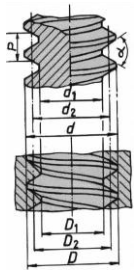
INFORMATION ON STANDARD M, UNC, PIPE THREADS (G) & WHITWORTH PLUS PITCH DIAMETER TOLERANCES



EXTERNAL THREAD
d = Major diameter
d_2 = Pitch diameter
d_1 = Minor diameter

INTERNAL THREAD
D = Major diameter
D_2 = Pitch diameter
D_1 = Minor diameter

P = Pitch
α = Flank angle

D_1 (drill size) can usually be found by subtracting the pitch size from the major diameter (d/D).
i.e Drill size for M16x2 is 16-2= 14,0 mm
TPI pitches to mm = 25.4/Pitch
i.e. 14 TPI = 25.4/14 = 1,81 mm

Important:

These tables are made as a guideline for calculating pitch diameter tolerances. As the primary purpose is to measure with a digital caliper (and the majority of pitch diameter tolerances in these tables is more than 0,10 mm), most dimensions are calculated to the nearest 0.01 mm.
When a tolerance in a table is used, it should be remembered that the tolerance will often be slightly larger for a finer pitch than standard.
i.e. the pitch diameter tolerance for M60x2 is larger than for M36x2, which again is larger than that for M16x2 – which is standard. Using the tolerances in these tables for a finer thread than "standard" will, in most cases, only mean that the thread is made to a slightly finer tolerance than necessary.
For exact tolerances use the relevant, approved standard.

Thread	Pitch diameter tolerances	
	Nut (6H)	Bolt (6g)
M16x2	+0.212 / -0	-0.038 / -0.198 (0.16)
M36x2	+0.224 / -0	-0.038 / -0.208 (0.17)
M60x2	+0.236 / -0	-0.038 / -0.218 (0.18)
M120x2	+0.250 / -0	-0.038 / -0.228 (0.19)

Nominal Pitch diameter =
Nominal Major diameter - (minus) **PD_N**
i.e. Nominal Pitch diameter for :
M20 x2 = 20.00 - 1.30 = **18.70**
and **1-8UNC** = 25.4 - 2.06 = **23.34**

ISO METRIC 60°		Pitch diameter tolerances	
Pitch	PD_N	Nut (6H)	Bolt (6g)
0,5	0.325	+ 0.10 / - 0	- 0.02 / - 0.095
0,6	0.39	+ 0.11 / - 0	- 0.02 / - 0.105
0,7	0.455	+ 0.12 / - 0	- 0.02 / - 0.11
0,75	0,487	+ 0.12 / - 0	- 0.02 / - 0.11
0,8	0.52	+ 0.125 / - 0	- 0.25 / - 0.12
1	0.65	+ 0.15 / - 0	- 0.03 / - 0.14
1.25	0.81	+ 0.16 / - 0	- 0.03 / - 0.15
1.5	0.97	+ 0.18 / - 0	- 0.03 / - 0.16
1.75	1.14	+ 0.20 / - 0	- 0.03 / - 0.18
2	1.30	+ 0.21 / - 0	- 0.04 / - 0.20
2.5	1.62	+ 0.22 / - 0	- 0.04 / - 0.21
3	1.95	+ 0.26 / - 0	- 0.05 / - 0.25
3.5	2.27	+ 0.28 / - 0	- 0.05 / - 0.26
4	2.60	+ 0.30 / - 0	- 0.06 / - 0.28
4.5	2.92	+ 0.31 / - 0	- 0.06 / - 0.30
5	3.25	+ 0.33 / - 0	- 0.07 / - 0.32
5.5	3.57	+ 0.35 / - 0	- 0.07 / - 0.34
6	3.90	+ 0.37 / - 0	- 0.08 / - 0.36
8	5,20	+ 0.45 / - 0	- 0.10 / - 0.44

UNC (ISO Inch) 60°		Pitch diameter tolerances	
Pitch	PD_N	Nut (2B)	Bolt (2A)
24	0.69	+ 0.11 / - 0	-0.025 /- 0.11
20	0.825	+ 0.12 / - 0	- 0.03 / - 0.12
18	0.92	+ 0.14 / - 0	- 0.03 / - 0.13
16	1.03	+ 0.15 / - 0	- 0.03 / - 0.15
14	1.18	+ 0.16 / - 0	- 0.04 / - 0.16
13	1.27	+ 0.17 / - 0	- 0.04 / - 0.17
12	1.37	+ 0.17 / - 0	- 0.04 / - 0.17
11	1.50	+ 0.18 / - 0	- 0.04 / - 0.18
10	1.65	+ 0.20 / - 0	- 0.05 / - 0.20
9	1.83	+ 0.21 / - 0	- 0.05 / - 0.21
8	2.06	+ 0.22 / - 0	- 0.05 / - 0.22
7	2.36	+ 0.24 / - 0	- 0.06 / - 0.24
6	2.75	+ 0.26 / - 0	- 0.06 / - 0.26
5	3.30	+ 0.30 / - 0	- 0.07 / - 0.30
4½	3.665	+ 0.32 / - 0	- 0.07 / - 0.32
4	4.125	+ 0.34 / - 0	- 0.08 / - 0.34

N.B. Please note that d/D for pipe threads (in the next table) is not the actual diameter.
The diameter stated is the approximate internal pipe diameter. For example diameter d for a 1" G pipe thread is 33.25 mm.

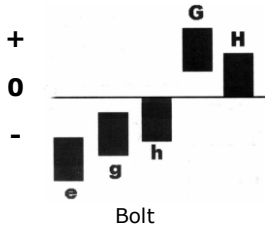
ISO 228/1-G 55°		Pitch diameter tolerances	
Pitch	PD_N	Nut	Bolt
19	0.86	+ 0.125 / - 0	**A** + 0 / - 0.125 **B** + 0 / - 0.25
14	1.16	+ 0.14 / - 0	**A** + 0 / - 0.14 **B** + 0 / - 0.28
11 op to G2	1.48	+ 0.18 / - 0	**A** + 0 / - 0.18 **B** + 0 / - 0.36
11 over G2	1.48	+ 0.22 / -0	**A** + 0 / - 0.22 **B** + 0 / - 0.44

Whitworth 55°		Pitch diameter tolerances	
Pitch	PD_N	Nut (Normal)	Bolt (Medium)
24	0.68	+ 0.13 / - 0	- 0.03 / - 0.12
20	0.81	+ 0.15 / - 0	- 0.03 / - 0.13
18	0.90	+ 0.16 / - 0	- 0.03 / - 0.14
16	1.02	+ 0.17 / - 0	- 0.03 / - 0.14
14	1.16	+ 0.18 / - 0	- 0.04 / - 0.16
12	1.36	+ 0.20 / - 0	- 0.04 / - 0.17
11	1.48	+ 0.22 / - 0	- 0.04 / - 0.19
10	1.63	+ 0.23 / - 0	- 0.05 / - 0.20
9	1.81	+ 0.24 / - 0	+ 0 / - 0.16
8	2.03	+ 0.26 / - 0	+ 0 / - 0.17
7	2.32	+ 0.27 / - 0	+ 0 / - 0.18
6	2.71	+ 0.30 / - 0	+ 0 / - 0.20
5	3.25	+ 0.33 / - 0	+ 0 / - 0.22
4½	3.61	+ 0.35 / - 0	+ 0 / - 0.23
4	4.07	+ 0.37 / - 0	+ 0 / - 0.24

ISO METRIC

Tolerance positions and classes for ISO metric screw threads

Nut

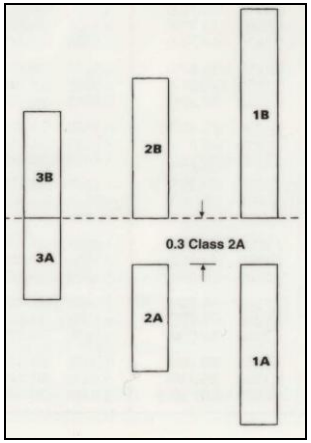


Bolt

H is standard for nuts & **g** is standard for bolts

ISO INCH GEVIND (UNC)

Relationship between the tolerances



*Tolerance class **2A** is the foundation*
1A = 1,500 x 2A

2A = 1,000

3A = 0,750 x 2A
1B = 1,950 x 2A
2B = 1,300 x 2A
3B = 0,975 x 2A

Example :

On a **½-13 UNC-2A** screw the pitch diameter tolerance is **0,127 mm**

Allowance from the nominal pitch diameter for **2A** and **1A** is 0,127 **x 0,3** = **0,038**
i.e. **0.3 x 2A** pitch diameter tolerance

1A is 0,127 x 1,5= **0,1905**
3A is 0,127 x 0,75= **0,095**
1B is 0,127 x 1,950 = **0,248**
2B is 0,127 x 1,300 = **0,165**

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