ALLUNITCONVERSIONS · PRINTABLE REFERENCE

Machinist and Maker Reference Pack

Drill and tap sizes, fractions to decimals, inches and millimetres, sheet gauges, angles and engineering factors in one PDF

For: Machinists, fabricators, toolmakers, makerspaces and engineering students

allunitconversions.com/charts/packs
By Miguel Coelho · Edition 2.0
9 November 2026

Six sheets for the workshop wall or the toolbox lid: number, letter, fractional and metric drills with tap drills for UNC, UNF and ISO threads; every 1/64 inch as a decimal and in millimetres; millimetres to inches; sheet-metal gauges for steel, stainless and aluminium; angles in degrees, minutes and seconds; and the everyday engineering multiply-by factors. Each sheet is also available on its own.

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Conversion values in this pack are generated by the AllUnitConversions conversion library and automatically checked against exact definitions (NIST SP 811, BIPM SI Brochure, 1959 International Yard and Pound Agreement) before the PDF is produced. Reference data taken from standards and regulations is cited to its source on each sheet. Free to print, copy and share with attribution (CC BY 4.0).

Printing tip: print double-sided and staple at the top left, or print single sheets from each chart's own page.

Drill Size and Tap Drill Chart

Number, letter, fractional and metric drills in decimal inches and mm, with UNC, UNF and metric tap drills

For: Machinists, toolmakers, engineers, makers and students

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KEY RELATIONSHIP
1 in = 25.4 mm. Number drills run from #80 (0.0135 in) to #1 (0.228 in); letters A–Z continue to 0.413 in

FORMULA
Metric tap drill ≈ major diameter − pitch; % thread (UN) = TPI × (D − drill) ÷ 0.01299

REVERSE
Drill (UN) for a target thread % = D − (% × 0.01299 ÷ TPI)

WORKED EXAMPLE
M8 × 1.25: 8 − 1.25 = 6.75 mm, usually a 6.8 mm drill; 1/4-20 UNC: #7 (0.201 in) gives 75% thread

Decimal inches to 4 places, millimetres to 3 (2 for tap drills). Tap drills give about 75% thread; harder materials can use a slightly larger drill.

Inch drill sizes up to 1/2 inch (number, letter and fraction, in size order)

Drill	Inches	mm	Drill	Inches	mm	Drill	Inches	mm	Drill	Inches	mm
#80	0.0135	0.343	#49	0.0730	1.854	#20	0.1610	4.089	I	0.2720	6.909
#79	0.0145	0.368	#48	0.0760	1.930	#19	0.1660	4.216	J	0.2770	7.036
1/64	0.0156	0.397	5/64	0.0781	1.984	#18	0.1695	4.305	K	0.2810	7.137
#78	0.0160	0.406	#47	0.0785	1.994	11/64	0.1719	4.366	9/32	0.2813	7.144
#77	0.0180	0.457	#46	0.0810	2.057	#17	0.1730	4.394	L	0.2900	7.366
#76	0.0200	0.508	#45	0.0820	2.083	#16	0.1770	4.496	M	0.2950	7.493
#75	0.0210	0.533	#44	0.0860	2.184	#15	0.1800	4.572	19/64	0.2969	7.541
#74	0.0225	0.571	#43	0.0890	2.261	#14	0.1820	4.623	N	0.3020	7.671
#73	0.0240	0.610	#42	0.0935	2.375	#13	0.1850	4.699	5/16	0.3125	7.938
#72	0.0250	0.635	3/32	0.0938	2.381	3/16	0.1875	4.762	O	0.3160	8.026
#71	0.0260	0.660	#41	0.0960	2.438	#12	0.1890	4.801	P	0.3230	8.204
#70	0.0280	0.711	#40	0.0980	2.489	#11	0.1910	4.851	21/64	0.3281	8.334
#69	0.0292	0.742	#39	0.0995	2.527	#10	0.1935	4.915	Q	0.3320	8.433
#68	0.0310	0.787	#38	0.1015	2.578	#9	0.1960	4.978	R	0.3390	8.611
1/32	0.0313	0.794	#37	0.1040	2.642	#8	0.1990	5.055	11/32	0.3438	8.731
#67	0.0320	0.813	#36	0.1065	2.705	#7	0.2010	5.105	S	0.3480	8.839
#66	0.0330	0.838	7/64	0.1094	2.778	13/64	0.2031	5.159	T	0.3580	9.093
#65	0.0350	0.889	#35	0.1100	2.794	#6	0.2040	5.182	23/64	0.3594	9.128
#64	0.0360	0.914	#34	0.1110	2.819	#5	0.2055	5.220	U	0.3680	9.347
#63	0.0370	0.940	#33	0.1130	2.870	#4	0.2090	5.309	3/8	0.3750	9.525
#62	0.0380	0.965	#32	0.1160	2.946	#3	0.2130	5.410	V	0.3770	9.576
#61	0.0390	0.991	#31	0.1200	3.048	7/32	0.2188	5.556	W	0.3860	9.804
#60	0.0400	1.016	1/8	0.1250	3.175	#2	0.2210	5.613	25/64	0.3906	9.922
#59	0.0410	1.041	#30	0.1285	3.264	#1	0.2280	5.791	X	0.3970	10.084
#58	0.0420	1.067	#29	0.1360	3.454	A	0.2340	5.944	Y	0.4040	10.262
#57	0.0430	1.092	#28	0.1405	3.569	15/64	0.2344	5.953	13/32	0.4063	10.319
#56	0.0465	1.181	9/64	0.1406	3.572	B	0.2380	6.045	Z	0.4130	10.490
3/64	0.0469	1.191	#27	0.1440	3.658	C	0.2420	6.147	27/64	0.4219	10.716
#55	0.0520	1.321	#26	0.1470	3.734	D	0.2460	6.248	7/16	0.4375	11.112
#54	0.0550	1.397	#25	0.1495	3.797	1/4	0.2500	6.350	29/64	0.4531	11.509
#53	0.0595	1.511	#24	0.1520	3.861	E	0.2500	6.350	15/32	0.4688	11.906
1/16	0.0625	1.588	#23	0.1540	3.912	F	0.2570	6.528	31/64	0.4844	12.303
#52	0.0635	1.613	5/32	0.1563	3.969	G	0.2610	6.629	1/2	0.5000	12.700
#51	0.0670	1.702	#22	0.1570	3.988	17/64	0.2656	6.747			

Drill	Inches	mm	Drill	Inches	mm	Drill	Inches	mm
#50	0.0700	1.778	**#21**	0.1590	4.039	**H**	0.2660	6.756

Fractional drills over 1/2 inch

Drill	Inches	mm	Drill	Inches	mm	Drill	Inches	mm	Drill	Inches	mm
33/64	0.5156	13.097	**41/64**	0.6406	16.272	**49/64**	0.7656	19.447	**57/64**	0.8906	22.622
17/32	0.5313	13.494	**21/32**	0.6563	16.669	**25/32**	0.7813	19.844	**29/32**	0.9063	23.019
35/64	0.5469	13.891	**43/64**	0.6719	17.066	**51/64**	0.7969	20.241	**59/64**	0.9219	23.416
9/16	0.5625	14.288	**11/16**	0.6875	17.463	**13/16**	0.8125	20.638	**15/16**	0.9375	23.813
37/64	0.5781	14.684	**45/64**	0.7031	17.859	**53/64**	0.8281	21.034	**61/64**	0.9531	24.209
19/32	0.5938	15.081	**23/32**	0.7188	18.256	**27/32**	0.8438	21.431	**31/32**	0.9688	24.606
39/64	0.6094	15.478	**47/64**	0.7344	18.653	**55/64**	0.8594	21.828	**63/64**	0.9844	25.003
5/8	0.6250	15.875	**3/4**	0.7500	19.050	**7/8**	0.8750	22.225	**1**	1.0000	25.400

Metric drills with the nearest inch drill

Metric drill	Inches	Nearest inch drill	Metric drill	Inches	Nearest inch drill
1 mm	0.0394	#61 (0.0390 in)	**7 mm**	0.2756	J (0.2770 in)
1.5 mm	0.0591	#53 (0.0595 in)	**7.5 mm**	0.2953	M (0.2950 in)
2 mm	0.0787	#47 (0.0785 in)	**8 mm**	0.3150	O (0.3160 in)
2.5 mm	0.0984	#40 (0.0980 in)	**8.5 mm**	0.3346	Q (0.3320 in)
3 mm	0.1181	#31 (0.1200 in)	**9 mm**	0.3543	T (0.3580 in)
3.3 mm	0.1299	#30 (0.1285 in)	**9.5 mm**	0.3740	3/8 (0.3750 in)
3.5 mm	0.1378	#29 (0.1360 in)	**10 mm**	0.3937	25/64 (0.3906 in)
4 mm	0.1575	#22 (0.1570 in)	**10.2 mm**	0.4016	Y (0.4040 in)
4.2 mm	0.1654	#19 (0.1660 in)	**10.5 mm**	0.4134	Z (0.4130 in)
4.5 mm	0.1772	#16 (0.1770 in)	**11 mm**	0.4331	7/16 (0.4375 in)
5 mm	0.1969	#9 (0.1960 in)	**12 mm**	0.4724	15/32 (0.4688 in)
5.5 mm	0.2165	7/32 (0.2188 in)	**13 mm**	0.5118	33/64 (0.5156 in)
6 mm	0.2362	B (0.2380 in)	**14 mm**	0.5512	35/64 (0.5469 in)
6.5 mm	0.2559	F (0.2570 in)	**15 mm**	0.5906	19/32 (0.5938 in)
6.8 mm	0.2677	H (0.2660 in)	**16 mm**	0.6299	5/8 (0.6250 in)

UNC and UNF tap drill chart

Thread	Major dia. (in)	TPI	Tap drill	Drill (in)	Drill (mm)	Thread %
#0-80 UNF	0.0600	80	3/64	0.0469	1.19	81%
#1-64 UNC	0.0730	64	#53	0.0595	1.51	67%
#1-72 UNF	0.0730	72	#53	0.0595	1.51	75%
#2-56 UNC	0.0860	56	#50	0.0700	1.78	69%
#2-64 UNF	0.0860	64	#50	0.0700	1.78	79%
#3-48 UNC	0.0990	48	#47	0.0785	1.99	76%
#3-56 UNF	0.0990	56	#45	0.0820	2.08	73%
#4-40 UNC	0.1120	40	#43	0.0890	2.26	71%
#4-48 UNF	0.1120	48	#42	0.0935	2.37	68%
#5-40 UNC	0.1250	40	#38	0.1015	2.58	72%
#5-44 UNF	0.1250	44	#37	0.1040	2.64	71%
#6-32 UNC	0.1380	32	#36	0.1065	2.71	78%
#6-40 UNF	0.1380	40	#33	0.1130	2.87	77%
#8-32 UNC	0.1640	32	#29	0.1360	3.45	69%
#8-36 UNF	0.1640	36	#29	0.1360	3.45	78%

Thread	Major dia. (in)	TPI	Tap drill	Drill (in)	Drill (mm)	Thread %
#10-24 UNC	0.1900	24	#25	0.1495	3.80	75%
#10-32 UNF	0.1900	32	#21	0.1590	4.04	76%
#12-24 UNC	0.2160	24	#16	0.1770	4.50	72%
#12-28 UNF	0.2160	28	#14	0.1820	4.62	73%
1/4-20 UNC	0.2500	20	#7	0.2010	5.11	75%
1/4-28 UNF	0.2500	28	#3	0.2130	5.41	80%
5/16-18 UNC	0.3125	18	F	0.2570	6.53	77%
5/16-24 UNF	0.3125	24	I	0.2720	6.91	75%
3/8-16 UNC	0.3750	16	5/16	0.3125	7.94	77%
3/8-24 UNF	0.3750	24	Q	0.3320	8.43	79%
7/16-14 UNC	0.4375	14	U	0.3680	9.35	75%
7/16-20 UNF	0.4375	20	25/64	0.3906	9.92	72%
1/2-13 UNC	0.5000	13	27/64	0.4219	10.72	78%
1/2-20 UNF	0.5000	20	29/64	0.4531	11.51	72%
9/16-12 UNC	0.5625	12	31/64	0.4844	12.30	72%
9/16-18 UNF	0.5625	18	33/64	0.5156	13.10	65%
5/8-11 UNC	0.6250	11	17/32	0.5313	13.49	79%
5/8-18 UNF	0.6250	18	37/64	0.5781	14.68	65%
3/4-10 UNC	0.7500	10	21/32	0.6563	16.67	72%
3/4-16 UNF	0.7500	16	11/16	0.6875	17.46	77%
7/8-9 UNC	0.8750	9	49/64	0.7656	19.45	76%
7/8-14 UNF	0.8750	14	13/16	0.8125	20.64	67%
1-8 UNC	1.0000	8	7/8	0.8750	22.22	77%
1-12 UNF	1.0000	12	59/64	0.9219	23.42	72%

ISO metric tap drill chart (coarse and fine)

Thread	Pitch (mm)	Series	D − P (mm)	Usual drill (mm)	Drill (in)
M1 × 0.25	0.25	Coarse	0.75	0.75	0.0295
M1.2 × 0.25	0.25	Coarse	0.95	0.95	0.0374
M1.4 × 0.3	0.3	Coarse	1.1	1.1	0.0433
M1.6 × 0.35	0.35	Coarse	1.25	1.25	0.0492
M2 × 0.4	0.4	Coarse	1.6	1.6	0.0630
M2.5 × 0.45	0.45	Coarse	2.05	2.05	0.0807
M3 × 0.5	0.5	Coarse	2.5	2.5	0.0984
M3.5 × 0.6	0.6	Coarse	2.9	2.9	0.1142
M4 × 0.7	0.7	Coarse	3.3	3.3	0.1299
M5 × 0.8	0.8	Coarse	4.2	4.2	0.1654
M6 × 1	1	Coarse	5	5	0.1969
M8 × 1.25	1.25	Coarse	6.75	6.8	0.2677
M8 × 1	1	Fine	7	7	0.2756
M10 × 1.5	1.5	Coarse	8.5	8.5	0.3346
M10 × 1.25	1.25	Fine	8.75	8.8	0.3465
M10 × 1	1	Fine	9	9	0.3543
M12 × 1.75	1.75	Coarse	10.25	10.2	0.4016
M12 × 1.5	1.5	Fine	10.5	10.5	0.4134
M12 × 1.25	1.25	Fine	10.75	10.8	0.4252
M14 × 2	2	Coarse	12	12	0.4724
M14 × 1.5	1.5	Fine	12.5	12.5	0.4921
M16 × 2	2	Coarse	14	14	0.5512

Thread	Pitch (mm)	Series	D − P (mm)	Usual drill (mm)	Drill (in)
M16 × 1.5	1.5	Fine	14.5	14.5	0.5709
M18 × 2.5	2.5	Coarse	15.5	15.5	0.6102
M18 × 1.5	1.5	Fine	16.5	16.5	0.6496
M20 × 2.5	2.5	Coarse	17.5	17.5	0.6890
M20 × 1.5	1.5	Fine	18.5	18.5	0.7283
M22 × 2.5	2.5	Coarse	19.5	19.5	0.7677
M22 × 1.5	1.5	Fine	20.5	20.5	0.8071
M24 × 3	3	Coarse	21	21	0.8268
M24 × 2	2	Fine	22	22	0.8661

Thread pitch: threads per inch to millimetres

TPI	Pitch (mm)	Metric pitch (mm)	TPI equivalent	TPI	Pitch (mm)	Metric pitch (mm)	TPI equivalent
4	6.3500	0.25	101.60	**18**	1.4111	1.75	14.51
5	5.0800	0.35	72.57	**20**	1.2700	2	12.70
6	4.2333	0.4	63.50	**24**	1.0583	2.5	10.16
7	3.6286	0.45	56.44	**28**	0.9071	3	8.47
8	3.1750	0.5	50.80	**32**	0.7938	3.5	7.26
9	2.8222	0.6	42.33	**36**	0.7056	4	6.35
10	2.5400	0.7	36.29	**40**	0.6350	4.5	5.64
11	2.3091	0.75	33.87	**48**	0.5292	5	5.08
12	2.1167	0.8	31.75	**56**	0.4536	5.5	4.62
13	1.9538	1	25.40	**64**	0.3969	6	4.23
14	1.8143	1.25	20.32	**72**	0.3528	8	3.18
16	1.5875	1.5	16.93	**80**	0.3175	10	2.54

Sources and method

- **ASME B94.11M** — Twist drills: number, letter, fractional and metric sizes
- **ASME B1.1** — Unified inch screw threads (UN and UNR thread form): UNC and UNF series
- **ISO 261 and ISO 262** — ISO general-purpose metric screw threads: diameter and pitch combinations
- **ISO 2306 / DIN 336** — Drills for use prior to tapping screw threads
- **Machinery's Handbook** — Percentage of thread: n × (major diameter − drill) ÷ 0.01299
- **International Yard and Pound Agreement (1959)** — 1 in = 25.4 mm exactly

Number and letter drill diameters are transcribed from ASME B94.11M and cross-checked against a second published table; fractional sizes, millimetres and the percentage of thread are calculated. Interactive version, corrections and more charts: **allunitconversions.com/drill-size-chart**

Fraction to Decimal Chart

Inch fractions to decimals and millimetres in 1/64 steps, plus inches to decimal feet for construction and surveying

For: Machinists, woodworkers, builders, surveyors, students and teachers

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KEY RELATIONSHIP	FORMULA	REVERSE	WORKED EXAMPLE
1/64 in = 0.015625 in = 0.396875 mm exactly	Decimal = numerator ÷ denominator; mm = inches × 25.4	Fraction (to 1/64) = round(decimal × 64) ÷ 64	5/16 in = 5 ÷ 16 = 0.3125 in = 7.9375 mm

Every fraction of 1/64 has an exact decimal, shown in full; mm to 4 decimals. Decimal feet to 4 places.

Fractions of an inch to decimal inches and millimetres

Fraction	Decimal (in)	mm	Fraction	Decimal (in)	mm	Fraction	Decimal (in)	mm	Fraction	Decimal (in)	mm
1/64	0.015625	0.3969	17/64	0.265625	6.7469	33/64	0.515625	13.0969	49/64	0.765625	19.4469
1/32	0.031250	0.7938	9/32	0.281250	7.1438	17/32	0.531250	13.4937	25/32	0.781250	19.8438
3/64	0.046875	1.1906	19/64	0.296875	7.5406	35/64	0.546875	13.8906	51/64	0.796875	20.2406
1/16	0.062500	1.5875	5/16	0.312500	7.9375	9/16	0.562500	14.2875	13/16	0.812500	20.6375
5/64	0.078125	1.9844	21/64	0.328125	8.3344	37/64	0.578125	14.6844	53/64	0.828125	21.0344
3/32	0.093750	2.3812	11/32	0.343750	8.7313	19/32	0.593750	15.0812	27/32	0.843750	21.4313
7/64	0.109375	2.7781	23/64	0.359375	9.1281	39/64	0.609375	15.4781	55/64	0.859375	21.8281
1/8	0.125000	3.1750	3/8	0.375000	9.5250	5/8	0.625000	15.8750	7/8	0.875000	22.2250
9/64	0.140625	3.5719	25/64	0.390625	9.9219	41/64	0.640625	16.2719	57/64	0.890625	22.6219
5/32	0.156250	3.9688	13/32	0.406250	10.3188	21/32	0.656250	16.6688	29/32	0.906250	23.0187
11/64	0.171875	4.3656	27/64	0.421875	10.7156	43/64	0.671875	17.0656	59/64	0.921875	23.4156
3/16	0.187500	4.7625	7/16	0.437500	11.1125	11/16	0.687500	17.4625	15/16	0.937500	23.8125
13/64	0.203125	5.1594	29/64	0.453125	11.5094	45/64	0.703125	17.8594	61/64	0.953125	24.2094
7/32	0.218750	5.5562	15/32	0.468750	11.9063	23/32	0.718750	18.2562	31/32	0.968750	24.6063
15/64	0.234375	5.9531	31/64	0.484375	12.3031	47/64	0.734375	18.6531	63/64	0.984375	25.0031
1/4	0.250000	6.3500	1/2	0.500000	12.7000	3/4	0.750000	19.0500	1	1.000000	25.4000

Inches to decimal feet

Row: whole inches; column: extra fraction. 7 5/8 in = 0.6354 ft.

Inches	+0	+1/8	+1/4	+3/8	+1/2	+5/8	+3/4	+7/8
0	0.0000	0.0104	0.0208	0.0313	0.0417	0.0521	0.0625	0.0729
1	0.0833	0.0938	0.1042	0.1146	0.1250	0.1354	0.1458	0.1563
2	0.1667	0.1771	0.1875	0.1979	0.2083	0.2188	0.2292	0.2396
3	0.2500	0.2604	0.2708	0.2813	0.2917	0.3021	0.3125	0.3229
4	0.3333	0.3438	0.3542	0.3646	0.3750	0.3854	0.3958	0.4063
5	0.4167	0.4271	0.4375	0.4479	0.4583	0.4688	0.4792	0.4896
6	0.5000	0.5104	0.5208	0.5313	0.5417	0.5521	0.5625	0.5729
7	0.5833	0.5938	0.6042	0.6146	0.6250	0.6354	0.6458	0.6563
8	0.6667	0.6771	0.6875	0.6979	0.7083	0.7188	0.7292	0.7396
9	0.7500	0.7604	0.7708	0.7813	0.7917	0.8021	0.8125	0.8229
10	0.8333	0.8438	0.8542	0.8646	0.8750	0.8854	0.8958	0.9063
11	0.9167	0.9271	0.9375	0.9479	0.9583	0.9688	0.9792	0.9896

Decimal feet to inches (nearest 1/16)

Row: tenths of a foot; column: hundredths. 0.47 ft = 5 5/8 in.

Feet	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0″	1/8″	1/4″	3/8″	1/2″	5/8″	3/4″	13/16″	15/16″	1 1/16″
0.1	1 3/16″	1 5/16″	1 7/16″	1 9/16″	1 11/16″	1 13/16″	1 15/16″	2 1/16″	2 3/16″	2 1/4″
0.2	2 3/8″	2 1/2″	2 5/8″	2 3/4″	2 7/8″	3″	3 1/8″	3 1/4″	3 3/8″	3 1/2″
0.3	3 5/8″	3 3/4″	3 13/16″	3 15/16″	4 1/16″	4 3/16″	4 5/16″	4 7/16″	4 9/16″	4 11/16″
0.4	4 13/16″	4 15/16″	5 1/16″	5 3/16″	5 1/4″	5 3/8″	5 1/2″	5 5/8″	5 3/4″	5 7/8″
0.5	6″	6 1/8″	6 1/4″	6 3/8″	6 1/2″	6 5/8″	6 3/4″	6 13/16″	6 15/16″	7 1/16″
0.6	7 3/16″	7 5/16″	7 7/16″	7 9/16″	7 11/16″	7 13/16″	7 15/16″	8 1/16″	8 3/16″	8 1/4″
0.7	8 3/8″	8 1/2″	8 5/8″	8 3/4″	8 7/8″	9″	9 1/8″	9 1/4″	9 3/8″	9 1/2″
0.8	9 5/8″	9 3/4″	9 13/16″	9 15/16″	10 1/16″	10 3/16″	10 5/16″	10 7/16″	10 9/16″	10 11/16″
0.9	10 13/16″	10 15/16″	11 1/16″	11 3/16″	11 1/4″	11 3/8″	11 1/2″	11 5/8″	11 3/4″	11 7/8″

Common fractions with other denominators

Fraction	Decimal	Percent
1/2	0.5	50%
1/3	0.333333	33.3333%
2/3	0.666667	66.6667%
1/4	0.25	25%
3/4	0.75	75%
1/5	0.2	20%
2/5	0.4	40%
3/5	0.6	60%
4/5	0.8	80%
1/6	0.166667	16.6667%
5/6	0.833333	83.3333%

Fraction	Decimal	Percent
1/7	0.142857	14.2857%
1/8	0.125	12.5%
1/9	0.111111	11.1111%
1/10	0.1	10%
1/12	0.083333	8.3333%
1/16	0.0625	6.25%
1/20	0.05	5%
1/25	0.04	4%
1/32	0.03125	3.125%
1/50	0.02	2%
1/100	0.01	1%

Sources and method

- **International Yard and Pound Agreement (1959)** — 1 in = 25.4 mm exactly

Every value is calculated exactly from the fraction; no values are typed in. Interactive version, corrections and more charts: **allunitconversions.com/fraction-to-decimal-chart**

Millimetres to Inches Conversion Chart

Decimal inches with the nearest 1/64 inch

For: Machinists, makers, engineers and anyone reading metric drawings

allunitconversions.com/mm-to-in-conversion-chart
By Miguel Coelho · Edition 2.0
9 November 2026

EXACT DEFINITION	FORMULA	REVERSE	WORKED EXAMPLE
1 inch = 25.4 mm exactly, so 1 mm = 0.039 370 08 in	in = mm ÷ 25.4	mm = in × 25.4	10 mm ÷ 25.4 = 0.3937 in ≈ 25/64 in

Decimal inches are rounded to 4 places; fractions show the nearest 1/64 in.

1 to 100 mm

Millimetres (mm)	Inches (in)	Nearest 1/64 in
1	0.0394	≈ 3/64
2	0.0787	≈ 5/64
3	0.1181	≈ 1/8
4	0.1575	≈ 5/32
5	0.1969	≈ 13/64
6	0.2362	≈ 15/64
7	0.2756	≈ 9/32
8	0.3150	≈ 5/16
9	0.3543	≈ 23/64
10	0.3937	≈ 25/64
11	0.4331	≈ 7/16
12	0.4724	≈ 15/32
13	0.5118	≈ 33/64
14	0.5512	≈ 35/64
15	0.5906	≈ 19/32
16	0.6299	≈ 5/8
17	0.6693	≈ 43/64
18	0.7087	≈ 45/64
19	0.7480	≈ 3/4
20	0.7874	≈ 25/32
21	0.8268	≈ 53/64
22	0.8661	≈ 55/64
23	0.9055	≈ 29/32
24	0.9449	≈ 15/16
25	0.9843	≈ 63/64
26	1.0236	≈ 1 1/32
27	1.0630	≈ 1 1/16
28	1.1024	≈ 1 7/64
29	1.1417	≈ 1 9/64
30	1.1811	≈ 1 3/16
31	1.2205	≈ 1 7/32
32	1.2598	≈ 1 17/64
33	1.2992	≈ 1 19/64
51	2.0079	≈ 2 1/64
52	2.0472	≈ 2 3/64
53	2.0866	≈ 2 3/32
54	2.1260	≈ 2 1/8
55	2.1654	≈ 2 11/64
56	2.2047	≈ 2 13/64
57	2.2441	≈ 2 1/4
58	2.2835	≈ 2 9/32
59	2.3228	≈ 2 21/64
60	2.3622	≈ 2 23/64
61	2.4016	≈ 2 13/32
62	2.4409	≈ 2 7/16
63	2.4803	≈ 2 31/64
64	2.5197	≈ 2 33/64
65	2.5591	≈ 2 9/16
66	2.5984	≈ 2 19/32
67	2.6378	≈ 2 41/64
68	2.6772	≈ 2 43/64
69	2.7165	≈ 2 23/32
70	2.7559	≈ 2 3/4
71	2.7953	≈ 2 51/64
72	2.8346	≈ 2 53/64
73	2.8740	≈ 2 7/8
74	2.9134	≈ 2 29/32
75	2.9528	≈ 2 61/64
76	2.9921	≈ 2 63/64
77	3.0315	≈ 3 1/32
78	3.0709	≈ 3 5/64
79	3.1102	≈ 3 7/64
80	3.1496	≈ 3 5/32
81	3.1890	≈ 3 3/16
82	3.2283	≈ 3 15/64
83	3.2677	≈ 3 17/64

Millimetres (mm)	Inches (in)	Nearest 1/64 in
34	1.3386	≈ 1 11/32
35	1.3780	≈ 1 3/8
36	1.4173	≈ 1 27/64
37	1.4567	≈ 1 29/64
38	1.4961	≈ 1 1/2
39	1.5354	≈ 1 17/32
40	1.5748	≈ 1 37/64
41	1.6142	≈ 1 39/64
42	1.6535	≈ 1 21/32
43	1.6929	≈ 1 11/16
44	1.7323	≈ 1 47/64
45	1.7717	≈ 1 49/64
46	1.8110	≈ 1 13/16
47	1.8504	≈ 1 27/32
48	1.8898	≈ 1 57/64
49	1.9291	≈ 1 59/64
50	1.9685	≈ 1 31/32

Millimetres (mm)	Inches (in)	Nearest 1/64 in
84	3.3071	≈ 3 5/16
85	3.3465	≈ 3 11/32
86	3.3858	≈ 3 25/64
87	3.4252	≈ 3 27/64
88	3.4646	≈ 3 15/32
89	3.5039	≈ 3 1/2
90	3.5433	≈ 3 35/64
91	3.5827	≈ 3 37/64
92	3.6220	≈ 3 5/8
93	3.6614	≈ 3 21/32
94	3.7008	≈ 3 45/64
95	3.7402	≈ 3 47/64
96	3.7795	≈ 3 25/32
97	3.8189	≈ 3 13/16
98	3.8583	≈ 3 55/64
99	3.8976	≈ 3 57/64
100	3.9370	≈ 3 15/16

110 to 1000 mm

Millimetres (mm)	Inches (in)
110	4.331
120	4.724
130	5.118
140	5.512
150	5.906
160	6.299
170	6.693
180	7.087
190	7.480
200	7.874
210	8.268
220	8.661
230	9.055
240	9.449
250	9.843

Millimetres (mm)	Inches (in)
260	10.236
270	10.630
280	11.024
290	11.417
300	11.811
310	12.205
320	12.598
330	12.992
340	13.386
350	13.780
360	14.173
370	14.567
380	14.961
390	15.354
400	15.748

Millimetres (mm)	Inches (in)
410	16.142
420	16.535
430	16.929
440	17.323
450	17.717
460	18.110
470	18.504
480	18.898
490	19.291
500	19.685
600	23.622
700	27.559
800	31.496
900	35.433
1,000	39.370

Sources and method

- **International Yard and Pound Agreement (1959)** — 1 in = 25.4 mm, 1 ft = 0.3048 m, 1 lb = 0.453 592 37 kg exactly
- **NIST Special Publication 811** — Guide for the Use of the International System of Units (www.nist.gov/pml/special-publication-811)

Conversion values on this sheet are generated by the AllUnitConversions conversion library and automatically checked against the exact definitions above before the PDF is produced; reference tables are taken from the sources listed. Interactive version, corrections and more charts: **allunitconversions.com/mm-to-in-conversion-chart**

Sheet Metal Gauge Chart

Gauge 3 to 30 in inches and mm for steel, galvanized steel, stainless steel and aluminium

For: Fabricators, HVAC and duct installers, welders, engineers and buyers

allunitconversions.com/sheet-metal-gauge-chart
By Miguel Coelho · Edition 2.0
9 November 2026

KEY RELATIONSHIP
Steel gauge is defined by weight: thickness (in) = weight (lb/ft²) ÷ 41.82

FORMULA
Galvanized = (steel weight + 2.5 oz/ft²) ÷ 41.82; aluminium = AWG diameter

REVERSE
Weight (lb/ft²) = thickness (in) × 41.82 for steel

WORKED EXAMPLE
16 gauge: steel 0.0598 in, galvanized 0.0635 in, stainless 0.0625 in, aluminium 0.0508 in

Nominal thicknesses to 4 decimal places of an inch. The same gauge number means a different thickness in each system, so always state the thickness.

Sheet metal gauge thickness

Many stainless suppliers quote the steel (MSG) decimals instead of the 1893 gauge; check the thickness on the mill certificate.

Gauge	Steel (in)	Steel (mm)	Galvanized (in)	Galvanized (mm)	Stainless (in)	Stainless (mm)	Aluminium (in)	Aluminium (mm)
3	0.2391	6.074	—	—	0.2500	6.350	—	—
4	0.2242	5.694	—	—	0.2344	5.953	—	—
5	0.2092	5.314	—	—	0.2188	5.556	—	—
6	0.1943	4.935	—	—	0.2031	5.159	0.1620	4.115
7	0.1793	4.555	—	—	0.1875	4.762	0.1443	3.665
8	0.1644	4.176	0.1681	4.271	0.1719	4.366	0.1285	3.264
9	0.1495	3.796	0.1532	3.891	0.1563	3.969	0.1144	2.906
10	0.1345	3.416	0.1382	3.511	0.1406	3.572	0.1019	2.588
11	0.1196	3.037	0.1233	3.132	0.1250	3.175	0.0907	2.305
12	0.1046	2.657	0.1084	2.752	0.1094	2.778	0.0808	2.053
13	0.0897	2.278	0.0934	2.373	0.0938	2.381	0.0720	1.828
14	0.0747	1.898	0.0785	1.993	0.0781	1.984	0.0641	1.628
15	0.0673	1.708	0.0710	1.803	0.0703	1.786	0.0571	1.450
16	0.0598	1.518	0.0635	1.613	0.0625	1.588	0.0508	1.291
17	0.0538	1.367	0.0575	1.461	0.0563	1.429	0.0453	1.150
18	0.0478	1.215	0.0516	1.310	0.0500	1.270	0.0403	1.024
19	0.0418	1.063	0.0456	1.158	0.0438	1.111	0.0359	0.912
20	0.0359	0.911	0.0396	1.006	0.0375	0.952	0.0320	0.812
21	0.0329	0.835	0.0366	0.930	0.0344	0.873	0.0285	0.723
22	0.0299	0.759	0.0336	0.854	0.0313	0.794	0.0253	0.644
23	0.0269	0.683	0.0306	0.778	0.0281	0.714	0.0226	0.573
24	0.0239	0.607	0.0276	0.702	0.0250	0.635	0.0201	0.511
25	0.0209	0.531	0.0247	0.626	0.0219	0.556	0.0179	0.455
26	0.0179	0.456	0.0217	0.550	0.0188	0.476	0.0159	0.405
27	0.0164	0.418	0.0202	0.512	0.0172	0.437	0.0142	0.361
28	0.0149	0.380	0.0187	0.475	0.0156	0.397	0.0126	0.321
29	0.0135	0.342	0.0172	0.437	0.0141	0.357	0.0113	0.286
30	0.0120	0.304	0.0157	0.399	0.0125	0.318	0.0100	0.255

Steel sheet weight by gauge

Gauge	lb/ft²	kg/m²	Galvanized lb/ft²	Galvanized kg/m²
3	10.0000	48.82	—	—
4	9.3750	45.77	—	—

Gauge	lb/ft²	kg/m²	Galvanized lb/ft²	Galvanized kg/m²
17	2.2500	10.99	2.4063	11.75
18	2.0000	9.76	2.1563	10.53

Gauge	lb/ft²	kg/m²	Galvanized lb/ft²	Galvanized kg/m²
5	8.7500	42.72	—	—
6	8.1250	39.67	—	—
7	7.5000	36.62	—	—
8	6.8750	33.57	7.0313	34.33
9	6.2500	30.52	6.4063	31.28
10	5.6250	27.46	5.7813	28.23
11	5.0000	24.41	5.1563	25.18
12	4.3750	21.36	4.5313	22.12
13	3.7500	18.31	3.9063	19.07
14	3.1250	15.26	3.2813	16.02
15	2.8125	13.73	2.9688	14.49
16	2.5000	12.21	2.6563	12.97

Gauge	lb/ft²	kg/m²	Galvanized lb/ft²	Galvanized kg/m²
19	1.7500	8.54	1.9063	9.31
20	1.5000	7.32	1.6563	8.09
21	1.3750	6.71	1.5313	7.48
22	1.2500	6.10	1.4063	6.87
23	1.1250	5.49	1.2813	6.26
24	1.0000	4.88	1.1563	5.65
25	0.8750	4.27	1.0313	5.04
26	0.7500	3.66	0.9063	4.42
27	0.6875	3.36	0.8438	4.12
28	0.6250	3.05	0.7813	3.81
29	0.5625	2.75	0.7188	3.51
30	0.5000	2.44	0.6563	3.20

Sources and method

- **Manufacturers' Standard Gauge for steel sheet** — Gauge defined by weight: 41.82 lb/ft² per inch of thickness; galvanized adds 2.5 oz/ft² of zinc
- **US Standard Gauge (Act of 3 March 1893)** — Gauge thickness as a fraction of an inch; still used for stainless steel sheet
- **Brown & Sharpe gauge (ASTM B258)** — Same as AWG; used for aluminium, copper and brass sheet

Thicknesses are calculated from each gauge system's definition (weight per square foot, the 1893 fractions, or the AWG formula) and cross-checked against a second published gauge table. Interactive version, corrections and more charts: **allunitconversions.com/sheet-metal-gauge-chart**

Angle Conversion Chart

Degrees, radians, gradians, arcminutes and arcseconds, plus slope and roof pitch

For: Students, surveyors, roofers, engineers and programmers

allunitconversions.com/angle-conversion-chart
By Miguel Coelho · Edition 2.0
9 November 2026

EXACT DEFINITION	FORMULA	REVERSE	WORKED EXAMPLE
360° = 2π rad = 400 gon; 1° = 60′ = 3600″	rad = ° × π ÷ 180; slope % = tan(°) × 100	° = rad × 180 ÷ π; ° = arctan(slope % ÷ 100)	A 6/12 roof pitch = 26.57° = 50 % slope

Matrix values use 6 significant figures; slope angles to 2 decimal places.

Factor matrix — 1 unit in every other unit

1 unit =	°	rad	gon	′	″
1 °	1	0.0174533	1.11111	60	3,600
1 rad	57.2958	1	63.662	3,437.75	206,265
1 gon	0.9	0.015708	1	54	3,240
1 ′	0.0166667	2.90888×10^{-4}	0.0185185	1	60
1 ″	2.77778×10^{-4}	4.84814×10^{-6}	3.08642×10^{-4}	0.0166667	1

Common angles

Degrees (°)	Radians (exact)	Radians (rad)	Gradians (gon)
0	0	0.00000	0
15	π/12	0.26180	16.667
30	π/6	0.52360	33.333
45	π/4	0.78540	50
60	π/3	1.04720	66.667
90	π/2	1.57080	100
120	2π/3	2.09440	133.333
135	3π/4	2.35619	150
150	5π/6	2.61799	166.667

Degrees (°)	Radians (exact)	Radians (rad)	Gradians (gon)
180	π	3.14159	200
210	7π/6	3.66519	233.333
225	5π/4	3.92699	250
240	4π/3	4.18879	266.667
270	3π/2	4.71239	300
300	5π/3	5.23599	333.333
315	7π/4	5.49779	350
330	11π/6	5.75959	366.667
360	2π	6.28319	400

Slope percentage to angle (ramps, roads, drainage)

Slope % = rise ÷ run × 100. 8.33 % is a 1:12 wheelchair ramp.

Slope (%)	Angle (°)	Ratio (1 in …)
1	0.57	100.0
2	1.15	50.0
2.5	1.43	40.0
4	2.29	25.0
5	2.86	20.0
6	3.43	16.7
8	4.57	12.5
8.33	4.76	12.0
10	5.71	10.0
12	6.84	8.3

Slope (%)	Angle (°)	Ratio (1 in …)
15	8.53	6.7
20	11.31	5.0
25	14.04	4.0
30	16.70	3.3
33.3	18.42	3.0
40	21.80	2.5
50	26.57	2.0
60	30.96	1.7
75	36.87	1.3
100	45.00	1.0

Roof pitch (rise per 12 run) to angle

Pitch is the rise for every 12 units of run (6 = 6/12 pitch).

Pitch	Angle (°)	Slope (%)	Pitch	Angle (°)	Slope (%)	Pitch	Angle (°)	Slope (%)
1	4.76	8.3	**9**	36.87	75.0	**17**	54.78	141.7
2	9.46	16.7	**10**	39.81	83.3	**18**	56.31	150.0
3	14.04	25.0	**11**	42.51	91.7	**19**	57.72	158.3
4	18.43	33.3	**12**	45.00	100.0	**20**	59.04	166.7
5	22.62	41.7	**13**	47.29	108.3	**21**	60.26	175.0
6	26.57	50.0	**14**	49.40	116.7	**22**	61.39	183.3
7	30.26	58.3	**15**	51.34	125.0	**23**	62.45	191.7
8	33.69	66.7	**16**	53.13	133.3	**24**	63.43	200.0

Sources and method

- **BIPM SI Brochure, 9th edition** — Definitions of the SI units, including the kelvin (www.bipm.org/en/publications/si-brochure)
- **NIST Special Publication 811** — Guide for the Use of the International System of Units (www.nist.gov/pml/special-publication-811)

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Engineering Conversion Chart

Multiply-by factors for the units engineers convert every day, with SI prefixes

For: Mechanical, civil, HVAC and process engineers; technicians and students

allunitconversions.com/engineering-conversion-chart
By Miguel Coelho · Edition 2.0
9 November 2026

EXACT DEFINITION	FORMULA	REVERSE	WORKED EXAMPLE
All factors derive from 1 in = 25.4 mm, 1 lb = 0.453 592 37 kg and g_0 = 9.806 65 m/s²	value in "To" units = value × factor	value in "From" units = value ÷ factor	250 psi × 6.894 757 = 1,723.7 kPa

Factors are given to 7 significant figures.

Conversion factors

From	To	Multiply by	Typical use
Inches (in)	Millimetres (mm)	25.4	Drawings, fasteners
Feet (ft)	Metres (m)	0.3048	Site dimensions
Miles (mi)	Kilometres (km)	1.609344	Distances
Nautical miles (nmi)	Kilometres (km)	1.852	Marine, aviation
Square inches (in²)	Square centimetres (cm²)	6.4516	Cross-sections
Square feet (ft²)	Square metres (m²)	0.09290304	Floor areas
Acres (ac)	Hectares (ha)	0.4046856	Land
Cubic inches (in³)	Cubic centimetres (cm³)	16.38706	Engine displacement
Cubic feet (ft³)	Litres (L)	28.31685	Tanks, rooms
US gallons (US gal)	Litres (L)	3.785412	US liquids
UK gallons (UK gal)	Litres (L)	4.54609	UK liquids
Pounds (lb)	Kilograms (kg)	0.4535924	Mass
Pound-force (lbf)	Newtons (N)	4.448222	Loads
Kips (kip)	Kilonewtons (kN)	4.448222	Structural loads
Kilogram-force (kgf)	Newtons (N)	9.80665	Legacy metric loads
psi (psi)	Kilopascals (kPa)	6.894757	Hydraulics, tyres
psi (psi)	Bar (bar)	0.06894757	Gauges
Bar (bar)	Kilopascals (kPa)	100	Gauges
Atmospheres (atm)	Kilopascals (kPa)	101.325	Standard atmosphere
Pound-force feet (lbf·ft)	Newton-metres (N·m)	1.355818	Bolt torque
Foot-pounds (ft·lbf)	Joules (J)	1.355818	Work, impact
British thermal units (BTU)	Kilojoules (kJ)	1.055056	Heat
Kilowatt-hours (kWh)	Megajoules (MJ)	3.6	Electricity
Therms (thm)	Kilowatt-hours (kWh)	29.30711	Gas billing
Horsepower (mech.) (hp)	Kilowatts (kW)	0.7456999	Motors, engines
BTU per hour (BTU/h)	Watts (W)	0.2930711	HVAC capacity
Tons of refrigeration (RT)	Kilowatts (kW)	3.516853	Chillers
Miles per hour (mph)	Kilometres per hour (km/h)	1.609344	Vehicles
Knots (kn)	Kilometres per hour (km/h)	1.852	Marine, aviation
Feet per second (ft/s)	Metres per second (m/s)	0.3048	Fluid velocity
US gallons per minute (US gpm)	Litres per minute (L/min)	3.785412	Pumps
Cubic feet per minute (CFM)	Cubic metres per hour (m³/h)	1.699011	Air flow

Temperature

Conversion	Formula
°C to °F	°F = °C × 1.8 + 32
°F to °C	°C = (°F − 32) ÷ 1.8
°C to K	K = °C + 273.15
°F to °R	°R = °F + 459.67
Temperature difference	1 K = 1 °C = 1.8 °F = 1.8 °R

SI prefixes

Prefix	Symbol	Factor	Prefix	Symbol	Factor
quetta	Q	10^{30}	deci	d	10^{-1}
ronna	R	10^{27}	centi	c	10^{-2}
yotta	Y	10^{24}	milli	m	10^{-3}
zetta	Z	10^{21}	micro	µ	10^{-6}
exa	E	10^{18}	nano	n	10^{-9}
peta	P	10^{15}	pico	p	10^{-12}
tera	T	10^{12}	femto	f	10^{-15}
giga	G	10^{9}	atto	a	10^{-18}
mega	M	10^{6}	zepto	z	10^{-21}
kilo	k	10^{3}	yocto	y	10^{-24}
hecto	h	10^{2}	ronto	r	10^{-27}
deca	da	10^{1}	quecto	q	10^{-30}

Sources and method

- **International Yard and Pound Agreement (1959)** — 1 in = 25.4 mm, 1 ft = 0.3048 m, 1 lb = 0.453 592 37 kg exactly
- **NIST Special Publication 811** — Guide for the Use of the International System of Units (www.nist.gov/pml/special-publication-811)
- **BIPM SI Brochure, 9th edition** — Definitions of the SI units, including the kelvin (www.bipm.org/en/publications/si-brochure)

Conversion values on this sheet are generated by the AllUnitConversions conversion library and automatically checked against the exact definitions above before the PDF is produced; reference tables are taken from the sources listed. Interactive version, corrections and more charts: **allunitconversions.com/engineering-conversion-chart**