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ASME B18.2.8-1999

CLEARANCE HOLES FOR BOLTS, SCREWS, AND STUDS

AN AMERICAN NATIONAL STANDARD



The American Society of Mechanical Engineers

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FOREWORD

During its December 3, 1998 meeting, the ASME B18 Fastener Committee authorized preparation of a standard to establish clearance holes for inch- and metric-threaded fasteners. Some of the metric screw and bolt standards already had, as an appendix, the ISO 273 approved normal-, close-, and loose-clearance hole diameters. It was recognized that for inch standard fasteners there was no B18 standard size recommendation.

A draft standard was prepared using common industry inch clearance values selected to follow the general metric design of three degrees of clearance. The recommendations are all tabulated as minimum holes and tolerance is recommended using ISO 273 tolerance classes. The Standard also includes values for fasteners in each system using the standard drill sizes from the other system of measurement.

This Standard should provide consistent application design information for the fasteners and can be a step toward rationalization of the tooling for fastener assembly operations. Metric standards need not include the appended information in each threaded fastener standard and inch-threaded fastener standards will have standardized clearance hole recommendations.

ASME B18.2.8-1999 was approved by the American National Standards Institute (ANSI) on August 19, 1999.

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Edition: Cite the applicable edition of the Standard for which the interpretation is being requested.

Question: Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings, which are necessary to explain the question; however, they should not contain proprietary names or information.

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CONTENTS

Foreword iii
Committee Roster v
Committee Correspondence vii

1 Scope 1

2 Comparison With ISO Standards 1
2.1 Metric Fasteners 1
2.2 Inch Fasteners 1

3 Dimensions 1
3.1 Inch Fasteners 1
3.2 Metric Fasteners 1
3.3 Tolerances 1
3.4 Clearances 1

Tables
1 Inch Clearance Hole Allowances 2
2 Clearance Holes for Inch Fasteners 2
3 Clearance Holes for Metric Fasteners 3
4 Metric Clearance Hole Allowances 4

Mandatory Appendix
I Nonsystem Drills 5

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CLEARANCE HOLES FOR BOLTS, SCREWS, AND STUDS

1 SCOPE

This Standard covers the recommended clearance hole sizes for #0 through 1.5 in. and M1.6 through M100 metric fasteners in three classes of clearance using a close-, normal-, and loose-fit category.

2 COMPARISON WITH ISO STANDARDS

2.1 Metric Fasteners

The hole sizes for metric fasteners are in agreement with ISO 273, Fasteners-Clearance Holes for Bolts and Screws, except the ISO 273 covers fastener sizes M1 through M150.

2.2 Inch Fasteners

The hole sizes for inch fasteners are patterned after USA common usage and the general clearances translated from the metric standard. The hole tolerances are based on the ISO System of Limits and Fits, as required by ISO 273.

3 DIMENSIONS

3.1 Inch Fasteners

The recommended drill sizes for inch fasteners are tabulated by nominal drill designation as letter, numbers, or fractional sizes. The drill sizes were selected to provide as nearly as practical a step-patterned clearance size for the minimum recommended hole (see Table 1). The maximum recommended hole size is based on standard hole tolerances. The tabulated drill and hole sizes of Table 2 list the inch fastener clearance hole recommendations.

3.2 Metric Fasteners

The recommended drill and hole sizes for metric fasteners are tabulated in Table 3. The minimum recommended hole is the drill size and the maximum recommended hole size is based on standard tolerances.

3.3 Tolerances

The clearance hole tolerances for both inch and metric holes are based on ISO 286, ISO System of Limits and Fits, using tolerance class H12 for close-fit, H13 for normal-fit, and H14 for loose-fit clearance holes.

3.4 Clearances

The clearances provided by the three classes of fit are based on regularly stepped clearances as listed in Table 1 for inch and Table 4 for metric.

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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

GENERAL NOTE: Dimensions are in inches.

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.

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TABLE 3 CLEARANCE HOLES FOR METRIC FASTENERS

	Fit Classes								
	Normal			Close			Loose		
Nominal Screw Size	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

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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

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MANDATORY APPENDIX I
NONSYSTEM DRILLS

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

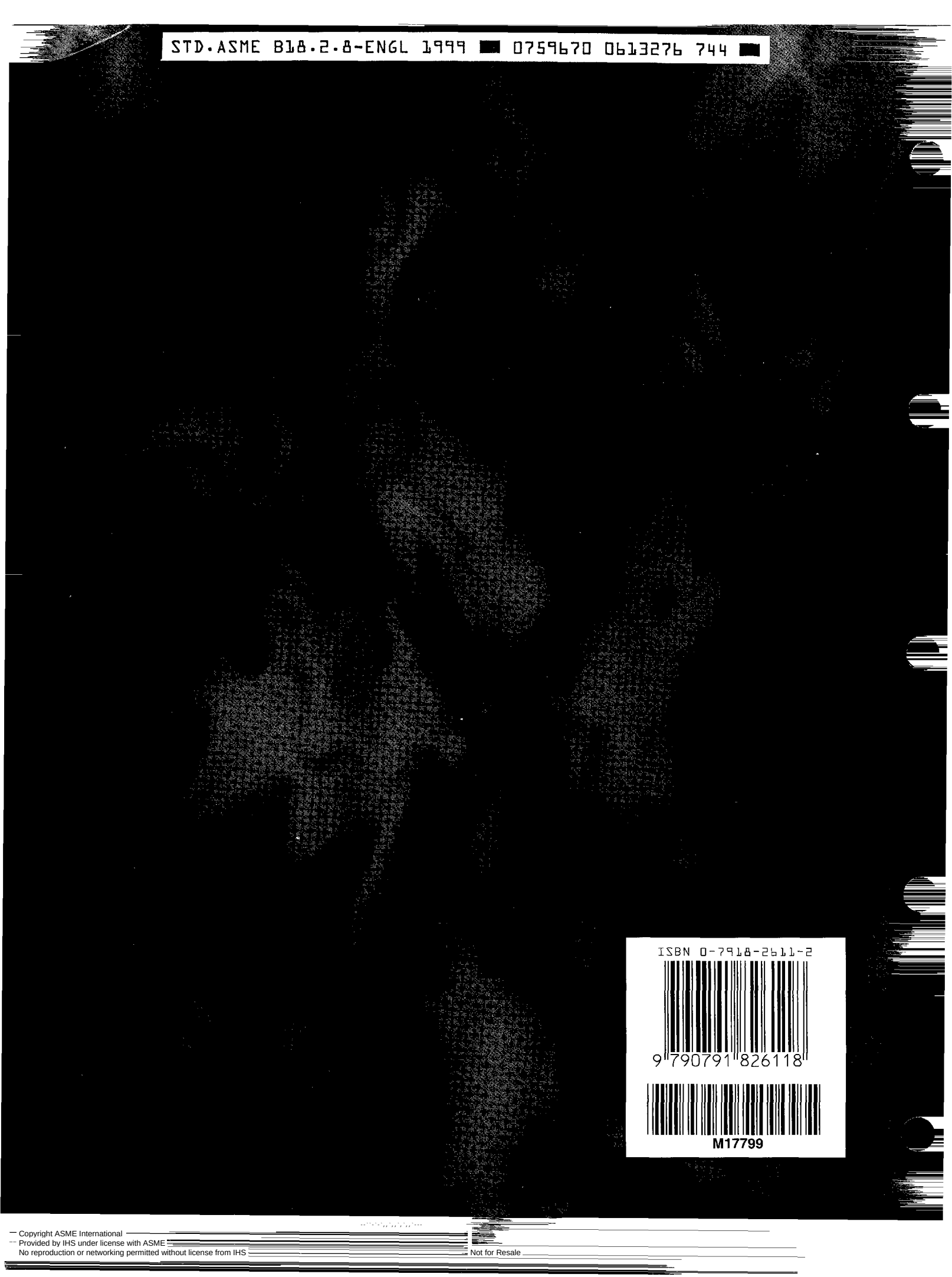
Nominal Screw Size, in.	Nominal Drill Size, mm		
	Fit Classes		
	Normal	Close	Loose
#0	1.9	1.7	2.4
#1	2.25	2.05	2.6
#2	2.6	2.4	2.9
#3	2.9	2.7	3.3
#4	3.3	3	3.7
#5	4	3.6	4.4
#6	4.3	3.9	4.7
#8	5	4.6	5.4
#10	5.6	5.2	6
1/4	7.1	6.7	7.5
5/15	8.7	8.3	9.1
3/8	10.2	9.9	10.5
7/16	11.8	11.5	12.2
1/2	14.25	13.5	15.5
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

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