The American Society of Mechanical Engineers

AN AMERICAN NATIONAL STANDARD

CLEARANCE HOLES FOR BOLTS, SCREWS, AND STUDS

ASME B18.2.8-1999

TABLE 1 INCH CLEARANCE HOLE ALLOWANCES

Nominal Screw Size	Fit Classes		
	Normal	Close	Loose
#0–#4	1/64	0.008	1/32
#5–7/16	1/32	1/64	3/64
1/2 , 5/8	1/16	1/32	7/64
3/4 , 7/8	1/16	1/32	5/32
1	3/32	1/32	5/32
1 1/8 , 1 1/4	3/32	1/32	3/16
1 3/8 , 1 1/2	1/8	1/16	15/64

TABLE 2 CLEARANCE HOLES FOR INCH FASTENERS

Nominal Screw Size	Fit Classes								
	Normal			Close			Loose		
	Nominal Drill Size	Hole Diameter		Nominal Drill Size	Hole Diameter		Nominal Drill Size	Hole Diameter	
		Min.	Max.		Min.	Max.		Min.	Max.
#0	#48	0.076	0.082	#51	0.067	0.071	3/32	0.094	0.104
#1	#43	0.089	0.095	#46	0.081	0.085	#37	0.104	0.114
#2	#38	0.102	0.108	3/32	0.094	0.098	#32	0.116	0.126
#3	#32	0.116	0.122	#36	0.106	0.110	#30	0.128	0.140
#4	#30	0.128	0.135	#31	0.120	0.124	#27	0.144	0.156
#5	5/32	0.156	0.163	9/64	0.141	0.146	11/64	0.172	0.184
#6	#18	0.170	0.177	#23	0.154	0.159	#13	0.185	0.197
#8	#9	0.196	0.203	#15	0.180	0.185	#3	0.213	0.225
#10	#2	0.221	0.228	#5	0.206	0.211	B	0.238	0.250
1/4	9/32	0.281	0.290	17/64	0.266	0.272	19/64	0.297	0.311
5/16	11/32	0.344	0.354	21/64	0.328	0.334	23/64	0.359	0.373
3/8	13/32	0.406	0.416	25/64	0.391	0.397	27/64	0.422	0.438
7/16	15/32	0.469	0.479	29/64	0.453	0.460	31/64	0.484	0.500
1/2	9/16	0.562	0.572	17/32	0.531	0.538	39/64	0.609	0.625
5/8	11/16	0.688	0.698	21/32	0.656	0.663	47/64	0.734	0.754
3/4	13/16	0.812	0.824	25/32	0.781	0.789	29/32	0.906	0.926
7/8	15/16	0.938	0.950	29/32	0.906	0.914	1 1/32	1.031	1.051
1	1 3/32	1.094	1.106	1 1/32	1.031	1.039	1 5/32	1.156	1.181
1 1/8	1 7/32	1.219	1.235	1 5/32	1.156	1.164	1 5/16	1.312	1.337
1 1/4	1 11/32	1.344	1.360	1 9/32	1.281	1.291	1 7/16	1.438	1.463
1 3/8	1 1/2	1.500	1.516	1 7/16	1.438	1.448	1 39/64	1.609	1.634
1 1/2	1 5/8	1.625	1.641	1 9/16	1.562	1.572	1 47/64	1.734	1.759

GENERAL NOTE: Dimensions are in inches.

TABLE 3 CLEARANCE HOLES FOR METRIC FASTENERS

Nominal Screw Size	Fit Classes								
	Normal			Close			Loose		
	Nominal Drill Size	Hole Diameter		Nominal Drill Size	Hole Diameter		Nominal Drill Size	Hole Diameter	
		Min.	Max.		Min.	Max.		Min.	Max.
M1.6	1.8	1.8	1.94	1.7	1.7	1.8	2	2	2.25
M2	2.4	2.4	2.54	2.2	2.2	2.3	2.6	2.6	2.85
M2.5	2.9	2.9	3.04	2.7	2.7	2.8	3.1	3.1	3.4
M3	3.4	3.4	3.58	3.2	3.2	3.32	3.6	3.6	3.9
M4	4.5	4.5	4.68	4.3	4.3	4.42	4.8	4.8	5.1
M5	5.5	5.5	5.68	5.3	5.3	5.42	5.8	5.8	6.1
M6	6.6	6.6	6.82	6.4	6.4	6.55	7	7	7.36
M8	9	9	9.22	8.4	8.4	8.55	10	10	10.36
M10	11	11	11.27	10.5	10.5	10.68	12	12	12.43
M12	13.5	13.5	13.77	13	13	13.18	14.5	14.5	14.93
M14	15.5	15.5	15.77	15	15	15.18	16.5	16.5	16.93
M16	17.5	17.5	17.77	17	17	17.18	18.5	18.5	19.02
M20	22	22	22.33	21	21	21.21	24	24	24.52
M24	26	26	26.33	25	25	25.21	28	28	28.52
M30	33	33	33.39	31	31	31.25	35	35	35.62
M36	39	39	39.39	37	37	37.25	42	42	42.62
M42	45	45	45.39	43	43	43.25	48	48	48.62
M48	52	52	52.46	50	50	50.25	56	56	56.74
M56	62	62	62.46	58	58	58.3	66	66	66.74
M64	70	70	70.46	66	66	66.3	74	74	74.74
M72	78	78	78.46	74	74	74.3	82	82	82.87
M80	86	86	86.54	82	82	82.35	91	91	91.87
M90	96	96	96.54	93	93	93.35	101	101	101.87
M100	107	107	107.54	104	104	104.35	112	112	112.87

GENERAL NOTE: Dimensions are in millimeters.

TABLE 4 METRIC CLEARANCE HOLE ALLOWANCES

Nominal Screw Size	Fit Classes		
	Normal	Close	Loose
M1.6	0.2	0.1	0.25
M2	0.4	0.1	0.3
M2.5	0.4	0.1	0.3
M3	0.4	0.2	0.6
M4, M5	0.5	0.3	0.8
M6	0.6	0.4	1
M8	1	0.4	2
M10	1	0.5	2
M12–M16	1.5	1	2.5
M20, M24	2	1	4
M30	3	1	5
M36, M42	3	1	6
M48	4	2	8
M56–M72	6	2	10
M80	6	2	11
M90	6	3	11
M100	7	4	12

GENERAL NOTE: Dimensions are in millimeters.

I-1 RECOMMENDED SUBSTITUTE DRILLS

If the clearance hole application is dimensioned in metric drill sizes for inch fasteners or inch drill sizes for metric fasteners, Tables I-1 and I-2 list the nearest standard drill size translations for the designated drills of Tables 2 and 3.

TABLE I-1 STANDARD METRIC DRILLS FOR INCH FASTENERS

Nominal Screw Size, in.	Nominal Drill Size, mm		
	Fit Classes		
	Normal	Close	Loose
#0	1.9	1.7	2.4
#1	2.25	2.05	2.6
#2	2.6	2.4	2.9
#3	2.9	2.7	3.3
#4	3.3	3	3.7
#5	4	3.6	4.4
#6	4.3	3.9	4.7
#8	5	4.6	5.4
#10	5.6	5.2	6
1/4	7.1	6.7	7.5
5/16	8.7	8.3	9.1
3/8	10.2	9.9	10.5
7/16	11.8	11.5	12.2
1/2	14.25	13.5	15.5
5/8	17.5	16.75	19
3/4	20.5	20	23
7/8	24	23	26
1	27.5	26	29.5
1 1/8	31	29.5	33.5
1 1/4	34	32.5	36.5
1 3/8	38	36.5	41
1 1/2	41	39.5	44

TABLE I-2 STANDARD INCH DRILLS FOR METRIC FASTENERS

Nominal Screw Size, mm	Nominal Drill Size, in.		
	Fit Classes		
	Normal	Close	Loose
M1.6	#50	#51	#47
M2	3/32	#44	#38
M2.5	#33	#36	#31
M3	#29	1/8	9/64
M4	#16	#19	#12
M5	7/32	#4	#1
M6	G	1/4	J
M8	T	Q	25/64
M10	7/16	Z	31/64
M12	17/32	33/64	37/64
M14	39/64	19/32	21/32
M16	11/32	43/64	47/64
M20	55/64	53/64	15/16
M24	1 1/32	63/64	1 7/64
M30	1 9/32	1 7/32	1 3/8
M36	1 17/32	1 15/32	1 21/32
M42	1 25/32	1 11/16	1 29/32
M48	2 1/32	1 31/32	2 3/16
M56	2 7/16	2 5/16	2 5/8
M64	2 3/4	2 5/8	2 5/16
M72	3 1/8	2 15/16	3 1/4

Tap size	Diameter (in)	Diameter (mm)	Thread count (TPI)	Thread pitch (mm)	Tap drill size
#0000-160	0.0210	0.5334	160	0.159	1/64 in
#000-120	0.0340	0.8636	120	0.212	#71
#00-90	0.0470	1.1938	90	0.282	#65
#0-80	0.0600	1.5240	80	0.318	3/64 in
#1-64	0.0730	1.8542	64	0.397	#52
#1-72	0.0730	1.8542	72	0.353	#53
#2-56	0.0860	2.1844	56	0.454	#50
#2-64	0.0860	2.1844	64	0.397	#50
#3-48	0.0990	2.5146	48	0.529	#47
#3-56	0.0990	2.5146	56	0.454	#45
#4-40	0.1120	2.8448	40	0.635	#43
#4-48	0.1120	2.8448	48	0.529	#42
#5-40	0.1250	3.1750	40	0.635	#39
#5-44	0.1250	3.1750	44	0.577	#37
#6-32	0.1380	3.5052	32	0.794	#36
#6-40	0.1380	3.5052	40	0.635	#33
#8-32	0.1640	4.1656	32	0.794	#29
#8-36	0.1640	4.1656	36	0.706	#29
#10-32	0.1900	4.8260	32	0.794	#21
#10-24	0.1900	4.8260	24	1.058	#25
#12-24	0.2160	5.4864	24	1.058	#17
#12-28	0.2160	5.4864	28	0.907	#15
1/4-20	0.2500	6.3500	20	1.270	#7
1/4-28	0.2500	6.3500	28	0.907	#3
5/16-18	0.3125	7.9375	18	1.411	F
5/16-24	0.3125	7.9375	24	1.058	I
3/8-24	0.3750	9.5250	24	1.058	Q
3/8-16	0.3750	9.5250	16	1.588	5/16 in
7/16-14	0.4375	11.1125	14	1.814	U
7/16-20	0.4375	11.1125	20	1.270	25/64 in
1/2-20	0.5000	12.7000	20	1.270	29/64 in
1/2-13	0.5000	12.7000	13	1.954	27/64 in
9/16-18	0.5625	14.2875	18	1.411	33/64 in
9/16-12	0.5625	14.2875	12	2.117	31/64 in
5/8-18	0.6250	15.8750	18	1.411	37/64 in
5/8-11	0.6250	15.8750	11	2.309	17/32 in
3/4-16	0.7500	19.0500	16	1.588	11/16 in
3/4-10	0.7500	19.0500	10	2.540	21/32 in
7/8-9	0.8750	22.2250	9	2.822	49/64 in
7/8-14	0.8750	22.2250	14	1.814	13/16 in
1-14	1.0000	25.4000	14	1.814	15/16 in
1-8	1.0000	25.4000	8	3.175	7/8 in
1 1/8-12	1.1250	28.5750	12	2.117	1 3/64 in
1 1/8-7	1.1250	28.5750	7	3.629	63/64 in
1 1/4-12	1.2500	31.7500	12	2.117	1 11/64 in
1 1/4-7	1.2500	31.7500	7	3.629	1 7/64 in
1 1/2 -12	1.5000	38.1000	12	2.117	1 27/64 in
1 1/2-6	1.5000	38.1000	6	4.233	1 11/32 in
1 3/4-12	1.7500	44.4500	12	2.117	1 43/64 in
1 3/4-5	1.7500	44.4500	5	5.080	1 35/64 in
2-12	2.0000	50.8000	12	2.117	1 59/64 in
2-4 1/2	2.0000	50.8000	4.5	5.644	1 25/32 in

Tap size	Diameter (in)	Diameter (mm)	Thread count (TPI)	Thread pitch (mm)	Tap drill size
M1x0.2	0.0394	1.0000	~127	0.200	0.8 mm
M1x0.25	0.0394	1.0000	~102	0.250	0.75 mm
M1.1x0.25	0.0433	1.1000	~102	0.250	0.85 mm
M1.1x0.2	0.0433	1.1000	~127	0.200	0.9 mm
M1.2x0.2	0.0472	1.2000	~127	0.200	1 mm
M1.2x0.25	0.0472	1.2000	~102	0.250	0.95 mm
M1.4x0.2	0.0551	1.4000	~127	0.200	1.2 mm
M1.4x0.3	0.0551	1.4000	~85	0.300	1.1 mm
M1.6x0.2	0.0630	1.6000	~127	0.200	1.4 mm
M1.6x0.35	0.0630	1.6000	~73	0.350	1.25 mm
M1.8x0.2	0.0709	1.8000	~127	0.200	1.6 mm
M1.8x0.35	0.0709	1.8000	~73	0.350	1.45 mm
M2x0.25	0.0787	2.0000	~102	0.250	1.75 mm
M2x0.4	0.0787	2.0000	~64	0.400	1.6 mm
M2.2x0.25	0.0866	2.2000	~102	0.250	1.95 mm
M2.2x0.45	0.0866	2.2000	~57	0.450	1.75 mm
M2.5x0.35	0.0984	2.5000	~73	0.350	2.1 mm
M2.5x0.45	0.0984	2.5000	~57	0.450	2.05 mm
M3x0.35	0.1181	3.0000	~73	0.350	2.6 mm
M3x0.5	0.1181	3.0000	~51	0.500	2.5 mm
M3.5x0.35	0.1378	3.5000	~73	0.350	3.1 mm
M3.5x0.6	0.1378	3.5000	~43	0.600	2.9 mm
M4x0.35	0.1575	4.0000	~73	0.350	3.6 mm
M4x0.5	0.1575	4.0000	~51	0.500	3.5 mm
M4x0.7	0.1575	4.0000	~37	0.700	3.3 mm
M4.5x0.5	0.1772	4.5000	~51	0.500	4 mm
M4.5x0.75	0.1772	4.5000	~34	0.750	3.8 mm
M5x0.5	0.1969	5.0000	~51	0.500	4.5 mm
M5x0.8	0.1969	5.0000	~32	0.800	4.2 mm
M5.5x0.5	0.2165	5.5000	~51	0.500	5 mm
M6x0.5	0.2362	6.0000	~51	0.500	5.5 mm
M6x0.75	0.2362	6.0000	~34	0.750	5.2 mm
M6x1	0.2362	6.0000	~26	1.000	5 mm
M7x0.75	0.2756	7.0000	~34	0.750	6.2 mm
M7x1	0.2756	7.0000	~26	1.000	6 mm
M8x0.5	0.3150	8.0000	~51	0.500	7.5 mm
M8x0.75	0.3150	8.0000	~34	0.750	7.2 mm
M8x1	0.3150	8.0000	~26	1.000	7 mm
M8x1.25	0.3150	8.0000	~21	1.250	6.8 mm
M9x0.75	0.3543	9.0000	~34	0.750	8.2 mm
M9x1	0.3543	9.0000	~26	1.000	8 mm
M9x1.25	0.3543	9.0000	~21	1.250	7.8 mm
M10x0.75	0.3937	10.0000	~34	0.750	9.2 mm
M10x1.5	0.3937	10.0000	~17	1.500	8.5 mm
M10x1.25	0.3937	10.0000	~21	1.250	8.8 mm
M10x1	0.3937	10.0000	~26	1.000	9 mm
M11x0.75	0.4331	11.0000	~34	0.750	10.2 mm
M11x1	0.4331	11.0000	~26	1.000	10 mm
M11x1.5	0.4331	11.0000	~17	1.500	9.5 mm
M12x1.5	0.4724	12.0000	~17	1.500	10.5 mm
M12x1.75	0.4724	12.0000	~15	1.750	10.2 mm
M12x0.75	0.4724	12.0000	~34	0.750	11.25 mm
M12x1	0.4724	12.0000	~26	1.000	11 mm

M12x1.25	0.4724	12.0000	~21	1.250	10.8 mm
M14x1.5	0.5512	14.0000	~17	1.500	12.5 mm
M14x1.25	0.5512	14.0000	~21	1.250	12.8 mm
M14x1	0.5512	14.0000	~26	1.000	13 mm
M14x2	0.5512	14.0000	~13	2.000	12 mm
M15x1	0.5906	15.0000	~26	1.000	14 mm
M15x1.5	0.5906	15.0000	~17	1.500	13.5 mm
M16x2	0.6299	16.0000	~13	2.000	14 mm
M16x1.5	0.6299	16.0000	~17	1.500	14.5 mm
M16x1	0.6299	16.0000	~26	1.000	15 mm
M17x1	0.6693	17.0000	~26	1.000	16 mm
M17x1.5	0.6693	17.0000	~17	1.500	15.5 mm
M18x2.5	0.7087	18.0000	~11	2.500	15.5 mm
M18x1	0.7087	18.0000	~26	1.000	17 mm
M18x1.5	0.7087	18.0000	~17	1.500	16.5 mm
M18x2	0.7087	18.0000	~13	2.000	16 mm
M20x2	0.7874	20.0000	~13	2.000	18 mm
M20x1.5	0.7874	20.0000	~17	1.500	18.5 mm
M20x1	0.7874	20.0000	~26	1.000	19 mm
M20x2.5	0.7874	20.0000	~11	2.500	17.5 mm
M22x2	0.8661	22.0000	~13	2.000	20 mm
M22x1.5	0.8661	22.0000	~17	1.500	20.5 mm
M22x1	0.8661	22.0000	~26	1.000	21 mm
M22x2.5	0.8661	22.0000	~11	2.500	19.5 mm
M24x3	0.9449	24.0000	~9	3.000	21 mm
M24x1	0.9449	24.0000	~26	1.000	23 mm
M24x1.5	0.9449	24.0000	~17	1.500	22.5 mm
M24x2	0.9449	24.0000	~13	2.000	22 mm
M25x2	0.9843	25.0000	~13	2.000	23 mm
M25x1	0.9843	25.0000	~26	1.000	24 mm
M25x1.5	0.9843	25.0000	~17	1.500	23.5 mm
M26x1.5	1.0236	26.0000	~17	1.500	24.5 mm
M27x1.5	1.0630	27.0000	~17	1.500	25.5 mm
M27x3	1.0630	27.0000	~9	3.000	24 mm
M27x1	1.0630	27.0000	~26	1.000	26 mm
M27x2	1.0630	27.0000	~13	2.000	25 mm
M28x2	1.1024	28.0000	~13	2.000	26 mm
M28x1	1.1024	28.0000	~26	1.000	27 mm
M28x1.5	1.1024	28.0000	~17	1.500	26.5 mm
M30x1.5	1.1811	30.0000	~17	1.500	28.5 mm
M30x3.5	1.1811	30.0000	~8	3.500	26.5 mm
M30x2	1.1811	30.0000	~13	2.000	28 mm
M33x2	1.2992	33.0000	~13	2.000	31 mm
M33x3.5	1.2992	33.0000	~8	3.500	29.5 mm
M36x3	1.4173	36.0000	~9	3.000	33 mm
M36x4	1.4173	36.0000	~7	4.000	32 mm
M39x4	1.5354	39.0000	~7	4.000	35 mm
M39x3	1.5354	39.0000	~9	3.000	36 mm
M42x4.5	1.6535	42.0000	~6	4.500	37.5 mm
M45x4.5	1.7717	45.0000	~6	4.500	40.5 mm
M48x5	1.8898	48.0000	~6	5.000	43 mm
M52x5	2.0472	52.0000	~6	5.000	47 mm
M56x5.5	2.2047	56.0000	~5	5.500	50.5 mm
M60x5.5	2.3622	60.0000	~5	5.500	54.5 mm
M64x6	2.5197	64.0000	~5	6.000	58 mm
M68x6	2.6772	68.0000	~5	6.000	62 mm