

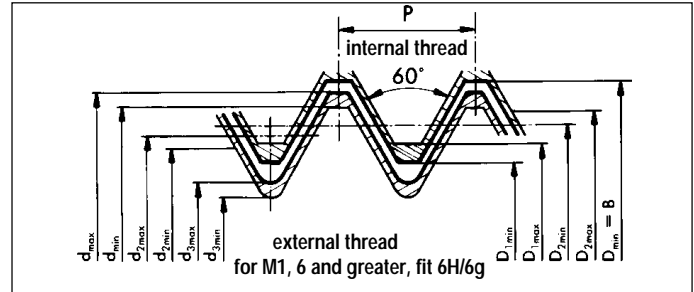
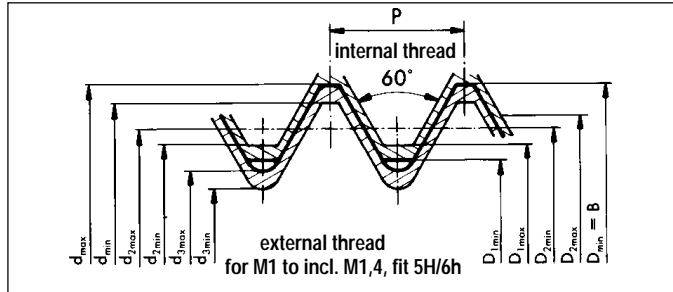
STANDARD

ISO : 965 Part 2
EN : -
DIN : 13 Part 13/20

SCREW THREADS

Metric (ISO) screw thread, coarse series -M-

Basic profile and limiting profiles



The bold lines indicate the maximum material profiles.
The maximum material profile of the internal thread is the basic profile.
B = basic major diameter
P = pitch

d = major diameter
d₂ = minor diameter
d₃ = pitch diameter
D = major diameter
D₁ = minor diameter
D₂ = pitch diameter

Limits of sizes for metric screw thread, coarse series, fit 6H/6g¹⁾

Dimensions in mm

Basic ²⁾ diameter	Pitch	External thread tol. 6g ¹⁾ (bolts and screws)						Internal thread tol. 6H ¹⁾ (nuts)				Section at minor dia.	Stress area
		major diameter		pitch diameter		minor diameter		pitch diameter		minor diameter		$\pi/4 d_2^3$	$\pi/4 \frac{(d_2 + d_3)^2}{2}$
B = D _{min}	P	d _{max}	d _{min}	d _{2max}	d _{2min}	d _{3max}	d _{3min}	D _{2min}	D _{2max}	D _{1min}	D _{1max}	A _{d₂} mm ²	A _{d₂} mm ²
1 ¹⁾	0,25	1,000	0,933	0,838	0,785	0,693	0,630	0,838	0,894	0,729	0,785	0,377	0,460
1,1 ¹⁾	0,25	1,100	1,033	0,938	0,885	0,793	0,730	0,938	0,994	0,829	0,885	0,494	0,588
1,2 ¹⁾	0,25	1,200	1,133	1,038	0,985	0,893	0,830	1,038	1,094	0,929	0,985	0,626	0,732
1,4 ¹⁾	0,3	1,400	1,325	1,205	1,149	1,032	0,964	1,205	1,265	1,075	1,142	0,837	0,983
1,6	0,35	1,581	1,496	1,354	1,291	1,152	1,075	1,373	1,458	1,221	1,321	1,075	1,27
1,8	0,35	1,781	1,696	1,554	1,491	1,352	1,275	1,573	1,658	1,421	1,521	1,474	1,70
2	0,4	1,981	1,886	1,721	1,654	1,490	1,407	1,740	1,830	1,567	1,679	1,788	2,07
2,2	0,45	2,180	2,080	1,888	1,817	1,628	1,540	1,908	2,003	1,713	1,838	2,133	2,48
2,5	0,45	2,480	2,380	2,188	2,117	1,928	1,840	2,208	2,303	2,013	2,138	2,980	3,39
3	0,5	2,980	2,874	2,655	2,580	2,367	2,273	2,675	2,775	2,459	2,599	4,475	5,03
3,5	0,6	3,479	3,354	3,089	3,004	2,743	2,635	3,110	3,222	2,850	3,010	6,000	6,78
4	0,7	3,978	3,838	3,523	3,433	3,119	3,002	3,545	3,663	3,242	3,422	7,749	8,78
4,5	0,75	4,478	4,338	3,991	3,901	3,558	3,439	4,013	4,131	3,688	3,878	10,07	11,3
5	0,8	4,976	4,826	4,456	4,361	3,995	3,869	4,480	4,605	4,134	4,334	12,69	14,2
6	1	5,974	5,794	5,324	5,212	4,747	4,596	5,350	5,500	4,917	5,153	17,89	20,1
7	1	6,974	6,794	6,324	6,212	5,747	5,596	6,350	6,500	5,917	6,153	26,18	28,9
8	1,25	7,972	7,760	7,160	7,042	6,438	6,272	7,188	7,348	6,647	6,912	32,84	36,6
9	1,25	8,972	8,760	8,160	8,042	7,438	7,272	8,188	8,348	7,647	7,912	43,78	48,1
10	1,5	9,968	9,732	8,994	8,862	8,128	7,938	9,026	9,206	8,376	8,676	52,30	58,0
11	1,5	10,968	10,732	9,994	9,862	9,128	8,938	10,026	10,206	9,376	9,676	65,90	72,3
12	1,75	11,966	11,701	10,829	10,679	9,819	9,602	10,863	11,063	10,106	10,441	76,25	84,3
14	2	13,962	13,682	12,663	12,503	11,508	11,271	12,701	12,913	11,835	12,210	104,7	115
16	2	15,962	15,682	14,663	14,503	13,508	13,271	14,701	14,913	13,835	14,210	144,1	157
18	2,5	17,958	17,623	16,334	16,164	14,891	14,625	16,376	16,600	15,294	15,744	175,1	193
20	2,5	19,958	19,623	18,334	18,164	16,891	16,625	18,376	18,600	17,294	17,744	225,2	245
22	2,5	21,958	21,623	20,334	20,164	18,891	18,625	20,376	20,600	19,294	19,744	281,5	303
24	3	23,952	23,577	22,003	21,803	20,271	19,955	22,051	22,316	20,752	21,252	324,3	353
27	3	26,952	26,577	25,003	24,803	23,271	22,955	25,051	25,316	23,752	24,252	427,1	459
30	3,5	29,947	29,522	27,674	27,462	25,653	25,306	27,727	28,007	26,211	26,771	519,0	561
33	3,5	32,947	32,522	30,674	30,462	28,653	28,306	30,727	31,007	29,211	29,771	647,2	694
36	4	35,940	35,465	33,342	33,118	31,033	30,655	33,402	33,702	31,670	32,270	759,3	817
39	4	38,940	38,465	36,342	36,118	34,033	33,655	36,402	36,702	34,670	35,270	913,0	976
42	4,5	41,937	41,437	39,014	38,778	36,416	36,007	39,077	39,392	37,129	37,799	1045	1121
45	4,5	44,937	44,437	42,014	41,778	39,416	39,007	42,077	42,392	40,129	40,799	1224	1306
48	5	47,929	47,399	44,681	44,431	41,795	41,352	44,752	45,087	42,587	43,297	1377	1473
52	5	51,929	51,399	48,681	48,431	45,795	45,352	48,752	49,087	46,587	47,297	1652	1758
56	5,5	55,925	55,365	52,353	52,088	49,177	48,700	52,428	52,783	50,046	50,796	1905	2030
60	5,5	59,925	59,365	56,353	56,088	53,177	52,700	56,428	56,783	54,046	54,796	2227	2362
64	6	63,920	63,320	60,023	59,743	56,559	56,048	60,103	60,478	57,505	58,305	2520	2676
68	6	67,920	67,320	64,023	63,743	60,559	60,048	64,103	64,478	61,505	62,305	2888	3055

- For basic diameters above 68 mm see: metric screw thread, fine series.

- For coated threads the maximum values of d_{2max} and d_{3max} are equal to the values of the basic profile (d_{2max} = D_{2min} and d_{3max} = D_{1min}).

- 1) the values for sizes 1 to incl. 1,4 mm correspond to the fit 5H/6h.

- 2) metric screw thread is designated by the basic diameter, preceded by the profile letter M and followed by the tolerance grade, e.g. 6, and the tolerance position, e.g. g.
Example: M10-6g. If no tolerance class is indicated the above mentioned fits are valid.

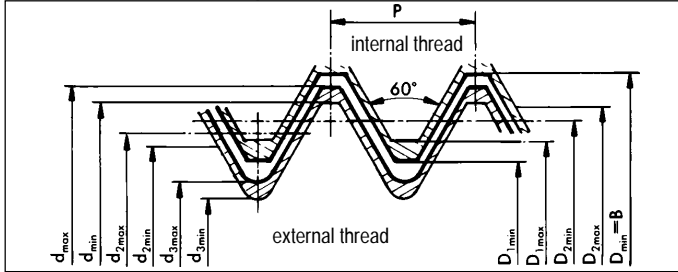
STANDARD

ISO : 965 Part 2
 EN : -
 DIN : 13 Part 13/21/22/23

SCREW THREADS

Metric (ISO) screw thread, fine series - MF-

Basic profile and limiting profiles



The bold lines indicate the maximum material profiles.
 The maximum material profile of the internal thread is the basic profile.

B = basic major diameter
 P = pitch

d = major diameter
 d₂ = pitch diameter
 d₃ = minor diameter } external thread

D = major diameter
 D₂ = pitch diameter
 D₁ = minor diameter } internal thread

Limits of sizes for metric screw thread, fine series, fit 6H/6g

Dimensions in mm

Basic ²⁾ diameter	Pitch	External thread tol. 6g (bolts and screws)						Internal thread tol. 6H (nuts)				Section at minor dia $\pi/4 d_3^2$	Stress area $\pi/4 \frac{(d_2 + d_3)^2}{2}$
		major diameter		pitch diameter		minor diameter		pitch diameter		minor diameter			
D _{min} = B	P	d _{max}	d _{min}	d _{2max}	d _{2min}	d _{3max}	d _{3min}	D _{2min}	D _{2max}	D _{1min}	D _{1max}	A ₃ mm ²	A _s mm ²
6	0,75	5,978	5,838	5,491	5,391	5,058	4,929	5,513	5,645	5,188	5,378	20,27	22,0
8	1	7,974	7,794	7,324	7,212	6,747	6,596	7,350	7,500	6,917	7,153	36,03	39,2
10	1	9,974	9,794	9,324	9,212	8,747	8,596	9,350	9,500	8,917	9,153	60,45	64,5
10	1,25	9,972	9,760	9,160	9,042	8,438	8,272	9,188	9,348	8,647	8,912	56,29	61,2
12	1	11,974	11,794	11,324	11,206	10,747	10,590	11,350	11,510	10,917	11,153	91,15	96,1
12	1,25	11,972	11,760	11,160	11,028	10,438	10,258	11,188	11,368	10,647	10,912	86,03	92,1
12	1,5	11,968	11,732	10,994	10,854	10,128	9,930	11,026	11,216	10,376	10,676	81,07	88,1
14	1,5	13,968	13,732	12,994	12,854	12,128	11,930	13,026	13,216	12,376	12,676	116,1	125
16	1,5	15,968	15,732	14,994	14,854	14,128	13,930	15,026	15,216	14,376	14,676	157,5	167
18	1,5	17,968	17,732	16,994	16,854	16,128	15,930	17,026	17,216	16,376	16,676	205,1	216
18	2	17,962	17,682	16,663	16,503	15,508	15,271	16,701	16,913	15,835	16,210	189,8	204
20	1,5	19,968	19,732	18,994	18,854	18,128	17,930	19,026	19,216	18,376	18,676	259,0	272
20	2	19,962	19,682	18,663	18,503	17,508	17,271	18,701	18,913	17,835	18,210	241,8	258
22	1,5	21,968	21,732	20,994	20,854	20,128	19,930	21,026	21,216	20,376	20,676	319,2	333
22	2	21,962	21,682	20,663	20,503	19,508	19,271	20,701	20,913	19,835	20,210	300,1	318
24	1,5	23,968	23,732	22,994	22,844	22,128	21,920	23,026	23,226	22,376	22,676	385,7	401
24	2	23,962	23,682	22,663	22,493	21,508	21,261	22,701	22,925	21,835	22,210	364,6	384
27	1,5	26,968	26,732	25,994	25,844	25,128	24,920	26,026	26,226	25,376	25,676	497,2	514
27	2	26,962	26,682	25,663	25,493	24,508	24,261	25,701	25,925	24,835	25,210	473,2	496
30	1,5	29,968	29,732	28,994	28,844	28,128	27,920	29,026	29,226	28,376	28,676	622,8	642
30	2	29,962	29,682	28,663	28,493	27,508	27,261	28,701	28,925	27,835	28,210	596,0	621
33	1,5	32,968	32,732	31,994	31,844	31,128	30,920	32,026	32,226	31,376	31,676	762,6	784
33	2	32,962	32,682	31,663	31,493	30,508	30,261	31,701	31,925	30,835	31,210	732,8	761
36	1,5	35,968	35,732	34,994	34,844	34,128	33,920	35,026	35,226	34,376	34,676	916,5	940
36	3	35,952	35,577	34,003	33,803	32,271	31,955	34,051	34,316	32,752	33,252	820,4	865
39	1,5	38,968	38,732	37,994	37,844	37,128	36,920	38,026	38,226	37,376	37,676	1085	1110
39	3	38,952	38,577	37,003	36,803	35,271	34,955	37,051	37,316	35,752	36,252	979,7	1028
42	1,5	41,968	41,732	40,994	40,844	40,128	39,920	41,026	41,226	40,376	40,676	1267	1294
42	3	41,952	41,577	40,003	39,803	38,271	37,955	40,051	40,316	38,752	39,252	1153	1206
45	1,5	44,968	44,732	43,994	43,844	43,128	42,920	44,026	44,226	43,376	43,676	1463	1492
45	3	44,952	44,577	43,003	42,803	41,276	40,955	43,051	43,316	41,752	42,252	1341	1398
48	1,5	47,968	47,732	46,994	46,834	46,128	45,910	47,026	47,238	46,376	46,676	1674	1705
48	3	47,952	47,577	46,003	45,791	44,271	43,943	46,051	46,331	44,752	45,252	1543	1604
52	1,5	51,968	51,732	50,994	50,834	50,128	49,910	51,026	51,238	50,376	50,676	1976	2010
52	3	51,952	51,577	50,003	49,791	48,271	47,943	50,051	50,331	48,752	49,252	1834	1900
56	2	55,962	55,682	54,663	54,483	53,508	53,251	54,701	54,937	53,835	54,210	2252	2301
56	4	55,940	55,465	53,342	53,106	51,033	50,643	53,402	53,717	51,670	52,270	2050	2144
60	4	59,940	59,465	57,342	57,106	55,033	54,643	57,402	57,717	55,670	56,270	2384	2485
64	4	63,940	63,465	61,342	61,106	59,033	58,643	61,402	61,717	59,670	60,270	2743	2851
68	4	67,940	67,465	65,342	65,106	63,033	62,643	65,402	65,717	63,670	64,270	3127	3242
72	6	71,920	71,320	68,023	67,743	64,559	64,048	68,103	68,478	65,505	66,305	3287	3463
76	6	75,920	75,320	72,023	71,743	68,559	68,048	72,103	72,478	69,505	70,305	3700	3889
80	6	79,920	79,320	76,023	75,743	72,559	72,048	76,103	76,478	73,505	74,305	4144	4344
90	6	89,920	89,320	86,023	85,743	82,559	82,048	86,103	86,478	83,505	84,305	5364	5590
100	6	99,920	99,320	96,023	95,723	92,559	92,028	96,103	96,503	93,505	94,305	6740	7000
110	6	109,920	109,320	106,023	105,723	102,559	102,028	106,103	106,503	103,505	104,305	8273	8560

- For coated threads the maximum values of d, d₂ and d₃ are equal to the values of the basic profile (d_{2max} = D_{2min} and d_{3max} = D_{1min})
 - Metric screw thread, fine series, are designated by the basic diameter, preceded by the profile letter M and followed by the pitch separated by an x-mark and then by the tolerance grade, e.g. 6, and the tolerance position, e.g. H. Example: M10 x 1,25 - 6H. If no tolerance is indicated the fit 6H/6g is valid.



STANDARD

ISO : -
 EN : -
 DIN : -

SCREW THREADS

Fine versus coarse thread

The general trend for commercial fasteners over the past 20 years has shown a gradual and noticeable shifting in popularity toward coarse threads.

And rightly so, as fine threads cannot be said to be technically superior. Although fine threads are used in special cases, (such as for adjustment, or for certain engine screws), these cases occur so seldom that fasteners with fine thread are becoming more and more a special product with all the economic disadvantages (higher price, poor availability, double stocking).

The fine screw thread is mainly created for and is still popular in, the automotive industry - and other related industries.

The most important arguments of proponents of fine thread are:

- a higher static tensile strength because of its larger stress area.
- because of the smaller helix angle it offers more resistance to loosening when subjected to vibration.
- better accuracy of adjustment.

In practice however most constructions are not charged statically but dynamically, so fatigue strength is the criterion. Coarse thread exhibits a better fatigue resistance because stress concentration at the root decreases as thread pith increases. The argument of better resistance to loosening has been outdated by the development of mechanical and chemical locking systems, which offer a more effective solution for loss of pre-tension especially during dynamic transversal forces.

Further advantages of coarse thread are:

- less sensitive to damaging and generally easier and quicker assembly
- thicker coatings as a consequence of the larger thread allowances
- less danger of stripping off.

The most important pros and cons can be summarised in the following evaluation table:

Functional properties	Screw thread	
	coarse	fine
Strength		
- static	-	+
- dynamic	+	-
Locking		
- without locking systems	-	+
- with locking systems	++	++
Insensitivity to damaging	+	-
Coating thickness	+	-
Stripping off	+	-
Ease of assembly	+	-
Cost and availability	+	-

COARSE THREAD
 is recommended for standardized fasteners in general constructions

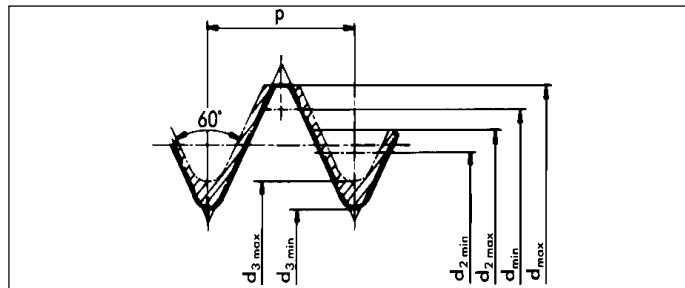
+ means better or more favourable

Note:

For the conversion from the imperial to the metric system in the U.S.A. the Industrial Fasteners Institute has issued the handbook "Metric Fasteners Standards". In this book all threaded fasteners have only the COARSE thread series as standard. Changing from UNF to metric-fine is not recommended for commercial fasteners.

STANDARD ISO : - EN : - DIN : 13 Part 51	<h1 style="margin: 0;">SCREW THREADS</h1> <h2 style="margin: 0;">Metric (ISO) screw thread with tolerance class Sk6</h2> <p style="margin: 0;">at the metal end of studs DIN 939</p>	
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Basic profile and limiting profiles



The bold line indicates the minimum material profile

- P = pitch
- d = major diameter = basic diameter
- d₂ = pitch diameter
- d₃ = minor diameter

Limits of sizes for metric screw thread with tolerance class Sk6

Dimensions in mm

Basic diameter d	Pitch P	External thread (studs)					
		major diameter		pitch diameter		minor diameter	
		d _{max}	d _{min}	d _{2max}	d _{2min}	d _{3max}	d _{3min}
6	1	6	5,776	5,406	5,335	4,773	4,663
(7)*	1	7	6,776	6,406	6,335	5,773	5,663
8	1,25	8	7,750	7,244	7,173	6,466	6,343
(9)*	1,25	9	8,750	8,244	8,173	7,466	7,343
10	1,5	10	9,720	9,082	9,011	8,160	8,017
(11)*	1,5	11	10,720	10,082	10,011	9,160	9,017
12	1,75	12	11,600	10,943	10,843	9,853	9,691
14	2	14	13,525	12,781	12,681	11,546	11,369
16	2	16	15,525	14,781	14,681	13,546	13,369
18	2,5	18	17,470	16,456	16,356	14,933	14,731
20	2,5	20	19,470	18,456	18,356	16,933	16,731
22	2,5	22	21,470	20,456	20,356	18,933	18,731
24	3	24	23,400	22,131	22,031	20,319	20,078

Remark:

Tolerance class Sk6 is used for general applications e.g. studs (not sealed connection) and in combination with internal thread, tolerance class fine (4H resp. 4H5H).

These tolerance classes have to do with a transition fit, so a press fit will not always be achieved.

Note:

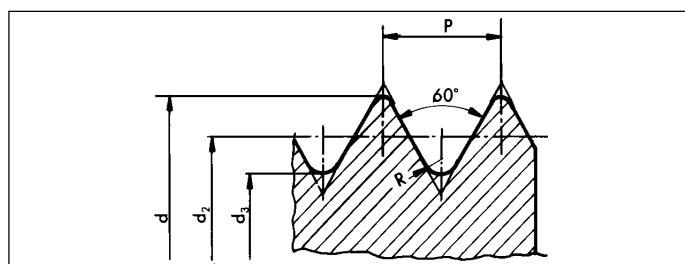
In the meantime a real press fit of metric screwthread (MFS) has been developed, which is achieved by an oversize on the major diameter.

For the tolerances of this screwthread is referred to DIN 8141 Part 1 and for the corresponding gauges to DIN 8141 Part 2. These standards can only be used for application in aluminium cast alloys and for sizes M 5 up to and including M 16. Further development depends on obtained experience.

Designation of this screw thread e.g. M12 Sk6.

* Preferably not to be used.

STANDARD ISO : - EN : - DIN : 2510 Part 2	<h1 style="margin: 0;">SCREW THREADS</h1> <h2 style="margin: 0;">Metric screw thread with large clearance</h2> <p style="margin: 0;">for double end studs with reduced shank DIN 2510</p>	
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- P = pitch
- R = root radius
- d = major diameter = basic diameter
- d₂ = pitch diameter
- d₃ = minor diameter

Basic profile and limits of sizes

Dimensions in mm

Basic diameter d	Pitch P	Root-radius R	External thread (double studs with reduced shank)							
			major diameter		pitch diameter		pitch clear- ance min.	minor diameter		section at minor dia.
			d _{max}	d _{min}	d _{2max}	d _{2min}		d _{3max}	d _{3min}	
M 12	1,75	0,18	11,823	11,558	10,686	10,536	0,177	9,676	9,400	69
M 16	2	0,20	15,823	15,543	14,524	14,364	0,177	13,369	13,065	133
M 20	2,5	0,25	19,800	19,465	18,176	18,006	0,200	16,733	16,383	210
M 24	3	0,30	23,788	23,413	21,839	21,639	0,212	20,107	19,691	303
M 27	3	0,30	26,788	26,413	24,839	24,639	0,212	23,107	22,691	403
M 30	3,5	0,35	29,775	29,350	27,502	27,290	0,225	25,481	25,017	490

Designation of this screw thread e.g. M 16 DIN 2510

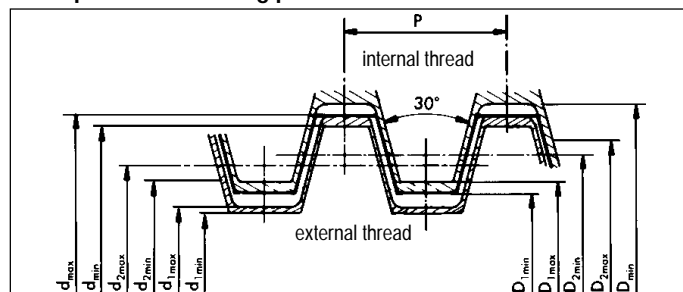
STANDARD

ISO : 2903
 EN : -
 DIN : 103 Part 5 and 7

SCREW THREADS

Metric (ISO) trapezoidal screw thread -Tr-
 for threaded rods and nuts

Basic profile and limiting profiles



The bold lines indicate the maximum material profiles.
 The extra thick line is the basic profile.

P = pitch

d = major diameter }
 d₂ = pitch diameter } external thread
 d₁ = minor diameter }

D = major diameter }
 D₂ = pitch diameter } internal thread
 D₁ = minor diameter }

Limits of sizes for trapezoidal thread, medium pitch series, fit 7H/7e

Dimensions in mm

Designation	Pitch P	External thread tol. 7e (threaded rods)						Internal thread tol. 7H (nuts)				
		major diameter		pitch diameter		minor diameter		major diameter	pitch diameter		minor diameter	
		d _{max}	d _{min}	d _{2max}	d _{2min}	d _{1max}	d _{1min}	D _{min}	D _{2min}	D _{2max}	D _{1min}	D _{1max}
Tr 10x2	2	10,000	9,820	8,929	8,739	7,500	7,191	10,500	9,000	9,250	8,000	8,236
Tr 12x3	3	12,000	11,764	10,415	10,191	8,500	8,135	12,500	10,500	10,800	9,000	9,315
Tr 14x3	3	14,000	13,764	12,415	12,191	10,500	10,135	14,500	12,500	12,800	11,000	11,315
Tr 16x4	4	16,000	15,700	13,905	13,640	11,500	11,074	16,500	14,000	14,355	12,000	12,375
Tr 18x4	4	18,000	17,700	15,905	15,640	13,500	13,074	18,500	16,000	16,355	14,000	14,375
Tr 20x4	4	20,000	19,700	17,905	17,640	15,500	15,074	20,500	18,000	18,355	16,000	16,375
Tr 22x5	5	22,000	21,665	19,394	19,114	16,500	16,044	22,500	19,500	19,875	17,000	17,450
Tr 24x5	5	24,000	23,665	21,394	21,094	18,500	18,019	24,500	21,500	21,900	19,000	19,450
Tr 26x5	5	26,000	25,665	23,394	23,094	20,500	20,019	26,500	23,500	23,900	21,000	21,450
Tr 28x5	5	28,000	27,665	25,394	25,094	22,500	22,019	28,500	25,500	25,900	23,000	23,450
Tr 30x6	6	30,000	29,625	26,882	26,547	23,000	22,463	31,000	27,000	27,450	24,000	24,500
Tr 32x6	6	32,000	31,625	28,882	28,547	25,000	24,463	33,000	29,000	29,450	26,000	26,500
Tr 36x6	6	36,000	35,625	32,882	32,547	29,000	28,463	37,000	33,000	33,450	30,000	30,500
Tr 40x7	7	40,000	39,575	36,375	36,020	32,000	31,431	41,000	36,500	36,975	33,000	33,560
Tr 44x7	7	44,000	43,575	40,375	40,020	36,000	35,431	45,000	40,500	40,975	37,000	37,560
Tr 50x8	8	50,000	49,550	45,868	45,468	41,000	40,368	51,000	46,000	46,530	42,000	42,630
Tr 60x9	9	60,000	59,500	55,360	54,935	50,000	49,329	61,000	55,500	56,060	51,000	51,670

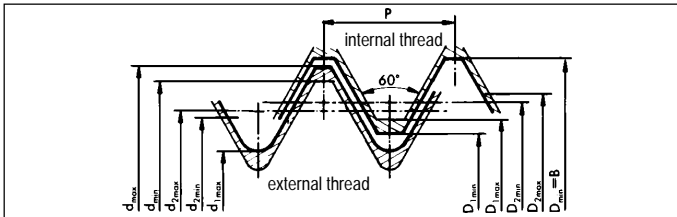
This trapezoidal screw thread is recommended for general use and does not apply to special requirements for axial displacement, e.g. lead screws. The diameter/pitch combination "medium" only refers to the choice out of the series coarse, medium or fine and not to the quality of the screw thread or the tolerance class.

This trapezoidal screw thread is designated with the profile letters Tr, followed by the basic diameter and the pitch separated by a X-mark e.g. Tr 20x4.



STANDARD	<h1>SCREW THREADS</h1> <h2>Unified number threads - UNC and UNF -</h2>
ISO : - EN : - DIN : - USAS : B 1.1	

Basic profile and limiting profiles



The bold lines indicate the maximum material profiles.
The maximum material profile of the internal thread is the basic profile.

- B = basic major diameter
 - P = pitch
 - n = number of threads per inch
 - B = major diameter
 - d = major diameter
 - d₂ = pitch diameter
 - d₁ = minor diameter
- } external thread
- D = major diameter
 - D₂ = pitch diameter
 - D₁ = minor diameter
- } internal thread

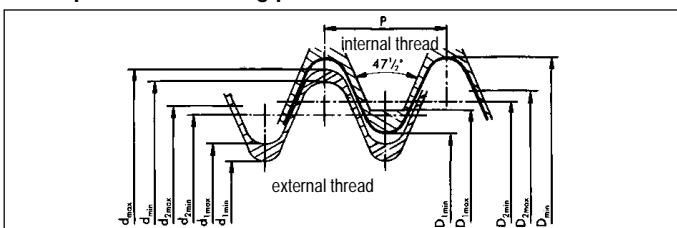
Limits of sizes for UNC en UNF-number thread, tolerance class 2A en 2B
Dimensions in mm

designation	B	n	P	External thread - tol. 2A (screws)					Internal thread - tol. 2B (nuts)			
				major diameter		pitch diameter		minor diameter	pitch diameter		minor diameter	
				d _{max}	d _{min}	d _{2max}	d _{2min}	d _{1max}	D _{2min}	D _{2max}	D _{1min}	D _{1max}
4-40 UNC	2,844	40	0,635	2,824	2,695	2,413	2,350	2,044	2,434	2,517	2,157	2,385
5-40 UNC	3,175	40	0,635	3,154	3,026	2,743	2,678	2,374	2,764	2,847	2,487	2,697
6-32 UNC	3,505	32	0,794	3,484	3,333	2,969	2,899	2,512	2,990	3,083	2,642	2,895
8-32 UNC	4,165	32	0,794	4,142	3,991	3,627	3,554	3,169	3,650	3,746	3,302	3,530
10-24 UNC	4,826	24	1,058	4,800	4,618	4,112	4,029	3,502	4,138	4,246	3,683	3,962
12-24 UNC	5,486	24	1,058	5,461	5,279	4,772	4,687	4,163	4,799	4,909	4,344	4,597
4-48 UNF	2,844	48	0,529	2,827	2,713	2,484	2,424	2,176	2,502	2,580	2,271	2,458
5-44 UNF	3,175	44	0,577	3,157	3,036	2,781	2,718	2,448	2,800	2,880	2,551	2,740
6-40 UNF	3,505	40	0,635	3,484	3,356	3,073	3,008	2,705	3,094	3,180	2,820	3,022
8-36 UNF	4,165	36	0,706	4,145	4,006	3,688	3,617	3,279	3,709	3,799	3,404	3,606
10-32 UNF	4,826	32	0,794	4,803	4,651	4,287	4,212	3,830	4,311	4,409	3,963	4,165
12-28 UNF	5,486	28	0,907	5,461	5,296	4,871	4,791	4,348	4,898	5,003	4,496	4,724

STANDARD	<h1>SCREW THREADS</h1> <h2>BA-screw thread</h2>
ISO : - EN : - DIN : - BS : 93 (1951)	



Basic profile and limiting profiles



- P = pitch
 - d = major diameter
 - d₂ = pitch diameter
 - d₁ = minor diameter
- } external thread
- D = major diameter
 - D₂ = pitch diameter
 - D₁ = minor diameter
- } internal thread

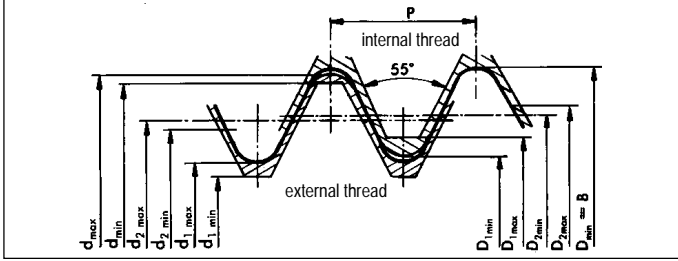
Limits of sizes for BA-screw thread, tolerance class normal
Dimensions in mm

designation	P	External thread (screws)						Internal thread (nuts)				
		major diameter		pitch diameter		minor diameter		major diameter	pitch diameter		minor diameter	
		d _{max}	d _{min}	d _{2max}	d _{2min}	d _{1max}	d _{1min}	D _{min}	D _{2min}	D _{2max}	D _{1min}	D _{1max}
0 BA	1,00	5,975	5,775	5,375	5,250	4,775	4,525	6,000	5,400	5,550	4,800	5,175
1 BA	0,90	5,275	5,095	4,375	4,620	4,195	3,965	5,300	4,760	4,900	4,220	4,560
2 BA	0,81	4,675	4,515	4,190	4,085	3,705	3,495	4,700	4,215	4,340	3,730	4,035
3 BA	0,73	4,075	3,930	3,635	3,535	3,195	3,000	4,100	3,660	3,780	3,220	3,495
4 BA	0,66	3,575	3,445	3,180	3,090	2,785	2,605	3,600	3,205	3,315	2,810	3,060
5 BA	0,59	3,175	3,055	2,820	2,735	2,465	2,295	3,200	2,845	2,945	2,490	2,710
6 BA	0,53	2,775	2,670	2,455	2,375	2,135	1,980	2,800	2,480	2,575	2,160	2,360
7 BA	0,48	2,475	2,380	2,185	2,110	1,895	1,750	2,500	2,210	2,300	1,920	2,100
8 BA	0,43	2,175	2,090	1,915	1,845	1,655	1,520	2,200	1,940	2,020	1,680	1,840

This screw thread is not recommended internationally and for new constructions is advised to use the metric (ISO) or the unified (ISO) screw thread.

STANDARD	<h1>SCREW THREADS</h1> Whitworth screw thread - BSW and BSF -	
ISO : - EN : - DIN : 11 (1930) w BS : 84 (1956)		

Basic profile and limiting profiles



The bold line indicates the maximum material profile.

- B = basic major diameter
- P = pitch
- n = number of threads per inch

- | | | | | | |
|---------------------------------|---|-----------------|---------------------------------|---|-----------------|
| d = major diameter | } | external thread | D = major diameter | } | internal thread |
| d ₂ = pitch diameter | | | D ₂ = pitch diameter | | |
| d ₁ = minor diameter | | | D ₁ = minor diameter | | |

Limits of sizes for whitworth screw thread coarse-BSW, medium class
Dimensions in mm

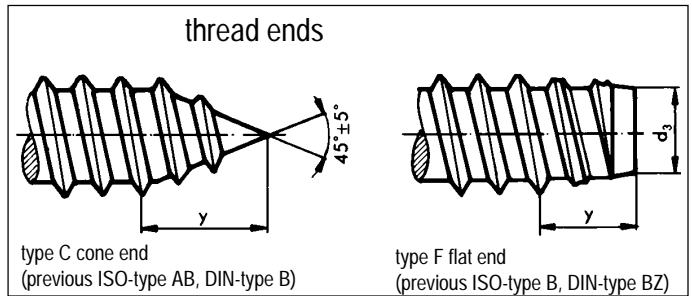
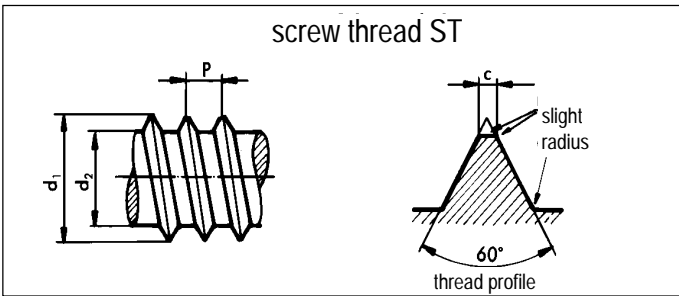
Basic diameter	number of threads	pitch	external thread (bolts and screws)						internal thread (nuts)					Section at minor dia. $\pi/4 d_1^2$ mm ²
			major diameter		pitch diameter		minor diameter		major diameter	pitch diameter		minor diameter		
B inch	n	P	d _{max}	d _{min}	d _{2max}	d _{2min}	d _{1max}	d _{1min}	D _{min} =B	D _{2min}	D _{2max}	D _{1min}	D _{1max}	A _{d12} mm ²
1/8	40	0,635	3,155	3,035	2,769	2,689	2,362	2,202	3,175	2,769	2,849	2,382	2,622	4,39
	32	0,794	3,949	3,814	3,461	3,371	2,953	2,773	3,969	3,461	3,551	2,973	3,243	6,85
	24	1,058	4,743	4,587	4,084	3,980	3,406	3,198	4,763	4,084	4,188	3,426	3,738	9,10
1/4	20	1,270	6,330	6,000	5,537	5,424	4,724	4,422	6,350	5,537	5,650	4,744	5,224	17,55
	18	1,411	7,918	7,600	7,034	6,915	6,131	5,813	7,938	7,034	7,153	6,151	6,661	29,48
	16	1,588	9,505	9,100	8,509	8,382	7,492	7,154	9,525	8,509	8,636	7,512	8,052	44,06
7/16	14	1,814	11,093	10,700	9,951	9,816	8,789	8,430	11,113	9,951	10,086	8,809	9,379	60,71
	12	2,117	12,675	12,200	11,345	11,199	9,990	9,600	12,700	11,345	11,491	10,015	10,610	78,32
	12	2,117	14,263	13,800	12,933	12,787	11,578	11,188	14,288	12,933	13,079	11,603	12,198	105
5/8	11	2,309	15,846	15,400	14,397	14,244	12,918	12,510	15,876	14,397	14,550	12,948	13,598	131
	11	2,309	17,433	17,000	15,985	15,832	14,507	14,099	17,463	15,985	16,138	14,537	15,187	165
	10	2,540	19,018	18,500	17,424	17,264	15,798	15,371	19,051	17,424	17,584	15,831	16,538	196
7/8	9	2,822	22,190	21,600	20,419	20,250	18,611	18,161	22,226	20,419	20,588	18,647	19,411	272
	8	3,175	25,361	24,800	23,368	23,189	21,335	20,858	25,401	23,368	23,547	21,375	22,185	358
	7	3,629	28,529	27,900	26,253	26,062	23,929	23,419	28,576	26,253	26,444	23,976	24,879	450
1 1/4	7	3,629	31,704	31,000	29,428	29,237	27,104	26,594	31,751	29,428	29,619	27,151	28,054	577
	6	4,233	38,048	37,300	35,391	35,184	32,680	32,128	38,101	35,391	35,598	32,733	33,730	839
	5	5,080	44,389	43,500	41,199	40,972	37,946	37,341	44,452	41,199	41,426	38,009	39,096	1131
2	4,5	5,645	50,732	49,800	47,187	46,948	43,573	42,936	50,802	47,187	47,426	43,643	44,823	1491
	4	6,350	57,072	56,200	53,086	52,833	49,020	48,345	57,152	53,086	53,339	49,100	50,420	1887
	4	6,350	63,422	62,500	59,436	59,183	55,370	54,695	63,502	59,436	59,689	55,450	56,770	2408
2 3/4	3,5	7,257	69,763	68,800	65,205	64,934	60,558	59,836	69,853	65,205	65,476	60,648	62,108	2880
	3	7,257	76,113	75,100	71,556	71,285	66,909	66,187	76,203	71,556	71,827	66,999	68,459	3515

Limits of sizes for whitworth screw thread fine-BSF, medium class for external thread and normal class for internal thread
Dimensions in mm

1/4	26	0,977	6,322	6,177	5,697	5,603	5,072	4,879	6,350	5,725	5,867	5,100	5,398	20,45
	26	0,977	7,112	6,962	6,487	6,388	5,862	5,664	7,142	6,518	6,665	5,893	6,190	27,29
	22	1,155	7,907	7,750	7,168	7,064	6,429	6,215	7,938	7,198	7,356	6,459	6,817	32,77
3/8	20	1,270	9,492	9,324	8,679	8,567	7,866	7,640	9,525	8,712	8,880	7,899	8,331	49,03
	18	1,411	11,077	10,897	10,173	10,053	9,268	9,030	11,113	10,208	10,386	9,304	9,764	68,00
	16	1,588	12,662	12,471	11,646	11,519	10,630	10,376	12,700	11,684	11,872	10,668	11,163	89,35
7/16	16	1,588	14,249	14,054	13,233	13,101	12,217	11,958	14,288	13,272	13,467	12,256	12,751	118
	14	1,814	15,834	15,629	14,674	14,536	13,513	13,241	15,875	14,714	14,920	13,553	14,094	144
	14	1,814	17,419	17,209	16,259	16,116	15,098	14,821	17,463	16,302	16,515	15,141	15,682	180
3/4	12	2,117	19,004	18,781	17,648	17,498	16,292	15,994	19,050	17,694	17,917	16,338	16,939	210
	11	2,309	22,225	21,991	20,747	20,589	19,268	18,959	22,225	20,747	20,983	19,268	19,909	292
	10	2,540	25,400	25,151	23,774	23,607	22,149	21,821	25,400	23,774	24,026	22,149	22,835	385

- After applying a corrosion resistant coating the maximum limits of sizes of the external thread may not exceed the minimum limits of sizes of the internal thread.
- Whitworth screw thread is designated by the basic diameter in inches followed by the number of threads per inch (n), the thread series BSW or BSF and if desired the class of tolerances. Where the latter is not indicated, the above mentioned classes are applicable e.g. 1/4 -20 BSW or 1/2 -16 BSF.

STANDARD ISO : 1478 EN : 21478 DIN : 7970	<h1 style="margin: 0;">SCREW THREADS</h1> <h2 style="margin: 0;">Tapping screw thread-ST</h2> <p style="margin: 0;">for tapping and self drilling screws</p>	
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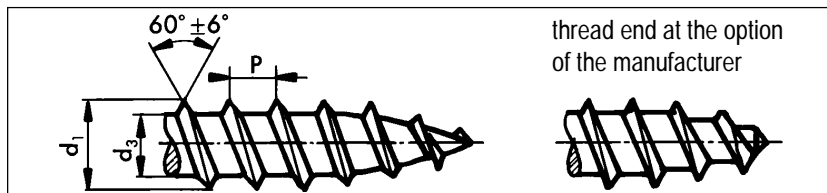
Limits of sizes for tapping screw thread

Dimensions in mm

Basic Diameter	ISO Nr.	Pitch P	Major diameter		Minor diameter		Flat end diameter		Crest flattening c_{max}	Point taper length y_{max}	
			d_{1max}	d_{1min}	d_{2max}	d_{2min}	d_{3max}	d_{3min}		Type C	Type F
ST 2,2	2	0,8	2,24	2,1	1,63	1,52	1,47	1,37	0,1	2	1,6
ST 2,6	3	0,9	2,57	2,43	1,9	1,8	1,73	1,6	0,1	2,3	1,8
ST 2,9	4	1,1	2,9	2,76	2,18	2,08	2,01	1,88	0,1	2,6	2,1
ST 3,3	5	1,3	3,3	3,12	2,39	2,29	2,21	2,08	0,1	3	2,5
ST 3,5	6	1,3	3,53	3,35	2,64	2,51	2,41	2,26	0,1	3,2	2,5
ST 3,9	7	1,3	3,91	3,73	2,92	2,77	2,67	2,51	0,1	3,5	2,7
ST 4,2	8	1,4	4,22	4,04	3,1	2,95	2,84	2,69	0,1	3,7	2,8
ST 4,8	10	1,6	4,8	4,62	3,58	3,43	3,3	3,12	0,15	4,3	3,2
ST 5,5	12	1,8	5,46	5,28	4,17	3,99	3,86	3,68	0,15	5	3,6
ST 6,3	14	1,8	6,25	6,03	4,88	4,7	4,55	4,34	0,15	6	3,6

- It has been agreed internationally that tapping screw thread is designated by the basic diameter, preceded by the profile letters ST and that the thread end with cone end is indicated with type C and the thread end with flat end with type F, e.g.: ST 3,5-C.
- For core holes see table elsewhere in this section.

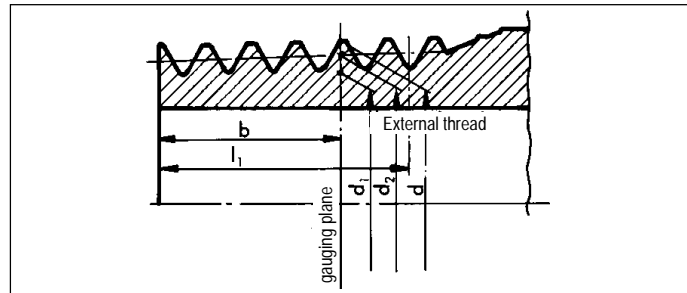
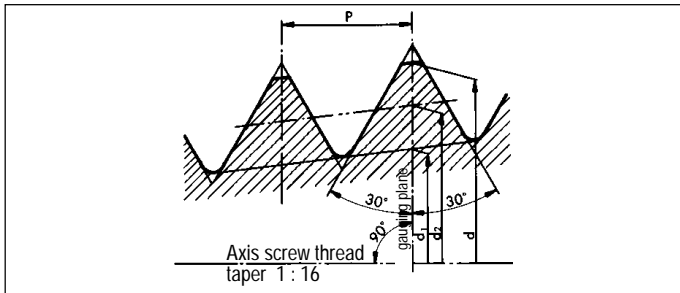
STANDARD ISO : - EN : - DIN : 7998	<h1 style="margin: 0;">SCREW THREADS</h1> <h2 style="margin: 0;">Wood screw thread</h2> <p style="margin: 0;">for wood screws</p>	
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Basic diameter d_1 tol. h15	Pitch		Minor diameter d_2 tol. h15
	P	tolerance	
1,6	0,7	$\pm 0,07$	1,1
2	0,9	$\pm 0,09$	1,4
2,5	1,1	$\pm 0,11$	1,7
3	1,35	$\pm 0,14$	2,1
3,5	1,6	$\pm 0,16$	2,4
4	1,8	$\pm 0,18$	2,8
4,5	2	$\pm 0,2$	3,1
5	2,2	$\pm 0,22$	3,5
(5,5)	2,4	$\pm 0,24$	3,8
6	2,6	$\pm 0,26$	4,2
(7)	3,2	$\pm 0,32$	4,9
8	3,6	$\pm 0,36$	5,6
10	4,5	$\pm 0,45$	7
12	5	$\pm 0,5$	9
16	6	$\pm 0,6$	12
20	7	$\pm 0,7$	15

Wood screw thread is designated by the basic diameter e.g. 4 mm: 4

STANDARD ISO : - EN : - DIN : 158	<h1 style="margin: 0;">SCREW THREADS</h1> <h2 style="margin: 0;">Metric-fine tapered external screw thread</h2> <h3 style="margin: 0;">for pipe plugs DIN 906</h3>	
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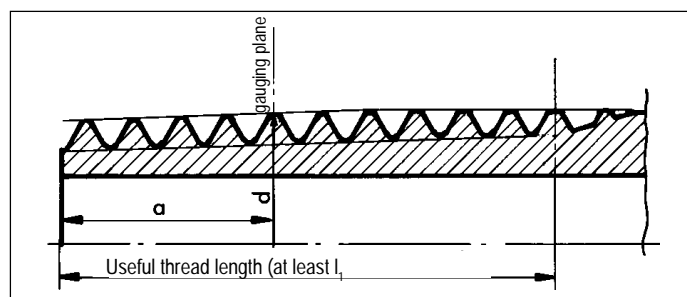
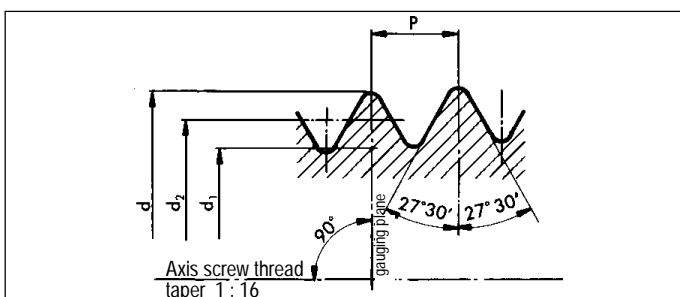


Limits of sizes for tapered external thread, short type
Dimensions in mm

Metric-fine tapered external screw thread is intended to be used for tight joints like pipe plugs, lubricating nipples, etc. Up to and including M26 no jointing medium is required for oils, other liquids and gases; above an appropriate pressure, tight medium is recommended. The tapered external thread is normally combined with parallel internal thread according to DIN 158. The metric-fine tapered external thread is designated by the basic diameter, preceded by the profile letter M and followed by the pitch, separated by an X-mark e.g.: M 20x1,5.

Designation	Pitch P	External thread						gauge length b	useful thread length l ₁
		major diameter		pitch diameter		minor diameter			
		d _{max}	d _{min}	d _{2max}	d _{2min}	d _{1max}	d _{1min}		
M 8x1	1	8,093	8,033	7,443	7,383	6,866	6,806	3	4
M 10x1	1	10,093	10,033	9,443	9,383	8,866	8,806	3	4
M 12x1,5	1,5	12,235	12,141	11,261	11,167	10,395	10,301	5,5	7,5
M 14x1,5	1,5	14,235	14,141	13,261	13,167	12,395	12,301	5,5	7,5
M 16x1,5	1,5	16,235	16,141	15,261	15,167	14,395	14,301	5,5	7,5
M 18x1,5	1,5	18,235	18,141	17,261	17,167	16,395	16,301	5,5	7,5
M 20x1,5	1,5	20,235	20,141	19,261	19,167	18,395	18,301	5,5	7,5
M 22x1,5	1,5	22,235	22,141	21,261	21,167	20,395	20,301	5,5	7,5
M 24x1,5	1,5	24,235	24,141	23,261	23,167	22,395	22,301	5,5	7,5
M 30x1,5	1,5	30,235	30,141	29,261	29,167	28,395	28,301	5,5	7,5
M 36x1,5	1,5	36,282	36,156	35,306	35,182	34,442	34,316	6,9	9
M 42x1,5	1,5	42,282	42,156	41,308	41,182	40,442	40,316	6,9	9

STANDARD ISO : - EN : - DIN : 3858	<h1 style="margin: 0;">SCREW THREADS</h1> <h2 style="margin: 0;">Whitworth tapered external pipe thread-R</h2> <h3 style="margin: 0;">for pipe plugs DIN 906</h3>	
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Nominal sizes for tapered external thread with tolerance 2 and short type a.
Dimensions in mm

Designation	Number of threads n	Pitch P	External thread				Useful thread length l ₁
			major diameter d	pitch diameter d ₂	minor diameter d ₁	Gauge length a	
R ¹ / ₈	28	0,907	9,728	9,147	8,566	3	5,5
R ¹ / ₄	19	1,337	13,157	12,301	11,445	4,5	8,2
R ³ / ₈	19	1,337	16,662	15,806	14,950	4,5	8,2
R ¹ / ₂	14	1,814	20,955	19,793	18,631	5	10,0
R ³ / ₄	14	1,814	26,441	25,279	24,117	6	11,0
R1	11	2,309	33,249	31,770	30,291	7	13,4
R ¹ / ₄	11	2,309	41,910	40,431	38,952	7,5	13,9
R ¹ / ₂	11	2,309	47,803	46,324	44,845	7,5	13,9

The Whitworth tapered external pipe thread is designated by the profile letter R followed by the nominal diameter in inches e.g.: R¹/₈.

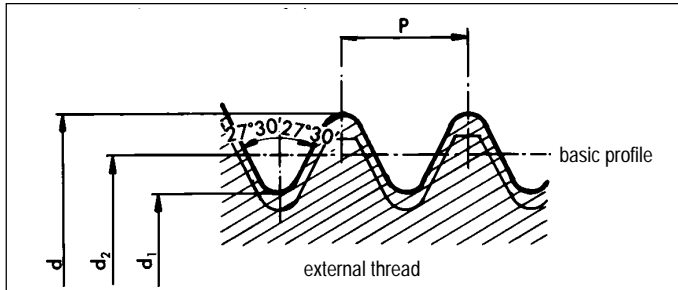
STANDARD

ISO : 228 Part 1
 EN : -
 DIN ISO : 228 part 1

SCREW THREADS

Pipe threads - G, parallel, non pressure-tight

Basic profile and limiting profiles



The bold line indicates the basic profile

P = pitch

n = number of threads per inch

d = major diameter

d₂ = pitch diameter

d₁ = minor diameter

} external thread

D = major diameter

D₂ = pitch diameter

D₁ = minor diameter

} internal thread

Limits of sizes for parallel external pipe threads - G

Dimensions in mm

Designation	External thread, class of tolerance A					number of threads n	pitch p	Designation	Internal thread				
	Major diameter		Pitch diameter		minor diameter				major diameter	pitch diameter		minor diameter	
	d max.	d min.	d ₂ max.	d ₂ min.	d ₁ nom.				D nom.	D ₂ max.	D ₂ min.	D ₁ max.	D ₁ min.
G 1/8 A	9,728	9,514	9,147	9,040	8,566	28	0,907	G 1/8	9,728	9,254	9,147	8,848	8,566
G 1/4 A	13,157	12,907	12,301	12,176	11,445	19	1,337	G 1/4	13,157	12,426	12,301	11,890	11,445
G 3/8 A	16,662	16,412	15,806	15,681	14,950	19	1,337	G 3/8	16,662	15,931	15,806	15,395	14,950
G 1/2 A	20,995	20,671	19,793	19,651	18,631	14	1,814	G 1/2	20,995	19,935	19,793	19,172	18,631
G 5/8 A	22,911	22,627	21,749	21,607	20,587	14	1,814	G 5/8	22,911	21,891	21,749	21,128	20,587
G 3/4 A	26,441	26,157	25,279	25,137	24,117	14	1,814	G 3/4	26,441	25,421	25,279	24,658	24,117
G 7/8 A	30,201	29,917	29,039	28,897	27,877	14	1,814	G 7/8	30,201	29,181	29,039	28,418	27,877
G 1 A	33,249	32,899	31,770	31,590	30,291	11	2,309	G 1	33,249	31,950	31,770	30,931	30,291
G 1 1/8 A	37,897	37,537	36,418	36,238	34,939	11	2,309	G 1 1/8	37,897	36,598	36,418	35,579	34,939
G 1 1/4 A	41,910	41,550	40,431	40,251	38,952	11	2,309	G 1 1/4	41,910	40,611	40,431	39,529	38,952
G 1 1/2 A	47,803	47,443	46,324	46,144	44,845	11	2,309	G 1 1/2	47,803	46,504	46,324	45,485	44,845

Parallel pipe threads - G are intended for the mechanical assembly of the component parts of fittings, cocks and valves, accessories, etc., where pressure-tight joints are not made on the threads.

These threads are designated by the letter G, followed by the nominal size in inches and for external thread followed by the letter A or B of the class of tolerance.

Example: for external thread G 1/2 A and for internal thread G 1/2.