60	2,11		
1 ¼-11 UNC	15,83	14,31	13,00	2,30		
1 ⅝-10 UNC	19,00	17,33	15,80	2,54		
1 ¾-9 UNC	22,17	20,32	18,70	2,82		
2-8 UNC	25,34	23,25	21,40	3,17		0 -0.08
2 ⅛-7 UNC	28,51	26,13	24,00	3,62		
2 ¼-7 UNC	31,69	29,30	27,20	3,62		
2 ⅝-6 UNC	34,86	32,08	29,60	4,23		
2 ¾-6 UNC	38,03	35,25	32,80	4,23		
3-5 UNC	44,38	41,05	38,10	5,08		
3 ⅛-4 ½ UNC	50,72	47,03	43,80	5,64		
3 ¼-4 ½ UNC	57,07	53,38	50,10	5,64		
3 ½-4 UNC	63,42	59,25	55,60	6,35		
3 ¾-4 UNC	69,76	65,60	61,90	6,35	0 -0.12	
4-4 UNC	76,11	71,95	68,30	6,35		
4 ¼-4 UNC	82,46	78,30	74,60	6,35		
4 ½-4 UNC	88,81	84,65	81,00	6,35		
4 ¾-4 UNC	95,16	90,99	87,30	6,35		
5-4 UNC	101,51	97,34	93,70	6,35		

UNF thread (60°)					
Designation	outer Ø	Ø a	Ø b	p [mm]	Tolerance
No 0-80 UNF	1,51	1,30	1,10	0,31	0 -0.03
No 1-72 UNF	1,83	1,60	1,40	0,35	
No 2-64 UNF	2,16	1,90	1,60	0,39	
No 3-56 UNF	2,49	2,20	1,90	0,45	
No 4-48 UNF	2,82	2,48	2,10	0,52	
No 5-44 UNF	3,15	2,78	2,40	0,57	
No 6-40 UNF	3,48	3,06	2,70	0,63	
No 8-36 UNF	4,14	3,67	3,20	0,70	
No 10-32 UNF	4,80	4,27	3,80	0,79	
No 12-28 UNF	5,46	4,86	4,30	0,90	
¼-28 UNF	6,32	5,72	5,20	0,90	0 -0.05
⅜-24 UNF	7,91	7,21	6,60	1,05	
½-24 UNF	9,49	8,79	8,10	1,05	
⅞-20 UNF	11,07	10,23	9,50	1,27	
1-20 UNF	12,66	11,82	11,10	1,27	
1 ⅛-18 UNF	14,25	13,31	12,50	1,41	
1 ¼-18 UNF	15,83	14,90	14,10	1,41	
1 ⅝-16 UNF	19,01	17,96	17,00	1,58	
1 ¾-14 UNF	22,18	20,98	19,90	1,81	
2-12 UNF	25,35	23,95	22,70	2,11	
2 ⅛-12 UNF	28,52	27,12	25,90	2,11	0 -0.05
2 ¼-12 UNF	31,70	30,30	29,10	2,11	
2 ⅝-12 UNF	34,87	33,47	32,20	2,11	
2 ¾-12 UNF	38,05	36,64	35,40	2,11	

UNEF thread (60°)					
Designation	outer Ø	Ø a	Ø b	p [mm]	Tolerance
No 12-32 UNEF	5,46	4,93	4,40	0,79	0 -0.03
¼-32 UNEF	6,32	5,79	5,30	0,79	
⅜-32 UNEF	7,91	7,38	6,90	0,79	
½-28 UNEF	9,50	8,97	8,50	0,79	
⅞-28 UNEF	11,08	10,48	9,90	0,90	
1-28 UNEF	12,67	12,07	11,50	0,90	
1 ⅛-24 UNEF	14,25	13,55	12,90	1,05	
1 ¼-24 UNEF	15,84	15,14	14,50	1,05	
1 ⅝-24 UNEF	17,43	16,73	16,10	1,05	
1 ¾-20 UNEF	19,01	18,17	17,40	1,27	
2-20 UNEF	20,60	19,75	19,00	1,27	0 -0.05
2 ⅛-20 UNEF	22,19	21,34	20,60	1,27	
2 ¼-20 UNEF	23,77	22,93	22,20	1,27	
2 ⅝-20 UNEF	25,36	24,51	23,80	1,27	
2 ¾-18 UNEF	26,95	26,00	25,20	1,41	
3-18 UNEF	28,53	27,59	26,80	1,41	
3 ⅛-18 UNEF	30,12	29,17	28,30	1,41	
3 ¼-18 UNEF	31,71	30,76	29,90	1,41	
3 ½-18 UNEF	33,29	32,35	31,50	1,41	
3 ¾-18 UNEF	34,88	33,94	33,10	1,41	
4-18 UNEF	36,47	35,52	34,70	1,41	0 -0.05
4 ¼-18 UNEF	38,06	37,11	36,30	1,41	
4 ½-18 UNEF	39,64	38,70	37,90	1,41	
4 ¾-18 UNEF	41,23	40,29	39,50	1,41	
5-18 UNEF	42,82	41,87	41,00	1,41	

UN thread profile

Basic profile corresponds to basic metric profile except that diameter and pitch are in inch.

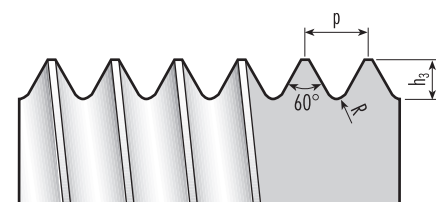
UN = thread with constant pitch

UNC = coarse thread

UNF = fine thread

UNEF = extra-fine thread

UNJF = thread with enlarged root radius (aviation application)



p = pitch [mm]

$h_3 = 0,61343 \cdot p$

$R = 0,14434 \cdot p$



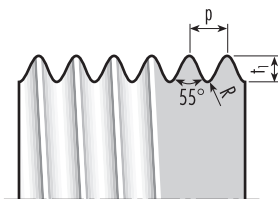
Whitworth / Whitworth pipe threads (55°)

Whitworth (55°)					
nominal Ø [inch]	p	outer Ø	Ø a	Ø b	Tolerance
1/4	20	6,35	5,51	4,50	0 -0.05
5/16	18	7,93	7,01	5,90	
3/8	16	9,52	8,48	7,30	
7/16	14	11,11	9,92	8,60	
1/2	12	12,70	11,31	9,70	0 -0.08
5/8	11	15,87	14,36	12,70	
3/4	10	19,05	17,39	15,50	
7/8	9	22,22	20,38	18,30	
1	8	25,40	23,32	21,00	0 -0.08
1 1/8	7	28,57	26,21	23,60	
1 1/4	7	31,75	29,37	26,80	
1 3/8	6	34,92	32,16	29,20	
1 1/2	6	38,10	35,34	32,20	0 -0.12
1 5/8	5	41,27	37,97	34,40	
1 3/4	5	44,45	41,14	37,60	
1 7/8	4 1/2	47,62	43,95	40,00	
2	4 1/2	50,80	47,12	43,20	0 -0.12
2 1/4	4	57,15	53,01	48,60	
2 1/2	4	63,50	59,36	55,00	
2 3/4	3 1/2	69,85	65,13	60,10	
3	3 1/2	76,20	71,48	66,50	0 -0.12
3 1/4	3 1/4	82,55	77,47	72,10	
3 1/2	3 1/4	88,90	83,82	78,50	
3 3/4	3	95,25	89,75	84,00	
4	3	101,60	96,10	90,30	0 -0.12
4 1/4	2 7/8	107,95	102,22	96,20	
4 1/2	2 7/8	114,30	108,57	102,50	
4 3/4	2 3/4	120,65	114,67	108,40	
5	2 3/4	127,00	121,02	114,70	0 -0.12
5 1/4	2 5/8	133,35	127,08	120,50	
5 1/2	2 5/8	139,70	133,43	126,80	
5 3/4	2 1/2	146,05	139,47	132,60	
6	2 1/2	152,40	145,83	138,90	0 -0.12

Whitworth pipe threads (55°)					
nominal Ø [inch]	p	outer Ø	Ø a	Ø b	Tolerance
R 1/8	28	9,72	9,11	8,40	0 -0.03
R 1/4	19	13,15	12,25	11,30	0 -0.05
R 3/8	19	16,66	15,76	14,80	
R 1/2	14	20,95	19,74	18,40	
R 5/8	14	22,91	21,69	20,40	
R 3/4	14	26,44	25,22	23,90	0 -0.05
R 7/8	14	30,20	28,98	27,70	
R 1	11	33,24	31,71	30,00	
R 1 1/8	11	37,89	36,35	34,60	
R 1 1/4	11	41,91	40,37	38,60	0 -0.05
R 1 3/8	11	44,32	42,78	41,00	
R 1 1/2	11	47,80	46,26	44,50	
R 1 3/4	11	53,74	52,20	50,40	
R 2	11	59,61	58,07	56,30	0 -0.05
R 2 1/4	11	65,71	64,17	62,40	
R 2 1/2	11	75,18	73,64	71,90	
R 2 3/4	11	81,53	79,99	78,20	
R 3	11	87,88	86,34	84,60	0 -0.05
R 3 1/4	11	93,98	92,44	90,70	
R 3 1/2	11	100,33	98,79	97,00	
R 3 3/4	11	106,68	105,14	103,40	
R 4	11	113,03	111,49	109,70	0 -0.05
R 4 1/2	11	125,73	124,19	122,40	
R 5	11	138,43	136,89	135,10	
R 5 1/2	11	151,13	149,59	147,80	
R 6	11	163,83	162,29	160,50	0 -0.05

Basic Whitworth profile according to B.S. 84

- W = Whitworth thread
- BSF = Whitworth fine thread
- R = Whitworth pipe thread (gas pipe threads)



p = pitch [number of threads per inch]
 $t_1 = 0,64033 \cdot p$
 $R = 0,13733 \cdot p$



Eichenberger Gewinde

The **examples** below illustrate the range of available cold-rolling applications. We may even inspire you to investigate innovative solutions. Indeed, we are convinced that rational cold-rolling solutions are available to solve your particular threading problem. Why not consider the benefits of cold rolling and profit from our know-how?



Ball screw profile.
As a rule, ogival threaded profiles are used



Trapezoidal thread as per ground profile DIN 103
Flat trapezoidal thread as per DIN 380
Multiple trapezoidal thread, incl. left/right



High-helix profiles
· multiple threads with pitch up to 6 x diameter
· synthetic or brass nuts



Special threads with special profiles according to customer specifications



Milled edges as per DIN 82
· concentric
· left/right
Serrations as per DIN 5481



Worm-gear profiles as per basic profile DIN 3976
· single gears
· multiple gears



Threads on awkward parts

Conical threads

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