

SELF-THREADING SCREWS

ANSI Standard Sheet Metal, Self-Tapping, and Metallic Drive Screws.—Table 1 shows the various types of “self-tapping” screw threads covered by the ANSI B18.6.4-1981 (R1991) standard. (Metric thread forming and thread cutting tapping screws are discussed beginning on page 1635). ANSI designations are also shown. Types A, AB, B, BP and C when turned into a hole of proper size form a thread by a displacing action. Types D, F, G, T, BF and BT when turned into a hole of proper size form a thread by a cutting action. Type U when driven into a hole of proper size forms a series of multiple threads by a displacing action. These screws have the following descriptions and applications:

Type A: Spaced-thread screw with gimlet point primarily for use in light sheet metal, resin-impregnated plywood, and asbestos compositions. This type is no longer recommended. Use Type AB in new designs and whenever possible substitute for Type A in existing designs.

Type AB: Spaced-thread screw with same pitches as Type B but with gimlet point, primarily for similar uses as for Type A.

Type B: Spaced-thread screw with a blunt point with pitches generally somewhat finer than Type A. Used for thin metal, non-ferrous castings, plastics, resin-impregnated plywood, and asbestos compositions.

Type BP: Spaced-thread screw, the same as Type B but having a conical point extending beyond incomplete entering threads. Used for piercing fabrics or in assemblies where holes are misaligned.

Type C: Screws having machine screw diameter-pitch combinations with threads approximately Unified Form and with blunt tapered points. Used where a machine screw thread is preferable to the spaced-thread types of thread forming screws. Also useful when chips from machine screw thread-cutting screws are objectionable. In view of the declining use of Type C screws, which in general require high driving torques, in favor of more efficient designs of thread tapping screws, they are not recommended for new designs.

Types D, F, G, and T: Thread-cutting screws with threads approximating machine screw threads, with blunt point, and with tapered entering threads having one or more cutting edges and chip cavities. The tapered threads of the Type F may be complete or incomplete at the producer's option; all other types have incomplete tapered threads. These screws can be used in materials such as aluminum, zinc, and lead die-castings; steel sheets and shapes; cast iron; brass; and plastics.

Types BF and BT: Thread-cutting screws with spaced threads as in Type B, with blunt points, and one or more cutting grooves. Used in plastics, asbestos, and other similar compositions.

Type U: Multiple-threaded drive screw with large helix angle, having a pilot point, for use in metal and plastics. This screw is forced into the work by pressure and is intended for making permanent fastenings.

ANSI Standard Head Types for Tapping and Metallic Drive Screws: Many of the head types used with “self-tapping” screw threads are similar to the head types of American National Standard machine screws shown in the section with that heading.

Round Head: The round head has a semi-elliptical top surface and a flat bearing surface. Because of the superior slot driving characteristics of pan head screws over round head screws, and the overlap in dimensions of cross recessed pan heads and round heads, it is recommended that pan head screws be used in new designs and wherever possible substituted in existing designs.

Undercut Flat and Oval Countersunk Heads: For short lengths, 82-degree and oval countersunk head tapping screws have heads undercut to 70 per cent of normal side height to afford greater length of thread on the screws.

Flat Countersunk Head: The flat countersunk head has a flat top surface and a conical bearing surface with a head angle for one design of approximately 82 degrees and for another design of approximately 100 degrees. Because of its limited usage and in the interest of curtailing product varieties, the 100-degree flat countersunk head is considered non-preferred.

Oval Countersunk Head: The oval countersunk head has a rounded top surface and a conical bearing surface with a head angle of approximately 82 degrees.

Flat and Oval Countersunk Trim Heads: Flat and oval countersunk trim heads are similar to the 82-degree flat and oval countersunk heads except that the size of head for a given size screw is one (large trim head) or two (small trim head) sizes smaller than the regular flat and oval countersunk head size. Oval countersunk trim heads have a definite radius where the curved top surface meets the conical bearing surface. Trim heads are furnished only in cross recessed types.

Pan Head: The slotted pan head has a flat top surface rounded into cylindrical sides and a flat bearing surface. The recessed pan head has a rounded top and a flat bearing surface. This head type is now preferred to the round head.

Fillister Head: The fillister head has a rounded top surface, cylindrical sides, and a flat bearing surface.

Hex Head: The hex head has a flat or indented top surface, six flat sides, and a flat bearing surface. Because the slotted hex head requires a secondary operation in manufacture which often results in burrs at the extremity of the slot that interfere with socket wrench engagement and the wrenching capability of the hex far exceeds that of the slot, it is not recommended for new designs.

Hex Washer Head: The hex washer head has an indented top surface and six flat sides formed integrally with a flat washer that projects beyond the sides and provides a flat bearing surface. Because the slotted hex washer head requires a secondary operation in manufacture which often results in burrs at the extremity of the slot that often interferes with socket wrench engagement and because the wrenching capability of the hex far exceeds that of the slot in the indented head, it is not recommended for new designs.

Truss Head: The truss head has a low rounded top surface with a flat bearing surface, the diameter of which for a given screw size is larger than the diameter of the corresponding round head. In the interest of product simplification and recognizing that the truss head is an inherently weak design, it is not recommended for new designs.

Method of Designation.—Tapping screws are designated by the following data in the sequence shown: Nominal size (number, fraction or decimal equivalent); threads per inch; nominal length (fraction or decimal equivalent); point type; product name, including head type and driving provision; material; and protective finish, if required.

Examples:

$\frac{1}{4}$ -14 \times 1 $\frac{1}{2}$ Type AB Slotted Pan Head Tapping Screw, Steel, Nickel Plated

6-32 \times $\frac{3}{4}$ Type T, Type 1A Cross Recessed Pan Head Tapping Screw, Corrosion Resistant Steel

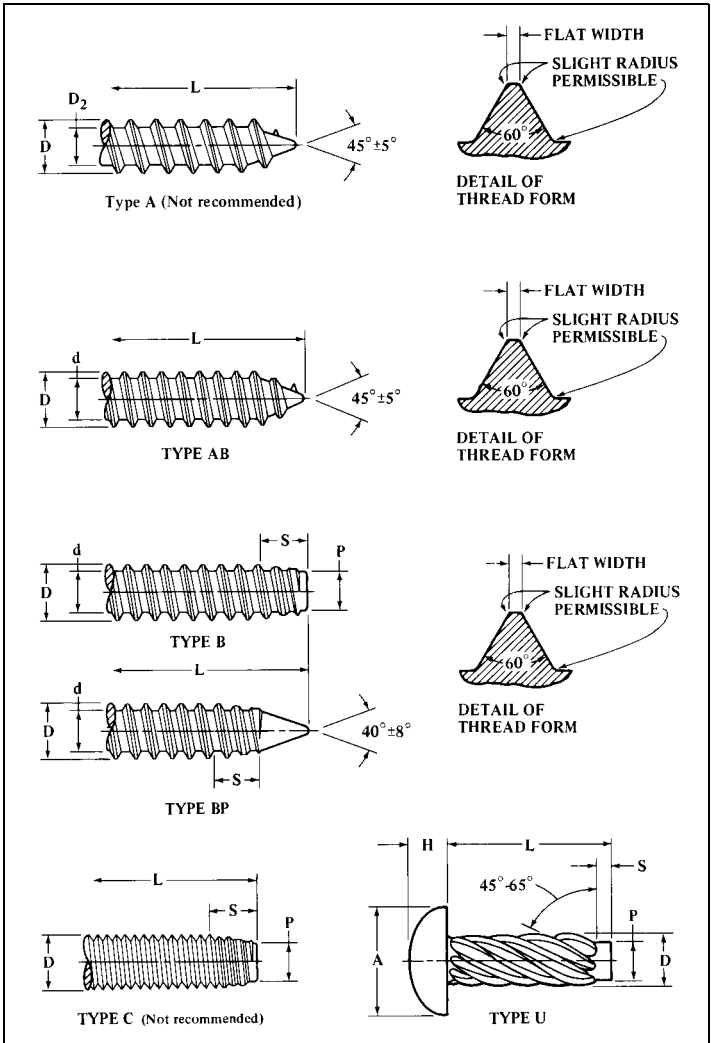
0.375-16 \times 1.50 Type D, Washer Head Tapping Screw, Steel

Metallic Drive Screws: Type U metallic drive screws are designated by the following data in the sequence shown: Nominal size (number, fraction, or decimal equivalent); nominal length (fraction or decimal equivalent); product name, including head type; material; and protective finish, if required. Examples:

10 \times $\frac{5}{16}$ Round Head Metallic Drive Screw, Steel

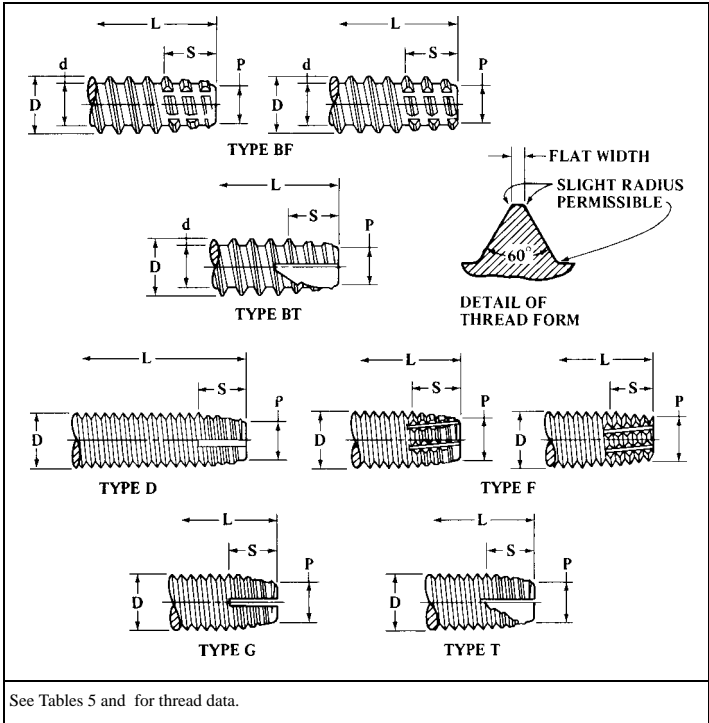
0.312 \times 0.50 Round Head Metallic Drive Screw, Steel, Zinc Plated

Table 1. ANSI Standard Threads and Points for Thread Forming Self-Tapping Screws ANSI B18.6.4-1981 (R1991)



See Tables 3, 5, and 6 for thread data.

Table 2. ANSI Standard Threads and Points for Thread Cutting Self-Tapping Screws ANSI B18.6.4-1981 (R1991)



Cross Recesses.—Type I cross recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded. Type IA cross recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded. Type II consists of two intersecting slots with parallel sides converging to a slightly truncated apex at the bottom of the recess. Type III has a square center opening, slightly tapered side walls, and a conical bottom, with top edges relieved or rounded.

Table 3. ANSI Standard Cross Recesses for Self-Tapping Screws ANSI B18.6.4-1981 (R1991) and Metric Thread Forming and Thread Cutting Tapping Screws ANSI/ASME B18.6.5M-1986

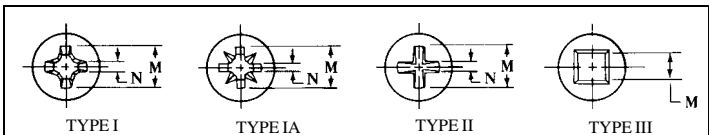


Table 4. ANSI Standard Thread and Point Dimensions for Types AB, A and U Thread Forming Tapping Screws ANSI B18.6.4-1981 (R1991)

Type AB (Formerly BA)							
Nominal Size or Basic Screw Diameter	Threads per inch	D		d		L	
		Major Diameter		Minor Diameter		Minimum Practical Screw Lengths	
		Max.	Min.	Max.	Min.	90° Heads	Csk. Heads
0 0.0600	48	0.060	0.054	0.036	0.033	1/8	3/32
1 0.0730	42	0.075	0.069	0.049	0.046	3/32	3/16
2 0.0860	32	0.088	0.082	0.064	0.060	3/16	7/32
3 0.0990	28	0.101	0.095	0.075	0.071	3/16	1/2
4 0.1120	24	0.114	0.108	0.086	0.082	7/32	5/32
5 0.1250	20	0.130	0.123	0.094	0.090	1/4	3/16
6 0.1380	20	0.139	0.132	0.104	0.099	9/32	11/32
7 0.1510	19	0.154	0.147	0.115	0.109	3/16	3/8
8 0.1640	18	0.166	0.159	0.122	0.116	3/16	3/8
10 0.1900	16	0.189	0.182	0.141	0.135	3/8	7/16
12 0.2160	14	0.215	0.208	0.164	0.157	7/16	21/32
1/4 0.2500	14	0.246	0.237	0.192	0.185	1/2	19/32
5/16 0.3125	12	0.315	0.306	0.244	0.236	3/8	5/8
3/8 0.3750	12	0.380	0.371	0.309	0.299	3/4	25/32
7/16 0.4375	10	0.440	0.429	0.359	0.349	7/8	1 1/32
1/2 0.5000	10	0.504	0.493	0.423	0.413	1	1 1/2

Type A							
Nominal Size ^a Basic Screw Diameter	Threads per inch	D		d		L	
		Major Diameter		Minor Diameter		These Lengths or Shorter —Use Type AB	
		Max.	Min.	Max.	Min.	90° Heads	Csk. Heads
0 0.0600	40	0.060	0.057	0.042	0.039	1/8	3/16
1 0.0730	32	0.075	0.072	0.051	0.048	1/8	3/16
2 0.0860	32	0.088	0.084	0.061	0.056	5/32	3/16
3 0.0990	28	0.101	0.097	0.076	0.071	3/16	7/32
4 0.1120	24	0.114	0.110	0.083	0.078	3/16	1/2
5 0.1250	20	0.130	0.126	0.095	0.090	3/16	1/2
6 0.1380	18	0.141	0.136	0.102	0.096	1/4	5/16
7 0.1510	16	0.158	0.152	0.114	0.108	3/16	3/8
8 0.1640	15	0.168	0.162	0.123	0.116	3/8	7/16
10 0.1900	12	0.194	0.188	0.133	0.126	3/8	1/2
12 0.2160	11	0.221	0.215	0.162	0.155	7/16	9/16
14 0.2420	10	0.254	0.248	0.185	0.178	1/2	5/8
16 0.2680	10	0.280	0.274	0.197	0.189	9/16	3/4
18 0.2940	9	0.306	0.300	0.217	0.209	3/8	13/16
20 0.3200	9	0.333	0.327	0.234	0.226	11/16	13/16
24 0.3720	9	0.390	0.383	0.291	0.282	3/4	1

^a Where specifying nominal size in decimals, zeros preceding decimal and in fourth place are omitted.

Type U Metallic Drive Screws											
Nom. Size	No. of Starts	Out. Dia.		Pilot Dia.		Nom. Size	No. of Starts	Out. Dia.		Pilot Dia.	
		Max.	Min.	Max.	Min.			Max.	Min.	Max.	Min.
00	6	0.060	0.057	0.049	0.046	8	8	0.167	0.162	0.136	0.132
0	6	0.075	0.072	0.063	0.060	10	8	0.182	0.177	0.150	0.146
2	8	0.100	0.097	0.083	0.080	12	8	0.212	0.206	0.177	0.173
4	7	0.116	0.112	0.096	0.092	14	9	0.242	0.236	0.202	0.198
6	7	0.140	0.136	0.116	0.112	5/16	11	0.315	0.309	0.272	0.267
7	8	0.154	0.150	0.126	0.122	3/8	12	0.378	0.371	0.334	0.329

All dimensions are in inches. See Table 1 for thread diagrams.

Sizes shown in bold face type are preferred. Type A screws are no longer recommended.

Table 5. ANSI Standard Thread and Point Dimensions for B and BP Thread Forming and BF and BT Thread Cutting Tapping Screws ANSI B18.6.4-1981 (R1991)

THREAD FORMING TYPES B AND BP													
Nominal Size ^a or Basic Screw Diameter	Thds per Inch ^b	D		d		P		S		L			
		Major Diameter		Minor Diameter		Point Diameter ^c		Point Taper Length ^d		Minimum Practical Nominal Screw Lengths			
		Max	Min	Max	Min	Max	Min	Max	Min	Type B		Type BP	
										90° Heads	Csk Heads	90° Heads	Csk Heads
0 0.0600	48	0.060	0.054	0.036	0.033	0.031	0.027	0.042	0.031	1/8	1/8	3/32	3/16
1 0.0730	42	0.075	0.069	0.049	0.046	0.044	0.040	0.048	0.036	1/8	3/32	3/16	1/4
2 0.0860	32	0.088	0.082	0.064	0.060	0.058	0.054	0.062	0.047	3/32	3/16	1/4	3/32
3 0.0990	28	0.101	0.095	0.075	0.071	0.068	0.063	0.071	0.054	3/16	7/32	1/2	3/16
4 0.1120	24	0.114	0.108	0.086	0.082	0.079	0.074	0.083	0.063	3/16	1/4	3/16	1/2
5 0.1250	20	0.130	0.123	0.094	0.090	0.087	0.082	0.100	0.075	7/32	9/32	1/2	13/32
6 0.1380	20	0.139	0.132	0.104	0.099	0.095	0.089	0.100	0.075	1/4	9/32	3/8	7/16
7 0.1510	19	0.154	0.147	0.115	0.109	0.105	0.099	0.105	0.079	1/4	5/16	13/32	15/32
8 0.1640	18	0.166	0.159	0.122	0.116	0.112	0.106	0.111	0.083	5/16	1/2	7/16	1/2
10 0.1900	16	0.189	0.182	0.141	0.135	0.130	0.123	0.125	0.094	3/16	3/8	1/2	19/32
12 0.2160	14	0.215	0.208	0.164	0.157	0.152	0.145	0.143	0.107	1/2	7/16	9/16	2/3
1/4 0.2500	14	0.246	0.237	0.192	0.185	0.179	0.171	0.143	0.107	3/8	1/2	21/32	3/4
3/16 0.3125	12	0.315	0.306	0.244	0.236	0.230	0.222	0.167	0.125	15/32	19/32	27/32	31/32
3/8 0.3750	12	0.380	0.371	0.309	0.299	0.293	0.285	0.167	0.125	1/2	11/16	15/16	1 1/8
7/16 0.4375	10	0.440	0.429	0.359	0.349	0.343	0.335	0.200	0.150	3/4	25/32	1 1/8	1 1/8
1/2 0.5000	10	0.504	0.493	0.423	0.413	0.407	0.399	0.200	0.150	11/16	27/32	1 1/4	1 13/32

^a Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

^b The width of flat at crest of thread shall not exceed 0.004 inch for sizes up to No. 8, inclusive, and 0.006 inch for larger sizes.

^c Point diameters specified apply to screw threads before roll threading.

^d Points of screws are tapered and fluted or slotted. The flute on Type BT screws has an included angle of 90 to 95 degrees and the thread cutting edge is located above the axis of the screw. Flutes and slots extend through first full form thread beyond taper except for Type BF screw on which tapered threads may be complete at manufacturer's option and flutes may be one pitch short of first full form thread.

THREAD CUTTING TYPES BF AND BT ^d													
Nominal Size ^a or Basic Screw Diameter	Thds per Inch ^b	D		d		P		S		L			
		Major Diameter		Minor Diameter		Point Diameter ^c		Point Taper Length ^d		Minimum Practical Nominal Screw Lengths			
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	90° Heads	Csk Heads
												90° Heads	Csk Heads
0 0.0600	48	0.060	0.054	0.036	0.033	0.031	0.027	0.042	0.031	1/8	1/8	1/8	1/8
1 0.0730	42	0.075	0.069	0.049	0.046	0.044	0.040	0.048	0.036	1/8	3/32	3/16	3/16
2 0.0860	32	0.088	0.082	0.064	0.060	0.058	0.054	0.062	0.047	3/32	3/16	1/4	1/4
3 0.0990	28	0.101	0.095	0.075	0.071	0.068	0.063	0.071	0.054	3/16	7/32	1/2	1/2
4 0.1120	24	0.114	0.108	0.086	0.082	0.079	0.074	0.083	0.063	3/16	1/4	3/16	1/2
5 0.1250	20	0.130	0.123	0.094	0.090	0.087	0.082	0.100	0.075	7/32	9/32	1/2	1/2
6 0.1380	20	0.139	0.132	0.104	0.099	0.095	0.089	0.100	0.075	1/4	9/32	3/8	3/8
7 0.1510	19	0.154	0.147	0.115	0.109	0.105	0.099	0.105	0.079	1/4	5/16	13/32	13/32
8 0.1640	18	0.166	0.159	0.122	0.116	0.112	0.106	0.111	0.083	5/16	1/2	7/16	7/16
10 0.1900	16	0.189	0.182	0.141	0.135	0.130	0.123	0.125	0.094	3/16	3/8	1/2	1/2
12 0.2160	14	0.215	0.208	0.164	0.157	0.152	0.145	0.143	0.107	1/2	7/16	9/16	9/16
1/4 0.2500	14	0.246	0.237	0.192	0.185	0.179	0.171	0.143	0.107	3/8	1/2	21/32	21/32
3/16 0.3125	12	0.315	0.306	0.244	0.236	0.230	0.222	0.167	0.125	15/32	19/32	27/32	27/32
3/8 0.3750	12	0.380	0.371	0.309	0.299	0.293	0.285	0.167	0.125	1/2	11/16	15/16	15/16
7/16 0.4375	10	0.440	0.429	0.359	0.349	0.343	0.335	0.200	0.150	3/4	25/32	1 1/8	1 1/8
1/2 0.5000	10	0.504	0.493	0.423	0.413	0.407	0.399	0.200	0.150	11/16	27/32	1 1/4	1 13/32

All dimensions are in inches. See Tables 1 and 2 for thread diagrams.

Table 6. Thread and Point Dimensions for Type C Thread Forming Tapping Screws (ANSI B18.6.4–1981, R1991 Appendix)

Nominal Size ^a or Basic Screw Diameter	Threads per inch	D		P		S				L				
		Major Diameter		Point Diameter ^b		Point Taper Length ^c				Determinant Lengths for Point Taper ^c		Minimum Practical Nominal Screw Lengths		
		Max	Min	Max	Min	For Short Screws		For Long Screws		90° Heads	Csk Heads	90° Heads	Csk Heads	
						Max	Min	Max	Min					
2	0.0860	56	0.0860	0.0813	0.068	0.061	0.062	0.045	0.080	0.062	$\frac{3}{32}$	$\frac{3}{16}$	$\frac{3}{32}$	$\frac{3}{16}$
2	0.0860	64	0.0860	0.0816	0.070	0.064	0.055	0.039	0.070	0.055	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{3}{16}$
3	0.0990	48	0.0990	0.0938	0.078	0.070	0.073	0.052	0.094	0.073	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{3}{32}$	$\frac{7}{32}$
3	0.0990	56	0.0990	0.0942	0.081	0.074	0.062	0.045	0.080	0.062	$\frac{3}{32}$	$\frac{3}{16}$	$\frac{3}{32}$	$\frac{3}{16}$
4	0.1120	40	0.1120	0.1061	0.087	0.078	0.088	0.062	0.112	0.088	$\frac{3}{32}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{4}$
4	0.1120	48	0.1120	0.1068	0.091	0.083	0.073	0.052	0.094	0.073	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{3}{32}$	$\frac{7}{32}$
5	0.1250	40	0.1250	0.1191	0.100	0.091	0.088	0.062	0.112	0.088	$\frac{7}{32}$	$\frac{9}{32}$	$\frac{3}{16}$	$\frac{1}{4}$
5	0.1250	44	0.1250	0.1195	0.102	0.094	0.080	0.057	0.102	0.080	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{4}$
6	0.1380	32	0.1380	0.1312	0.107	0.096	0.109	0.078	0.141	0.109	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{5}{16}$
6	0.1380	40	0.1380	0.1321	0.113	0.104	0.088	0.062	0.112	0.088	$\frac{7}{32}$	$\frac{9}{32}$	$\frac{3}{16}$	$\frac{1}{4}$
8	0.1640	32	0.1640	0.1571	0.132	0.122	0.109	0.078	0.141	0.109	$\frac{1}{4}$	$\frac{11}{32}$	$\frac{1}{4}$	$\frac{5}{16}$
8	0.1640	36	0.1640	0.1577	0.136	0.126	0.097	0.069	0.125	0.097	$\frac{7}{32}$	$\frac{5}{16}$	$\frac{7}{32}$	$\frac{5}{16}$
10	0.1900	24	0.1900	0.1818	0.148	0.135	0.146	0.104	0.188	0.146	$\frac{11}{32}$	$\frac{7}{16}$	$\frac{5}{16}$	$\frac{13}{32}$
10	0.1900	32	0.1900	0.1831	0.158	0.148	0.109	0.078	0.141	0.109	$\frac{1}{4}$	$\frac{11}{32}$	$\frac{1}{4}$	$\frac{5}{16}$
12	0.2160	24	0.2160	0.2078	0.174	0.161	0.146	0.104	0.188	0.146	$\frac{11}{32}$	$\frac{7}{16}$	$\frac{5}{16}$	$\frac{5}{16}$
12	0.2160	28	0.2160	0.2085	0.180	0.168	0.125	0.089	0.161	0.125	$\frac{5}{16}$	$\frac{13}{32}$	$\frac{9}{32}$	$\frac{3}{8}$
$\frac{1}{4}$	0.2500	20	0.2500	0.2408	0.200	0.184	0.175	0.125	0.225	0.175	$\frac{11}{32}$	$\frac{17}{32}$	$\frac{3}{8}$	$\frac{1}{2}$
$\frac{1}{4}$	0.2500	28	0.2500	0.2425	0.214	0.202	0.125	0.089	0.161	0.125	$\frac{5}{16}$	$\frac{13}{32}$	$\frac{9}{32}$	$\frac{3}{8}$
$\frac{5}{16}$	0.3125	18	0.3125	0.3026	0.257	0.239	0.194	0.139	0.250	0.194	$\frac{15}{32}$	$\frac{19}{32}$	$\frac{7}{16}$	$\frac{9}{16}$
$\frac{5}{16}$	0.3125	24	0.3125	0.3042	0.271	0.257	0.146	0.104	0.188	0.146	$\frac{11}{32}$	$\frac{15}{32}$	$\frac{5}{16}$	$\frac{15}{32}$
$\frac{3}{8}$	0.3750	16	0.3750	0.3643	0.312	0.293	0.219	0.156	0.281	0.219	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{5}{16}$	$\frac{5}{8}$
$\frac{3}{8}$	0.3750	24	0.3750	0.3667	0.333	0.319	0.146	0.104	0.188	0.146	$\frac{11}{32}$	$\frac{1}{2}$	$\frac{5}{16}$	$\frac{1}{2}$
$\frac{7}{16}$	0.4375	14	0.4375	0.4258	0.366	0.344	0.250	0.179	0.321	0.250	$\frac{19}{32}$	$\frac{3}{4}$	$\frac{9}{16}$	$\frac{23}{32}$
$\frac{7}{16}$	0.4375	20	0.4375	0.4281	0.387	0.371	0.175	0.125	0.225	0.175	$\frac{13}{32}$	$\frac{9}{16}$	$\frac{3}{8}$	$\frac{3}{4}$
$\frac{1}{2}$	0.5000	13	0.5000	0.4876	0.423	0.399	0.269	0.192	0.346	0.269	$\frac{1}{2}$	$\frac{25}{32}$	$\frac{19}{32}$	$\frac{3}{4}$
$\frac{1}{2}$	0.5000	20	0.5000	0.4906	0.450	0.433	0.175	0.125	0.225	0.175	$\frac{13}{32}$	$\frac{9}{16}$	$\frac{3}{8}$	$\frac{17}{32}$

^a Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

^b The tabulated values apply to screw blanks before roll threading.

^c Screws of these nominal lengths and shorter shall have point taper length specified above for short screws. Longer lengths shall have point taper length specified for long screws.

All dimensions are in inches. See Table 1 for thread diagrams. Type C is not recommended for new designs.

Tapered threads shall have unfinished crests.

**Table 7. ANSI Standard Thread and Point Dimensions for Types D, F, G, and T
Thread Cutting Tapping Screws ANSI B18.6.4-1981 (R1991)**

Nominal Size ^a or Basic Screw Diameter	Threads per inch	D		P		S				L			
		Major Diameter		Point Diameter ^b		Point Taper Length ^c				Determinant Lengths for Point Taper ^c		Minimum Practical Nominal Screw Lengths	
		Max	Min	Max	Min	For Short Screws		For Long Screws		90° Heads	Csk Heads	90° Heads	Csk Heads
						Max	Min	Max	Min				
2 0.0860	56	0.0860	0.0813	0.068	0.061	0.062	0.045	0.080	0.062	5/32	3/16	5/32	3/16
2 0.0860	64	0.0860	0.0816	0.070	0.064	0.055	0.039	0.070	0.055	1/8	3/16	1/8	5/32
3 0.0990	48	0.0990	0.0938	0.078	0.070	0.073	0.052	0.094	0.073	3/16	3/16	3/16	5/32
3 0.0990	56	0.0990	0.0942	0.081	0.074	0.062	0.045	0.080	0.062	5/32	3/16	5/32	3/16
4 0.1120	40	0.1120	0.1061	0.087	0.078	0.088	0.062	0.112	0.088	7/32	1/4	3/16	1/4
4 0.1120	48	0.1120	0.1068	0.091	0.083	0.073	0.052	0.094	0.073	3/16	3/16	5/32	7/32
5 0.1250	40	0.1250	0.1191	0.100	0.091	0.088	0.062	0.112	0.088	7/32	3/16	3/16	1/4
5 0.1250	44	0.1250	0.1195	0.102	0.094	0.080	0.057	0.102	0.080	3/16	1/4	3/16	1/4
6 0.1380	32	0.1380	0.1312	0.107	0.096	0.109	0.078	0.141	0.109	1/4	3/16	1/4	5/16
6 0.1380	40	0.1380	0.1321	0.113	0.104	0.088	0.062	0.112	0.088	7/32	3/16	3/16	5/16
8 0.1640	32	0.1640	0.1571	0.132	0.122	0.109	0.078	0.141	0.109	1/4	1/2	1/4	5/16
8 0.1640	36	0.1640	0.1577	0.136	0.126	0.097	0.069	0.125	0.097	7/32	3/16	7/32	9/32
10 0.1900	24	0.1900	0.1818	0.148	0.135	0.146	0.104	0.188	0.146	1/2	3/16	1/2	13/32
10 0.1900	32	0.1900	0.1831	0.158	0.148	0.109	0.078	0.141	0.109	1/4	1/2	1/4	5/16
12 0.2160	24	0.2160	0.2078	0.174	0.161	0.146	0.104	0.188	0.146	1/2	3/16	1/2	13/32
12 0.2160	28	0.2160	0.2085	0.180	0.168	0.125	0.089	0.161	0.125	5/16	3/16	5/16	3/8
1/4 0.2500	20	0.2500	0.2408	0.200	0.184	0.175	0.125	0.225	0.175	1/2	1/2	3/8	1/2
1/4 0.2500	28	0.2500	0.2425	0.214	0.202	0.125	0.089	0.161	0.125	5/16	1/2	5/16	3/8
5/16 0.3125	18	0.3125	0.3026	0.257	0.239	0.194	0.139	0.250	0.194	5/16	1/2	5/16	3/8
5/16 0.3125	24	0.3125	0.3042	0.271	0.257	0.146	0.104	0.188	0.146	1/2	1/2	5/16	3/8
3/8 0.3750	16	0.3750	0.3643	0.312	0.293	0.219	0.156	0.281	0.219	1/2	1/2	15/32	3/8
3/8 0.3750	24	0.3750	0.3667	0.333	0.319	0.146	0.104	0.188	0.146	1/2	1/2	5/16	1/2
7/16 0.4375	14	0.4375	0.4258	0.366	0.344	0.250	0.179	0.321	0.250	9/16	3/4	9/16	23/32
7/16 0.4375	20	0.4375	0.4281	0.387	0.371	0.175	0.125	0.225	0.175	13/32	9/16	3/8	17/32
1/2 0.5000	13	0.5000	0.4876	0.423	0.399	0.269	0.192	0.346	0.269	5/8	23/32	19/32	3/4
1/2 0.5000	20	0.5000	0.4906	0.450	0.433	0.175	0.125	0.225	0.175	13/32	9/16	3/8	17/32

^a Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

^b The tabulated values apply to screw blanks before roll threading.

^c Screws of these nominal lengths and shorter shall have point taper length specified above for short screws. Longer lengths shall have point taper length specified for long screws.

All dimensions are in inches. See Table 2 for thread diagrams.

Type "Type D" otherwise designated "Type 1."

Type "Type T" otherwise designated "Type 23."

Table 8. Approximate Hole Sizes for Type A Steel Thread Forming Screws

In Steel, Stainless Steel, Monel Metal, Brass, and Aluminum Sheet Metal									
Screw Size	Metal Thickness	Hole Size		Drill Size	Screw Size	Metal Thickness	Hole Size		Drill Size
		Pierced or Extruded	Drilled or Clean Punched				Pierced or Extruded	Drilled or Clean Punched	
4	0.015	...	0.086	44	8	0.024	0.136	0.125	1/8
	0.018	...	0.086	44		0.030	0.136	0.125	1/8
	0.024	0.098	0.094	42		0.036	0.136	0.125	1/8
	0.030	0.098	0.094	42		0.048	0.136	0.128	30
	0.036	0.098	0.098	40		0.018	...	0.136	29
6	0.015	...	0.104	37	10	0.024	0.157	0.136	29
	0.018	...	0.104	37		0.030	0.157	0.136	29
	0.024	0.111	0.104	37		0.036	0.157	0.136	29
	0.030	0.111	0.104	37		0.048	0.157	0.149	25
	0.036	0.111	0.106	36		0.024	...	0.161	20
7	0.015	...	0.116	32	12	0.030	0.185	0.161	20
	0.018	...	0.116	32		0.036	0.185	0.161	20
	0.024	0.120	0.116	32		0.048	0.185	0.161	20
	0.030	0.120	0.116	32		0.024	...	0.185	13
	0.036	0.120	0.116	32		0.030	0.209	0.189	12
8	0.048	0.120	0.120	31	14	0.036	0.209	0.191	11
	0.018	...	0.125	1/8		0.048	0.209	0.196	9

In Plywood (Resin Impregnated)						In Asbestos Compositions					
Screw Size	Hole Size	Drill Size	Min. Mat'l Thickness	Penetration in Blind Holes		Screw Size	Hole Size	Drill Size	Min. Mat'l Thickness	Penetration in Blind Holes	
				Min.	Max.					Min.	Max.
4	0.098	40	0.188	0.250	0.750	4	0.094	42	0.188	0.250	0.750
6	0.110	35	0.188	0.250	0.750	6	0.106	36	0.188	0.250	0.750
7	0.128	30	0.250	0.312	0.750	7	0.125	1/8	0.250	0.312	0.750
8	0.140	28	0.250	0.312	0.750	8	0.136	29	0.250	0.312	0.750
10	0.170	18	0.312	0.375	1.000	10	0.161	20	0.312	0.375	1.000
12	0.189	12	0.312	0.375	1.000	12	0.185	13	0.312	0.375	1.000
14	0.228	1	0.438	0.500	1.000	14	0.213	3	0.438	0.500	1.000

Type A is not recommended, use Type AB.
See footnote at bottom of Table 9.

Table 9. Approximate Hole Sizes for Type C Steel Thread Forming Screws

In Sheet Steel											
Screw Size	Metal Thickness	Hole Size	Drill Size	Screw Size	Metal Thickness	Hole Size	Drill Size	Screw Size	Metal Thickness	Hole Size	Drill Size
4-40	0.037	0.094	42	10-24	0.037	0.154	23	1/4-20	0.037	0.221	2
	0.048	0.094	42		0.048	0.161	20		0.048	0.221	2
	0.062	0.096	41		0.062	0.166	19		0.062	0.228	1
	0.075	0.100	39		0.075	0.170	18		0.075	0.234	A
	0.105	0.102	38		0.105	0.173	17		0.105	0.234	A
0.134	0.102	38	0.134	0.177	16	0.134	0.236	6mm			
6-32	0.037	0.113	33	10-32	0.037	0.170	18	1/4-28	0.037	0.224	5.7mm
	0.048	0.116	32		0.048	0.170	18		0.048	0.228	1
	0.062	0.116	32		0.062	0.170	18		0.062	0.232	5.9mm
	0.075	0.122	3.1mm		0.075	0.173	17		0.075	0.234	A
	0.105	0.125	1/8		0.105	0.177	16		0.105	0.238	B
0.134	0.125	1/8	0.134	0.177	16	0.134	0.238	B			
8-32	0.037	0.136	29	12-24	0.037	0.189	12	3/16-18	0.037	0.290	L
	0.048	0.144	27		0.048	0.194	10		0.048	0.290	L
	0.062	0.144	27		0.062	0.194	10		0.062	0.290	L
	0.075	0.147	26		0.075	0.199	8		0.075	0.295	M
	0.105	0.150	25		0.105	0.199	8		0.105	0.295	M
0.134	0.150	25	0.134	0.199	8	0.134	0.295	M			

All dimensions are in inches except drill sizes. It may be necessary to vary the hole size to suit a particular application.

Type C is not recommended for new designs.

Table 10. Approximate Pierced or Extruded Hole Sizes for Types AB, B, and BP Steel Thread Forming Screws

Screw Size	Metal Thickness	Pierced or Extruded Hole Size	Screw Size	Metal Thickness	Pierced or Extruded Hole Size	Screw Size	Metal Thickness	Pierced or Extruded Hole Size
In Steel, Stainless Steel, Monel Metal, and Brass Sheet Metal								
4	0.015	0.086	7	0.024	0.120	10	0.030	0.157
	0.018	0.086		0.030	0.120		0.036	0.157
	0.024	0.098		0.036	0.120		0.048	0.157
	0.030	0.098		0.048	0.120		0.024	0.185
	0.036	0.098		0.018	0.136		0.030	0.185
6	0.015	0.111	8	0.024	0.136	12	0.036	0.185
	0.018	0.111		0.030	0.136		0.048	0.185
	0.024	0.111		0.036	0.136		0.030	0.209
	0.030	0.111		0.048	0.136		0.036	0.209
	0.036	0.111		0.018	0.157		0.048	0.209
7	0.018	0.120	10	0.024	0.157	...	...	...
In Aluminum Alloy Sheet Metal								
4	0.024	0.086	6	0.048	0.111	8	0.036	0.136
	0.030	0.086		0.024	0.120		0.048	0.136
	0.036	0.086		0.030	0.120		0.024	0.157
	0.048	0.086		0.036	0.120		0.030	0.157
	0.024	0.111		0.048	0.120		0.036	0.157
6	0.030	0.111	8	0.024	0.136	...	0.048	0.157
	0.036	0.111		0.030	0.136		...	...

All dimensions are in inches except whole number screw and drill sizes.

Since conditions differ widely, it may be necessary to vary the hole size to suit a particular application.

Table 11. Drilled Hole Sizes for Types AB, B, and BP Steel Thread Forming Screws

Screw Size	Hole Size	Drill Size	Min. Mat'l Thickness	Penetration in Blind Holes		Screw Size	Hole Size	Drill Size	Min. Mat'l Thickness	Penetration in Blind Holes	
				Min.	Max.					Min.	Max.
In Plywood (Resin Impregnated)						In Asbestos Compositions					
2	0.073	49	0.125	0.188	0.500	2	0.076	48	0.125	0.188	0.500
4	0.100	39	0.188	0.250	0.625	4	0.101	38	0.188	0.250	0.625
6	0.125	1/8	0.188	0.250	0.625	6	0.120	31	0.188	0.250	0.625
7	0.136	29	0.188	0.250	0.750	7	0.136	29	0.250	0.312	0.750
8	0.144	27	0.188	0.250	0.750	8	0.147	26	0.312	0.375	0.750
10	0.173	17	0.250	0.312	1.000	10	0.166	19	0.312	0.375	1.000
12	0.194	10	0.312	0.375	1.000	12	0.196	9	0.312	0.375	1.000
1/4	0.228	1	0.312	0.375	1.000	1/4	0.228	1	0.438	0.500	1.000
In Aluminum, Magnesium, Zinc, Brass, and Bronze Castings ^a						In Phenol Formaldehyde Plastics ^a					
2	0.078	47	...	0.125	...	2	0.078	47	...	0.188	...
4	0.104	37	...	0.188	...	4	0.100	39	...	0.250	...
6	0.128	30	...	0.250	...	6	0.128	30	...	0.250	...
7	0.144	27	...	0.250	...	7	0.136	29	...	0.250	...
8	0.152	24	...	0.250	...	8	0.150	25	...	0.312	...
10	0.177	16	...	0.250	...	10	0.177	16	...	0.312	...
12	0.199	8	...	0.281	...	12	0.199	8	...	0.375	...
1/4	0.234	15/64	...	0.312	...	1/4	0.234	15/64	...	0.375	...
In Cellulose Acetate and Nitrate, and Acrylic and Styrene Resins ^a											
2	0.078	47	...	0.188	...	8	0.144	27	...	0.312	...
4	0.094	42	...	0.250	...	10	0.170	18	...	0.312	...
6	0.120	31	...	0.250	...	12	0.191	11	...	0.375	...
7	0.128	30	...	0.250	...	1/4	0.221	2	...	0.375	...

^a Data below apply to Types B and BP only.

All dimensions are in inches except whole number screw and drill sizes.

Since conditions differ widely, it may be necessary to vary the hole size to suit a particular application.

Table 12a. Approximate Drilled or Clean-Punched Hole Sizes for Types AB, B, and BP Steel Thread Forming Screws

Screw Size	Metal Thickness	Hole Size	Drill Size	Screw Size	Metal Thickness	Hole Size	Drill Size	Screw Size	Metal Thickness	Hole Size	Drill Size		
In Steel, Stainless Steel, Monel Metal, and Brass Sheet Metal													
2	0.015	0.064	52	7	0.018	0.116	32	10	0.125	0.170	18		
	0.018	0.064	52		0.024	0.116	32		0.135	0.170	18		
	0.024	0.067	51		0.030	0.116	32		0.164	0.173	17		
	0.030	0.070	50		0.036	0.116	32	12	0.024	0.166	19		
	0.036	0.073	49		0.048	0.120	31		0.030	0.166	19		
	0.048	0.073	49		0.060	0.128	30		0.036	0.166	19		
0.060	0.076	48	0.075	0.136	29	0.048	0.170		18				
4	0.015	0.086	44	8	0.105	0.140	28		0.060	0.177	16		
	0.018	0.086	44		0.024	0.125	$\frac{1}{8}$		0.075	0.182	14		
	0.024	0.089	43		0.030	0.125	$\frac{1}{8}$	0.105	0.185	13			
	0.030	0.094	42		0.036	0.125	$\frac{1}{8}$	0.125	0.196	9			
	0.036	0.094	42		0.048	0.128	30	0.135	0.196	9			
	0.048	0.096	41		0.060	0.136	29	0.164	0.201	7			
	0.060	0.100	39		0.075	0.140	28	$\frac{1}{4}$	0.030	0.194 ^a	10 ^a		
	0.075	0.102	38		0.105	0.150	25		0.036	0.194 ^a	10 ^a		
6	0.015	0.104	37	10	0.125	0.150	25		0.048	0.194 ^a	10 ^a		
	0.018	0.104	37		0.135	0.152	24		0.060	0.199 ^a	8 ^a		
	0.024	0.106	36		0.024	0.144	27		0.075	0.204 ^a	6 ^a		
	0.030	0.106	36		0.030	0.144	27		0.105	0.209	4		
	0.036	0.110	35		0.036	0.147	26	0.125	0.228	1			
	0.048	0.111	34		0.048	0.152 ^a	24 ^a	0.135	0.228	1			
	0.060	0.116	32		0.060	0.152 ^a	24 ^a	0.164	0.234	$\frac{1}{8}$ ^a			
	0.075	0.120	31		0.075	0.157	22	0.187	0.234	$\frac{1}{8}$ ^a			
	7	0.105	0.128		30	10	0.105	0.161	20	0.194	0.234	$\frac{1}{8}$ ^a	
										0.194	0.234	$\frac{1}{8}$ ^a	
In Aluminum Alloy Sheet Metal													
2	0.024	0.064	52	7	0.060	0.120	31	10	0.164	0.159	21		
	0.030	0.064	52		0.075	0.128	30		0.200	0.166	19		
	0.036	0.064	52		0.105	0.136	29		to				
	0.048	0.067	51		0.128	0.136	29		0.375				
	0.060	0.070	50		to								
4	0.030	0.086	44	8	0.250	0.136	29	12	0.048	0.161	20		
	0.036	0.086	44		0.030				0.116	32	0.060	0.166	19
	0.048	0.086	44		0.036				0.120	31	0.075	0.173	17
	0.060	0.089	43		0.048				0.128	30	0.105	0.180	15
	0.075	0.089	43		0.060				0.136	29	0.125	0.182	14
	0.105	0.094	42		0.075				0.140	28	0.135	0.182	14
	6	0.030	0.104		37				10	0.105	0.140	28	0.164
0.036		0.104	37	0.125	0.147	26	0.200	0.196		9			
0.048		0.104	37	0.135	0.149	25	to						
0.060		0.106	36	0.162	0.152	24	0.375						
0.075		0.110	35	to									
0.105		0.111	34	0.375									
7	0.128	120	31	10	0.036	0.144	27	$\frac{1}{4}$	0.060	0.199	8		
	to				0.048	0.144	27		0.075	0.201	7		
	250				0.060	0.144	27		0.105	0.204	6		
	0.030				0.113	33	0.075		0.147	26	0.125	0.209	4
					0.036	0.113	33		0.105	0.147	26	0.135	0.209	4
7	0.048	0.116	32	10	0.125	0.154	23	0.164	0.213	3			
					0.135	0.154	23	0.187	0.213	3			
					0.135	0.154	23	0.194	0.221	2			
								0.200	228	1			
								to					
								0.375					

^aFor Types B and BP only; for Type AB see concluded Table 12b following.

Since conditions differ widely, it may be necessary to vary the hole size to suit a particular application. Hole sizes for metal thicknesses above 0.075 inch are for Types B and BP only.

Table 12b. Supplementary Data for Types AB Thread Forming Screws in Steel, Stainless Steel, Monel Metal, and Brass Sheet Metal

Screw Size	Metal Thickness	Hole Size	Drill Size	Screw Size	Metal Thickness	Hole Size	Drill Size	Screw Size	Metal Thickness	Hole Size	Drill Size
In Steel, Stainless Steel, Monel Metal, and Brass Sheet Metal											
10	0.018	0.144	27	¼	0.018	0.196	9	¼	0.048	0.205	5
10	0.048	0.149	25	¼	0.024	0.196	9	¼	0.060	0.228	1
10	0.060	0.154	23	¼	0.030	0.196	9	¼	0.075	0.232	5.9 mm
...	...	...	...	¼	0.036	0.196	9	...	...	...	...

All dimensions are in inches except numbered screw and drill sizes.

Table 13. Approximate Hole Sizes for Types D, F, G, and T Steel Thread Cutting Screws in Sheet Metals

Screw Size	Thick-ness	Steel		Aluminum Alloy		Screw Size	Thick-ness	Steel		Aluminum Alloy		
		Hole Size	Drill Size	Hole Size	Drill Size			Hole Size	Drill Size	Hole Size	Drill Size	
2-56	0.050	0.073	49	0.070	50	8-32	0.187	0.150	25	0.147	26	
	0.060	0.073	49	0.073	49		0.250	0.150	25	0.150	25	
	0.083	0.073	49	0.073	49		0.312	0.150	25	0.150	25	
	0.109	0.073	49	0.073	49		10-24	0.050	0.152	24	0.150	25
	0.125	0.076	48	0.073	49			0.060	0.154	23	0.152	24
	0.140	0.076	48	0.073	49			0.083	0.161	20	0.154	23
3-48	0.050	0.081	46	0.078	¾ ₆₄	0.109		0.161	20	0.157	22	
	0.060	0.081	46	0.081	46	0.125		0.166	19	0.159	21	
	0.083	0.082	45	0.082	45	0.140		0.170	18	0.161	20	
	0.109	0.086	44	0.082	45	0.187	0.173	17	0.166	19		
	0.125	0.086	44	0.082	45	0.250	0.173	17	0.172	¼ ₆₄		
	0.140	0.086	44	0.086	44	0.312	0.173	17	0.173	17		
4-40	0.187	0.089	43	0.086	44	0.375	0.173	17	0.173	17		
	0.050	0.089	43	0.089	43	10-32	0.050	0.159	21	0.161	20	
	0.060	0.089	43	0.089	43		0.060	0.166	19	0.161	20	
	0.083	0.094	42	0.089	43		0.083	0.166	19	0.161	20	
	0.109	0.096	41	0.094	42		0.109	0.170	18	0.166	19	
	0.125	0.098	40	0.094	42		0.125	0.170	18	0.166	19	
0.140	0.098	40	0.094	¾ ₃₂	0.140		0.170	18	0.166	19		
5-40	0.187	0.102	38	0.098	40	0.187	0.177	16	0.172	¼ ₆₄		
	0.050	0.106	36	0.102	38	0.250	0.177	16	0.177	16		
	0.060	0.106	36	0.102	38	0.312	0.177	16	0.177	16		
	0.083	0.106	36	0.104	37	0.375	0.177	16	0.177	16		
	0.109	0.106	36	0.104	37	12-24	0.060	0.180	15	0.177	16	
	0.125	0.109	¾ ₆₄	0.106	36		0.083	0.182	14	0.180	15	
0.140	0.110	¾ ₆₄	0.106	36	0.109		0.188	¾ ₁₆	0.182	14		
0.187	0.116	¾ ₆₄	0.110	35	0.125		0.191	11	0.185	13		
0.250	0.116	¾ ₆₄	0.113	33	0.140		0.191	11	0.188	¾ ₁₆		
6-32	0.050	0.110	35	0.109	¾ ₆₄		0.187	0.199	8	0.191	11	
	0.060	0.113	33	0.109	¾ ₆₄	0.250	0.199	8	0.199	8		
	0.083	0.116	32	0.111	34	0.312	0.199	8	0.199	8		
	0.109	0.116	32	0.113	33	0.375	0.199	8	0.199	8		
	0.125	0.116	32	0.116	32	0.500	0.199	8	0.199	8		
	0.140	0.120	31	0.116	32	¼-20	0.083	0.213	3	0.206	5	
0.187	0.125	⅝	0.120	31	0.109		0.219	¾ ₃₂	0.209	4		
0.250	0.125	⅝	0.125	⅝	0.125		0.221	2	0.213	3		
8-32	0.050	0.136	29	0.136	29		0.140	0.221	2	0.213	3	
	0.060	0.140	28	0.136	29		0.187	0.228	1	0.221	2	
	0.083	0.140	28	0.136	29		0.250	0.228	1	0.228	1	
	0.109	0.144	27	0.140	28	0.312	0.228	1	0.228	1		
	0.125	0.144	27	0.140	28	0.375	0.228	1	0.228	1		
	0.140	0.147	26	0.144	27	0.500	0.228	1	0.228	1		

Table 13. (Continued) Approximate Hole Sizes for Types D, F, G, and T Steel Thread Cutting Screws in Sheet Metals

Screw Size	Thick-ness	Steel		Aluminum Alloy		Screw Size	Thick-ness	Steel		Aluminum Alloy	
		Hole Size	Drill Size	Hole Size	Drill Size			Hole Size	Drill Size	Hole Size	Drill Size
1/4-28	0.083	0.221	2	0.219	1/32	3/16-24	0.187	0.295	M	0.290	L
	0.109	0.228	1	0.221	2		0.250	0.295	M	0.295	M
	0.125	0.228	1	0.221	2		0.312	0.295	M	0.295	M
	0.140	0.234	A	0.221	2		0.375	0.295	M	0.295	M
	0.187	0.234	5/64	0.228	1		0.500	0.295	M	0.295	M
	0.250	0.234	5/64	0.234	5/64	3/8-16	0.125	0.339	R	0.328	3/64
	0.312	0.234	5/64	0.234	5/64		0.140	0.339	R	0.332	Q
	0.375	0.234	5/64	0.234	5/64		0.187	0.348	S	0.339	R
5/16-18	0.109	0.277	J	0.266	H		0.250	0.358	T	0.348	S
	0.125	0.277	J	0.272	I		0.312	0.358	T	0.348	S
	0.140	0.281	3/32	0.272	I		0.375	0.358	T	0.348	S
	0.187	0.290	L	0.281	K		0.500	0.358	T	0.348	S
	0.250	0.290	L	0.290	L		5/8-24	0.125	0.348	S	0.344	1/32
	0.312	0.290	L	0.290	L	0.140		0.348	S	0.344	1/32
	0.375	0.290	L	0.290	L	0.187		0.358	T	0.348	S
	0.500	0.290	L	0.290	L	0.250		0.358	T	0.358	T
5/16-24	0.109	0.290	L	0.281	K	0.312		0.358	T	0.358	T
	0.125	0.290	L	0.281	3/32	0.375		0.358	T	0.358	T
	0.140	0.290	L	0.281	3/32	0.500		0.358	T	0.358	T
					

All dimensions are in inches except numbered drill and screw sizes. It may be necessary to vary the hole size to suit a particular application.

Table 14. Approximate Hole Sizes for Types D, F, G, and T Steel Thread Cutting Screws in Cast Metals and Plastics

Screw Size	Thick-ness	Cast Iron		Zinc and Aluminum ^a		Screw Size	Thick-ness	Cast Iron		Zinc and Aluminum ^a	
		Hole Size	Drill Size	Hole Size	Drill Size			Hole Size	Drill Size	Hole Size	Drill Size
2-56	0.050	0.076	48	0.073	49	5-40	0.083	0.113	33	0.106	36
	0.060	0.076	48	0.073	49		0.109	0.113	33	0.110	35
	0.083	0.076	48	0.076	48		0.125	0.116	32	0.110	35
	0.109	0.078	5/64	0.076	48		0.140	0.116	32	0.110	35
	0.125	0.078	5/64	0.076	48		0.187	0.116	32	0.111	34
	0.140	0.078	5/64	0.076	48		0.250	0.116	32	0.113	33
3-48	0.050	0.089	43	0.082	45	6-32	0.050	0.120	31	0.116	32
	0.060	0.089	43	0.082	45		0.060	0.120	31	0.120	31
	0.083	0.089	43	0.082	45		0.083	0.125	1/8	0.120	31
	0.109	0.089	43	0.086	44		0.109	0.125	1/8	0.120	31
	0.125	0.089	43	0.089	43		0.125	0.125	1/8	0.120	31
	0.140	0.094	42	0.089	43		0.140	0.125	1/8	0.120	31
	0.187	0.094	42	0.089	43		0.187	0.128	30	0.120	31
4-40	0.050	0.100	39	0.090	41	8-32	0.250	0.128	30	0.120	31
	0.060	0.100	39	0.096	41		0.050	0.147	26	0.144	27
	0.083	0.102	38	0.096	41		0.060	0.150	25	0.144	27
	0.109	0.102	38	0.096	41		0.083	0.150	25	0.144	27
	0.125	0.102	38	0.100	39		0.109	0.150	25	0.144	27
	0.140	0.102	38	0.100	39		0.125	0.150	25	0.147	26
	0.187	0.104	37	0.100	39		0.140	0.150	25	0.147	26
5-40	0.050	0.111	34	0.106	36	0.187	0.154	23	0.147	26	
	0.060	0.111	34	0.106	36	0.250	0.154	23	0.150	25	
						0.312	0.154	23	0.150	25	

Table 14. (Continued) Approximate Hole Sizes for Types D, F, G, and T Steel Thread Cutting Screws in Cast Metals and Plastics

Screw Size	Thick-ness	Cast Iron		Zinc and Aluminum ^a		Screw Size	Thick-ness	Cast Iron		Zinc and Aluminum ^a		
		Hole Size	Drill Size	Hole Size	Drill Size			Hole Size	Drill Size	Hole Size	Drill Size	
10-24	0.050	0.170	18	0.161	20	1/4-28	0.083	0.234	A	0.228	J	
	0.060	0.170	18	0.166	19		0.109	0.234	15/64	0.228	1	
	0.083	0.172	15/64	0.166	19		0.125	0.234	15/64	0.228	1	
	0.109	0.173	17	0.166	19		0.140	0.234	15/64	0.228	1	
	0.125	0.173	17	0.166	19		0.187	0.238	B	0.228	1	
	0.140	0.173	17	0.166	19		0.250	0.238	B	0.234	A	
	0.187	0.177	16	0.170	18		0.312	0.238	B	0.234	A	
	0.250	0.177	16	0.170	18		0.375	0.238	B	0.234	15/64	
	0.312	0.177	16	0.172	15/64		0.500	0.238	B	0.234	15/64	
	0.375	0.177	16	0.172	15/64		1/16-18	0.109	0.290	L	0.277	J
0.050	0.173	17	0.170	18	0.125	0.290		L	0.281	K		
0.060	0.173	17	0.170	18	0.140	0.290		L	0.281	K		
0.083	0.177	16	0.172	15/64	0.187	0.295		M	0.281	3/32		
0.109	0.177	16	0.172	15/64	0.250	0.295		M	0.281	3/32		
0.125	0.177	16	0.172	15/64	0.312	0.295		M	0.290	L		
0.140	0.177	16	0.172	15/64	0.375	0.295		M	0.290	L		
0.187	0.180	15	0.172	15/64	0.500	0.295		M	0.290	L		
0.250	0.180	15	0.173	17	3/16-24	0.109		0.295	M	0.290	L	
0.312	0.180	15	0.173	17		0.125		0.295	M	0.290	L	
0.375	0.180	15	0.177	16		0.140	0.295	M	0.290	L		
0.060	0.196	9	0.189	12		0.187	0.302	N	0.290	L		
0.083	0.199	8	0.191	11		0.250	0.302	N	0.290	L		
0.109	0.199	8	0.191	11		0.312	0.302	N	0.295	M		
0.125	0.199	8	0.191	11		0.375	0.302	N	0.295	M		
0.140	0.199	8	0.194	10		0.500	0.302	N	0.295	M		
0.187	0.203	13/64	0.194	10		3/8-16	0.125	0.348	S	0.339	R	
0.250	0.204	6	0.196	9			0.140	0.348	S	0.339	R	
0.312	0.204	6	0.196	9	0.187		0.348	S	0.339	R		
0.375	0.204	6	0.199	8	0.250		0.348	S	0.344	1/32		
0.500	0.204	6	0.199	8	0.312		0.348	S	0.344	1/32		
1/4-20	0.083	0.228	1	0.219	3/32		0.375	0.348	S	0.348	S	
	0.109	0.228	1	0.219	3/32		0.500	0.348	S	0.348	S	
	0.125	0.228	1	0.221	2		3/8-24	0.125	0.358	T	0.348	S
	0.140	0.228	1	0.221	2			0.140	0.358	T	0.348	S
	0.187	0.234	15/64	0.221	2			0.187	0.358	T	0.348	S
	0.250	0.234	15/64	0.228	1	0.250		0.358	T	0.358	T	
	0.312	0.234	15/64	0.228	1	0.312		0.358	T	0.358	T	
	0.375	0.234	15/64	0.228	1	0.375		0.358	T	0.358	T	
	0.500	0.234	15/64	0.228	1	0.500		0.358	T	0.358	T	

^a Die Castings

Screw Size	Phenol Formaldehyde ^a				Cellulose Acetate, Cellulose Nitrate, Acrylic Resin, and Styrene Resin ^a			
	Hole Size	Drill Size	Depth of Penetration		Hole Size	Drill Size	Depth of Penetration	
			Min	Max			Min	Max
2-56	0.078	3/64	0.219	0.375	0.076	48	0.219	0.375
3-48	0.089	43	0.219	0.375	0.086	44	0.219	0.375
4-40	0.098	40	0.250	0.312	0.093	42	0.250	0.312
5-40	0.113	33	0.250	0.438	0.110	35	0.250	0.438
6-32	0.116	32	0.250	0.312	0.116	32	0.250	0.312
8-32	0.144	27	0.312	0.500	0.144	27	0.312	0.500
10-24	0.161	20	0.375	0.500	0.161	20	0.375	0.500
10-32	0.166	19	0.375	0.500	0.166	19	0.375	0.500
1/4-20	0.228	1	0.375	0.625	0.228	1	0.375	1.000

^a Plastics

For footnotes see Table 13.

Table 15. Approximate Hole Sizes for Types BF and BT Steel Thread Cutting Screws in Cast Metals

In Die Cast Zinc and Aluminum										
Screw Size	Thickness	Hole Size	Drill Size	Screw Size	Thickness	Hole Size	Drill Size			
2	0.060	0.073	49	10	0.125	0.166	19			
	0.083	0.073	49		0.140	0.166	19			
	0.109	0.076	48		0.188	0.166	19			
	0.125	0.076	48		0.250	0.170	18			
	0.140	0.076	48		0.312	0.172	$\frac{1}{16}$			
3	0.060	0.086	44		12	0.375	0.172	$\frac{1}{16}$		
	0.083	0.086	44			0.125	0.191	11		
	0.109	0.086	44			0.140	0.191	11		
	0.125	0.086	44			0.188	0.191	11		
	0.140	0.089	43			0.250	0.196	9		
4	0.188	0.089	43	$\frac{1}{4}$		0.312	0.196	9		
	0.250	0.102	38			0.375	0.196	9		
	5	0.109	0.111			34	0.125	0.221	2	
		0.125	0.111			34	0.140	0.221	2	
0.140		0.113	33			0.188	0.221	2		
0.188		0.113	33		0.250	0.228	1			
6	0.250	0.116	32		$\frac{5}{16}$	0.312	0.228	1		
	0.125	0.120	31			0.375	0.228	1		
	0.140	0.120	31			0.125	0.281	K		
	0.188	0.120	31			0.140	0.281	K		
8	0.250	0.125	$\frac{1}{8}$	$\frac{3}{8}$		0.188	0.281	K		
	0.312	0.125	$\frac{1}{8}$			0.250	0.281	K		
	10	0.125	0.149			25	$\frac{7}{8}$	0.312	0.290	L
		0.140	0.149			25		0.375	0.290	L
0.188		0.149	25			0.125		0.344	$\frac{1}{32}$	
0.250		0.152	24			0.140		0.344	$\frac{1}{32}$	
12	0.312	0.152	24		...	0.188		0.344	$\frac{1}{32}$	
	1/4	0.125	0.149			25		0.250	0.344	$\frac{1}{32}$
		0.188	0.149			25		0.312	0.348	S
		0.250	0.152			24		0.375	0.348	S
0.312		0.152	24	...		...		...

All dimensions are in inches except numbered drill and screw sizes. It may be necessary to vary the hole size to suit a particular application.

Table 16. Approximate Hole Size for Types BF and BT Steel Thread Cutting Screws in Plastics

Screw Size	Phenol Formaldehyde				Cellulose Acetate, Cellulose Nitrate, Acrylic Resin and Styrene Resin			
	Hole Size	Drill Size	Depth of Penetration		Hole Size	Drill Size	Depth of Penetration	
			Min	Max			Min	Max
2	0.078	$\frac{5}{64}$	0.094	0.250	0.076	48	0.094	0.250
3	0.089	43	0.125	0.312	0.089	43	0.125	0.312
4	0.104	37	0.125	0.312	0.100	39	0.125	0.312
5	0.116	32	0.188	0.375	0.113	33	0.188	0.375
6	0.125	$\frac{1}{8}$	0.188	0.375	0.120	31	0.188	0.375
8	0.147	26	0.250	0.500	0.144	27	0.250	0.500
10	0.170	18	0.312	0.625	0.166	19	0.312	0.625
12	0.194	10	0.375	0.625	0.189	12	0.375	0.625
$\frac{1}{4}$	0.228	1	0.375	0.750	0.221	2	0.375	0.750

For footnotes see above table.

Table 17. Approximate Hole Sizes for Type U Hardened Steel Metallic Drive Screws

In Ferrous and Non-Ferrous Castings, Sheet Metals, Plastics, Plywood (Resin-Impregnated) and Fiber								
Screw Size	Hole Size	Drill Size	Screw Size	Hole Size	Drill Size	Screw Size	Hole Size	Drill Size
00	.052	55	6	.120	31	12	.191	11
0	.067	51	7	.136	29	14	.221	2
2	.086	44	8	.144	27	$\frac{3}{16}$	.295	M
4	.104	37	10	.161	20	$\frac{3}{8}$	.358	T

All dimensions are in inches except whole number screw and drill sizes and letter drill sizes.

Table 18. ANSI Standard Torsional Strength Requirements for Tapping Screws
ANSI B18.6.4-1981 (R1991)

Nom. Screw Size	Type A	Types AB, B, BF, BP, and BT	Types C, D, F, G, and T		Nom-Screw Size	Type A	Types AB, B, BF, BP, and BT	Types C, D, F, G, and T	
			Coarse Thread	Fine Thread				Coarse Thread	Fine Thread
2	4	4	5	6	$\frac{1}{4}$	...	142	140	179
3	9	9	9	10	16	152	...	...	...
4	12	13	13	15	18	196	...	...	...
5	18	18	18	20	$\frac{5}{16}$	...	290	306	370
6	24	24	23	27	20	250	...	...	...
7	30	30	...	...	24	492	...	...	...
8	39	39	42	47	$\frac{3}{8}$	...	590	560	710
10	48	56	56	74	$\frac{7}{16}$	...	620	700	820
12	83	88	93	108	$\frac{1}{2}$	...	1020	1075	1285
14	125	...	...	...	...	...	...	...	...

Torsional strength data are in pound-inches.

Self-tapping Thread Inserts.—Self-tapping screw thread inserts are essentially hard bushings with internal and external threads. The internal threads conform to Unified and American standard classes 2B and 3B, depending on the type of insert used. The external thread has cutting edges on the end that provide the self-tapping feature. These inserts may be used in magnesium, aluminum, cast iron, zinc, plastics, and other materials. Self-tapping inserts are made of case-hardened carbon steel, stainless steel, and brass, the brass type being designed specifically for installation in wood.

Screw Thread Inserts.—Screw thread inserts are helically formed coils of diamond-shaped stainless steel or phosphor bronze wire that screw into a threaded hole to form a mating internal thread for a screw or stud. These inserts provide a convenient means of repairing stripped-out threads and are also used to provide stronger threads in soft materials such as aluminum, zinc die castings, wood, magnesium, etc. than can be obtained by direct tapping of the base metal involved.

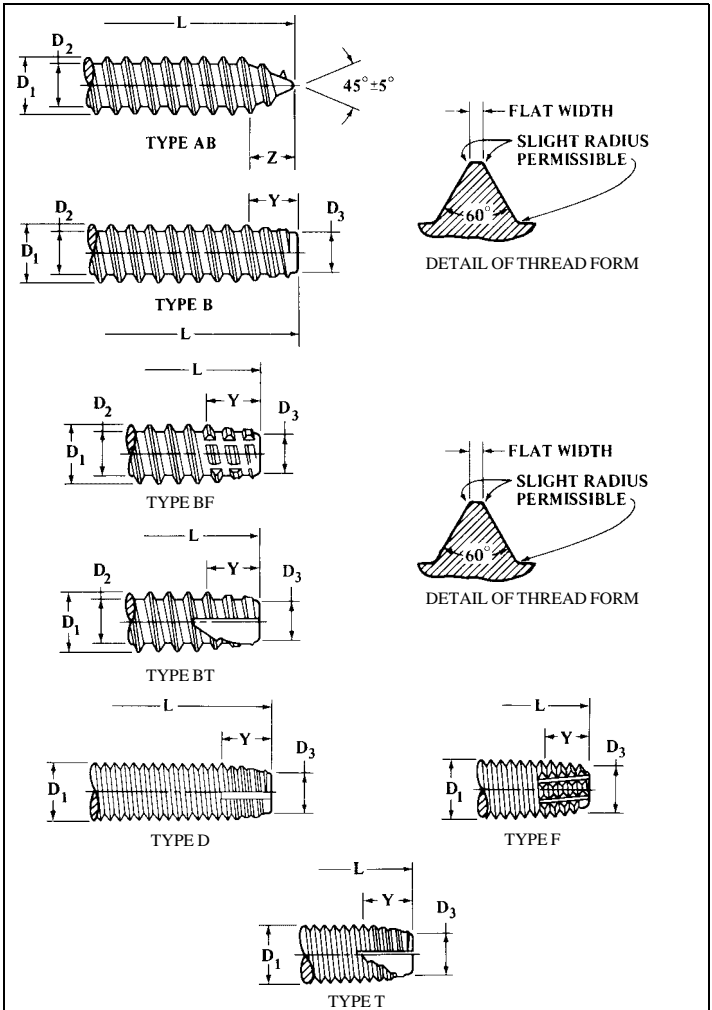
According to the Heli-Coil Corp., conventional design practice in specifying boss diameters or edge distances can usually be applied since the major diameter of a hole tapped to receive a thread insert is not much larger than the major diameter of thread the insert provides.

Screw thread inserts are available in thread sizes from 4–40 to $1\frac{1}{2}$ –6 inch National and Unified Coarse Thread Series and in 6–40 to $1\frac{1}{2}$ –12 sizes in the fine-thread series. When used in conjunction with appropriate taps and gages, screw thread inserts will meet requirements of 2, 2B, 3, and 3B thread classes.

ANSI Standard Metric Thread Forming and Thread Cutting Tapping Screws.—

Table 1 shows the various types of metric thread forming and thread cutting screw threads covered by the standard ANSI/ASME B18.6.5M-1986. The designations of the American National Standards Institute are shown.

Table 1. ANSI Standard Threads and Points for Metric Thread Forming and Thread Cutting Tapping Screws ANSI/ASME B18.6.5M-1986



See Tables 3 and 4 for thread data.

Thread Forming Tapping Screws: These types are generally for application in materials where large internal stresses are permissible or desirable, to increase resistance to loosening. These screws have the following descriptions and applications:

Type AB: Spaced thread screw with gimlet point primarily intended for use in thin metal, resin impregnated plywood, and asbestos compositions.

Type B: Spaced thread screw with a blunt point that has tapered entering threads with unfinished crests and same pitches as Type AB. Used for thin metal, nonferrous castings, resin impregnated plywood, certain resilient plastics, and asbestos compositions.

Thread Cutting Tapping Screws: These screws are generally for application in materials where disruptive internal stresses are undesirable or where excessive driving torques are encountered with thread forming tapping screws. These screws have the following descriptions and applications:

Types BF and BT: Spaced threads with blunt point and tapered entering threads having unfinished crests, as on Type B, with one or more cutting edges or chip cavities, intended for use in plastics, asbestos compositions, and other similar materials.

Types D, F, and T: Tapping screws with threads of machine screw diameter-pitch combinations (metric coarse thread series) approximating a 60 degree basic thread form (not necessarily conforming to any standard thread profile) with a blunt point and tapered entering threads with unfinished crests and having one or more cutting edges and chip cavities, intended for use in materials such as aluminum, zinc, and lead die castings; steel sheets and shapes; cast iron; brass; and plastics.

ANSI Standard Head Types for Metric Thread Forming and Cutting Tapping Screws.—The head types covered by ANSI/ASME B18.6.5M-1986 include those commonly applicable to metric tapping screws and are described as follows:

Flat Countersunk Head: The flat countersunk head has a flat top surface and a conical bearing surface with a head angle of 90 to 92 degrees.

Oval Countersunk Head: The oval countersunk head has a rounded top surface and a conical bearing surface with a head angle of 90 to 92 degrees.

Pan Head: The slotted pan head has a flat top surface rounding into cylindrical sides and a flat bearing surface. The recessed pan head has a rounded top surface blending into cylindrical sides and a flat bearing surface.

Hex Head: The hex head has a flat or indented top surface, six flat sides, and a flat bearing surface.

Hex Flange Head: The hex flange head has a flat or indented top surface and six flat sides formed integrally with a frustoconical or slightly rounded (convex) flange that projects beyond the sides and provides a flat bearing surface.

Method of Designation.—Metric tapping screws are designated with the following data, preferably in the sequence shown: Nominal size; thread pitch; nominal length; thread and point type; product name, including head style and driving provision; material; and protective finish, if required.

Examples:

6.3 × 1.8 × 30 Type AB, Slotted Pan Head Tapping Screw, Steel, Zinc Plated

6 × 1 × 20 Type T, Type 1A Cross Recessed Pan Head Tapping Screw, Corrosion Resistant Steel

4.2 × 1.4 × 13 Type BF, Type 1 Cross Recessed Oval Countersunk Head Tapping Screw, Steel, Chromium Plated

10 × 1.5 × 40 Type D, Hex Flange Head Tapping Screw, Steel

Table 2. Recommended Nominal Screw Lengths for Metric Tapping Screws
ANSI/ASME B18.6.5M-1986

Nominal Screw Length	Nominal Screw Size for Types AB, B, BF, and BT									
	2.2	-	2.9	3.5	4.2	4.8	5.5	6.3	8	9.5
	Nominal Screw Size for Types D, F, and T									
	2	2.5	3	3.5	4	5	-	6	8	10
4	PH	PH								
5	PH	PH								
6	A	A	PH							
8	A	A	A	PH	PH					
10	A	A	A	A	A	PH				
13	A	A	A	A	A	A	A	PH		
16		A	A	A	A	A	A	A	PH	
20				A	A	A	A	A	A	PH
25				A	A	A	A	A	A	A
30						A	A	A	A	A
35						A	A	A	A	A
40							A	A	A	A
45								A	A	A
50									A	A
55										A
60										A

Table 3. ANSI Standard Thread and Point Dimensions for Types AB and B Metric Thread Forming Tapping Screws ANSI/ASME B18.6.5M-1986

Nominal Screw Size and Thread Pitch ^a	Basic Screw Diameter	Basic Thread Pitch	D ₁		D ₂		D ₃		Y		Z	L			
			Thread Major Diameter		Thread Minor Diameter		Point Diameter ^b		Point Taper Length Type B ^c		Point Length Factor Type AB	Min. Practical Nominal Screw Length ^d			
			Type AB	Type B	Type AB	Type B	Type AB	Type B	Type AB	Type B	Note 7	Note 8	Note 7	Note 8	
	Ref ^e	Ref ^e	Max	Min	Max	Min	Max	Min	Max	Min	Ref ^f	Note 7	Note 8	Note 7	Note 8
2.2 × 0.8	2.184	0.79	2.24	2.10	1.63	1.52	1.47	1.37	1.6	1.2	2.0	4	6	4	5
2.9 × 1	2.845	1.06	2.90	2.76	2.18	2.08	2.01	1.88	2.1	1.6	2.6	6	7	5	7
3.5 × 1.3	3.505	1.27	3.53	3.35	2.64	2.51	2.41	2.26	2.5	1.9	3.2	7	9	6	8
4.2 × 1.4	4.166	1.41	4.22	4.04	3.10	2.95	2.84	2.69	2.8	2.1	3.7	8	10	7	10
4.8 × 1.6	4.826	1.59	4.80	4.62	3.58	3.43	3.30	3.12	3.2	2.4	4.3	9	12	8	11
5.5 × 1.8	5.486	1.81	5.46	5.28	4.17	3.99	3.86	3.68	3.6	2.7	5.0	11	14	9	12
6.3 × 1.8	6.350	1.81	6.25	6.03	4.88	4.70	4.55	4.34	3.6	2.7	6.0	12	16	10	13
8 × 2.1	7.938	2.12	8.00	7.78	6.20	5.99	5.84	5.64	4.2	3.2	7.5	16	20	12	17
9.5 × 2.1	9.525	2.12	9.65	9.43	7.85	7.59	7.44	7.24	4.2	3.2	8.0	19	24	14	19

^a The body diameter (unthreaded portion) is not less than the minimum minor diameter nor greater than the maximum major diameter of the thread.

^b The tabulated values shall apply to screw blanks prior to roll threading.

^c The tabulated maximum limits are equal to approximately two times the thread pitch.

^d Lengths shown are theoretical minimums and are intended to assist the user in the selection of appropriate short screw lengths. Refer to Table 2 for recommended diameter-length combinations.

^e Basic screw diameter and basic thread pitch shall be used for calculation purposes wherever these factors appear in formulations for dimensions.

^f The minimum effective grip length on Type AB tapping screws shall be determined by subtracting the point length factor from the minimum screw length.

All dimensions are in millimeters. See Table 1 for thread diagrams.

⁷ Pan, hex, and hex flange heads.

⁸ Flat and oval countersunk heads.

Table 4. ANSI Standard Thread and Point Dimensions for Types BF, BT, D, F, and T Metric Thread Cutting Tapping Screws ANSI/ASME B18.6.5M-1986

Types BF and BT														
Nominal Screw Size and Thread Pitch	Basic Screw Diameter	Basic Thread Pitch	D ₁		D ₂		D ₃		Y		L			
			Thread Major Diameter		Thread Minor Diameter		Point Diameter ^a		Point Taper Length Type B ^b		Minimal Practical Nominal Screw Length ^c			
			Ref ^d	Ref ^d	Max	Min	Max	Min	Max	Min	Max	Min	Pan, Hex and Hex Flange Heads	Flat and Oval Csunk Heads
2.2 × 0.8	2.184	0.79	2.24	2.10	1.63	1.52	1.47	1.37	1.6	1.2	4	5		
2.9 × 1	2.845	1.06	2.90	2.76	2.18	2.08	2.01	1.88	2.1	1.6	5	7		
3.5 × 1.3	3.505	1.27	3.53	3.35	2.64	2.51	2.41	2.26	2.5	1.9	6	8		
4.2 × 1.4	4.166	1.41	4.22	4.04	3.10	2.95	2.84	2.69	2.8	2.1	7	10		
4.8 × 1.6	4.826	1.59	4.80	4.62	3.58	3.43	3.30	3.12	3.2	2.4	8	11		
5.5 × 1.8	5.486	1.81	5.46	5.28	4.17	3.99	3.86	3.68	3.6	2.7	9	12		
6.3 × 1.8	6.350	1.81	6.25	6.03	4.88	4.70	4.55	4.34	3.6	2.7	10	13		
8 × 2.1	7.938	2.12	8.00	7.78	6.20	5.99	5.84	5.64	4.2	3.2	12	17		
9.5 × 2.1	9.525	2.12	9.65	9.43	7.85	7.59	7.44	7.24	4.2	3.2	14	19		

^aThe tabulated values apply to screw blanks prior to roll threading.

^bThe tabulated maximum limits are equal to approximately two times the thread pitch.

^cLengths shown are theoretical minimums and are intended to assist in the selection of appropriate short screw lengths. See Table 2 for recommended length-diameter combinations. For Types D, F, and T, shorter screws are available with the point length reduced to the limits tabulated for short screws.

^dBasic screw diameter and basic thread pitch are used for calculation purposes whenever these factors appear in formulations for dimensions.

Types D, F, T												
Nominal Screw Size and Thread Pitch	D ₁		D ₃		D ₅		Y				L	
	Thread Major Diameter		Point Diameter ^a		Body Diameter ^a		Point Taper Length				Minimum Practical Nominal Screw Length ^c	
	Max	Min	Max	Min	Min	For Short Screws		For Long Screws ^b		Pan, Hex and Hex Flange Heads	Flat and Oval Csunk Heads	
						Max	Min	Max	Min			
2 × 0.4	2.00	1.88	1.45	1.39	1.65	1.4	1.0	1.8	1.4	4	5	
2.5 × 0.45	2.50	2.37	1.88	1.82	2.12	1.6	1.1	2.0	1.6	4	6	
3 × 0.5	3.00	2.87	2.32	2.26	2.58	1.8	1.3	2.3	1.8	5	6	
3.5 × 0.6	3.50	3.35	2.68	2.60	3.00	2.1	1.5	2.7	2.1	5	8	
4 × 0.7	4.00	3.83	3.07	2.97	3.43	2.5	1.8	3.2	2.5	6	9	
5 × 0.8	5.00	4.82	3.94	3.84	4.36	2.8	2.0	3.6	2.8	7	10	
6 × 1	6.00	5.79	4.69	4.55	5.21	3.5	2.5	4.5	3.5	9	12	
8 × 1.25	8.00	7.76	6.40	6.24	7.04	4.4	3.1	5.6	4.4	11	16	
10 × 1.5	10.00	9.73	8.08	7.88	8.86	5.3	3.8	6.8	5.3	13	18	

^aMinimum limits for body diameter (unthreaded portion) are tabulated for convenient reference. For Types BF and BT, the body diameter is not less than the minimum minor diameter nor greater than the maximum major diameter of the thread.

^bLong screws are screws of nominal lengths equal to or longer than those listed under L.

All dimensions are in millimeters. See Table 1 for thread diagrams.

Material and Heat Treatment.—Tapping screws are normally fabricated from carbon steel and are suitably processed to meet the performance and test requirements outlined in the standard, B18.6.5M. Tapping screws may also be made from corrosion resistant steel, Monel, brass, and aluminum alloys. The materials, properties, and performance characteristics applicable to such screws should be mutually agreed upon between the manufacturer and the purchaser.

Table 5. Clearance Holes for Metric Tapping Screws
ANSI/ASME B18.6.5M-1986 Appendix

Nominal Screw Size and Thread Pitch	Basic Clearance Hole Diameter ^a			Nominal Screw Size and Thread Pitch	Basic Clearance Hole Diameter ^a		
	Close Clearance ^b	Normal Clearance (Preferred) ^b	Loose Clearance ^b		Close Clearance ^b	Normal Clearance (Preferred) ^b	Loose Clearance ^b
Types AB, B, BF, and BT				Types D, F, and T			
2.2×0.8	2.40	2.60	2.80	2×0.4	2.20	2.40	2.60
2.9×1	3.10	3.30	3.50	2.5×0.45	2.70	2.90	3.10
3.5×1.3	3.70	3.90	4.20	3×0.5	3.20	3.40	3.60
4.2×1.4	4.50	4.70	5.00	3.5×0.6	3.70	3.90	4.20
4.8×1.6	5.10	5.30	5.60	4×0.7	4.30	4.50	4.80
5.5×1.8	5.90	6.10	6.50	5×0.8	5.30	5.50	5.80
6.3×1.8	6.70	6.90	7.30	6×1	6.40	6.60	7.00
8×2.1	8.40	9.00	10.00	8×1.25	8.40	9.00	10.00
9.5×2.1	10.00	10.50	11.50	10×1.5	10.50	11.00	12.00

^a The values given in this table are minimum limits. The recommended plus tolerances are as follows: for clearance hole diameters over 1.70 to and including 5.80 mm, plus 0.12, 0.20, and 0.30 mm for close, normal, and loose clearances, respectively; over 5.80 to and including 14.50 mm, plus 0.18, 0.30, and 0.45 mm for close, normal, and loose clearances, respectively.

^b Normal clearance hole sizes are preferred. Close clearance hole sizes are for situations such as critical alignment of assembled components, wall thickness, or other limitations that necessitate the use of a minimal hole. Countersinking or counterboring at the fastener entry side may be necessary for the proper seating of the head. Loose clearance hole sizes are for applications where maximum adjustment capability between the components being assembled is necessary.

All dimensions are in millimeters.

Approximate Installation Hole Sizes for Metric Tapping Screws.—The approximate hole sizes given in Tables 7 through 9 provide general guidance in selecting holes for installing the respective types of metric thread forming and thread cutting tapping screws in various commonly used materials. Types AB, B, BF, and BT metric tapping screws are covered in these tables; hole sizes for Types D, F, and T metric thread cutting tapping screws are still under development.

Table 6. Approximate Pierced or Extruded Hole Sizes for Steel Types AB and B Metric Thread Forming Tapping Screws

Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size
In Steel, Stainless Steel, Monel, and Brass Sheet Metal								
2.9 × 1	0.38	2.18	4.2 × 1.4	0.46	3.45	5.5 × 1.8	0.61	4.70
	0.46	2.18		0.61	3.45		0.76	4.70
	0.61	2.49		0.76	3.45		0.91	4.70
	0.76	2.49		0.91	3.45		1.22	4.70
3.5 × 1.3	0.91	2.49	4.8 × 1.6	1.22	3.45	6.3 × 1.8	...	...
	0.38	2.82		0.46	3.99		0.76	5.31
	0.46	2.82		0.61	3.99		0.91	5.31
	0.61	2.82		0.76	3.99		1.22	5.31
3.5 × 1.3	0.76	2.82	4.8 × 1.6	0.91	3.99	4.8 × 1.6	...	...
	0.91	2.82		1.22	3.99		...	...
	0.38	2.82		0.46	3.99		0.76	5.31
	0.46	2.82		0.61	3.99		0.91	5.31
2.9 × 1	0.61	2.18	4.2 × 1.4	0.76	3.45	4.8 × 1.6	1.22	3.99
	0.76	2.18		0.91	3.45		...	...
	0.91	2.18		1.22	3.45		...	...
	1.22	2.18		...	...		...	...
3.5 × 1.3	0.61	2.82	4.2 × 1.4	0.91	3.45	4.8 × 1.6	...	...
	0.76	2.82		1.22	3.45		...	...

All dimensions are in millimeters.

Table 7. Approximate Drilled or Clean-Punched Hole Sizes for Steel Type AB Metric Thread Forming Tapping Screws in Sheet Metal

Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Drill Size ^a	Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Drill Size ^a	Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Drill Size ^a
In Steel, Stainless Steel, Monel, and Brass Sheet Metal											
2.2 × 0.8	0.38	1.63	52	3.5 × 1.3	0.61	2.69	36	4.8 × 1.6	1.22	3.78	25
	0.46	1.63	52		0.76	2.69	36		1.52	3.91	23
	0.61	1.70	51		0.91	2.79	35		1.90	3.99	22
	0.76	1.78	50		1.22	2.82	34	5.5 × 1.8	0.46	...	...
	0.91	1.85	49		1.52	2.95	32		0.61	4.22	19
	1.22	1.85	49		1.90	3.05	31		0.76	4.22	19
2.9 × 1	1.52	1.93	48	4.2 × 1.4	0.46	...	...	6.3 × 1.8	0.91	4.22	19
	0.38	2.18	44		0.61	3.18	...		1.22	4.32	18
	0.46	2.18	44		0.76	3.18	...		1.52	4.50	16
	0.61	2.26	43		0.91	3.18	...	1.90	4.62	14	
	0.76	2.39	42		1.22	3.25	30	6.3 × 1.8	0.46	4.98	9
	0.91	2.39	42		1.52	3.45	29		0.61	4.98	9
	1.22	2.44	41		1.90	3.56	28		0.76	4.98	9
	1.52	2.54	39		4.8 × 1.6	0.46	3.66		27	0.91	4.98	9
1.90	2.59	38	0.61	3.66		27	1.22	5.21	W		
3.5 × 1.3	0.38	2.64	37	4.8 × 1.6	0.76	3.66	27	1.52	5.79	1	
	0.46	2.64	37		0.91	3.73	26	1.90	5.89	...	
In Aluminum Alloy Sheet Metal											
2.2 × 0.8	0.38	...	...	3.5 × 1.3	0.61	...	...	4.8 × 1.6	1.22	3.66	27
	0.46	...	...		0.76	2.64	37		1.52	3.66	27
	0.61	1.63	52		0.91	2.64	37		1.90	3.73	26
	0.76	1.63	52		1.22	2.64	37	5.5 × 1.8	0.46	...	...
	0.91	1.63	52		1.52	2.69	36		0.61	...	...
	1.22	1.70	51		1.90	2.79	35		0.76	...	...
	1.52	1.78	50		0.46	...	...		0.91	...	...
2.9 × 1	0.38	...	...	4.2 × 1.4	0.61	...	...	6.3 × 1.8	1.22	4.09	20
	0.46	...	...		0.76	2.95	32		1.52	4.22	19
	0.61	...	...		0.91	3.05	31		1.90	4.39	17
	0.76	2.18	44		1.22	3.25	30	6.3 × 1.8	0.46	...	...
	0.91	2.18	44		1.52	3.45	29		0.61	...	...
	1.22	2.18	44		1.90	3.56	28		0.76	...	...
	1.52	2.26	43		4.8 × 1.6	0.46	0.91	...
1.90	2.26	43	0.61	...		...	1.22	...	...
3.5 × 1.3	0.38	...	...	4.8 × 1.6	0.76	...	...	1.52	5.05	8	
	0.46	...	...		0.91	3.66	27	1.90	5.11	7	

^a Customary drill size references have been retained where the metric hole diameters are direct conversions of their decimal inch equivalents.

All dimensions are in millimeters except drill sizes.

Table 8. Approximate Hole Sizes for Steel Type AB Metric Thread Forming Tapping Screws in Plywoods and Asbestos

Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Min Mat'l Thickness	Penetration in Blind Holes		Hole Size	Drill Size ^a	Min Mat'l Thickness	Penetration in Blind Holes	
				Min	Max				Min	Max
In Plywood (Resin Impregnated)						In Asbestors Compositions				
2.2×0.8	1.85	49	3.18	4.78	12.70	1.93	48	3.18	4.78	12.70
2.9×1	2.54	39	4.78	6.35	15.88	2.57	38	4.78	6.35	15.88
3.5×1.3	3.18	...	4.78	6.35	15.88	3.05	31	4.78	6.35	15.88
4.2×1.4	3.66	27	4.78	6.35	19.05	3.73	26	7.92	9.52	19.05
4.8×1.6	4.39	17	6.35	7.92	25.40	4.22	19	7.92	9.52	25.40
5.5×1.8	4.93	10	7.92	9.52	25.40	4.98	9	7.92	9.52	25.40
6.3×1.8	5.79	1	7.92	9.52	25.40	5.79	1	11.13	12.70	25.40

^a Customary drill size references have been retained where the metric hole diameters are direct conversions of their decimal inch equivalents.

All dimensions are in millimeters except drill sizes.

Table 9. Approximate Hole Sizes for Steel Type B Metric Thread Forming Tapping Screws in Plywoods, Asbestos, and Plastics

Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Min Mat'l Thickness	Penetration in Blind Holes		Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Min Mat'l Thickness	Penetration in Blind Holes	
				Min	Max					Min	Max
In Plywood (Resin Impregnated)											
2.2×0.8	1.85	49	3.18	4.78	12.70	4.8×1.6	4.39	17	6.35	7.92	25.40
2.9×1	2.54	39	4.78	6.35	15.88	5.5×1.8	4.93	10	7.92	9.52	25.40
3.5×1.3	3.18	...	4.78	6.35	15.88	6.3×1.8	5.79	1	7.92	9.52	25.40
4.2×1.4	3.66	27	4.78	6.35	19.05	...	...	...	...	...	...

^a Customary drill size references have been retained where the metric hole diameters are direct conversions of their decimal inch equivalents.

Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Min Mat'l Thickness	Penetration in Blind Holes		
				Min	Max	
In Asbestos Compositions						
2.2×0.8		1.93	48	3.18	12.70	
2.9×1		2.57	38	4.78	15.88	
3.5×1.3		3.05	31	4.78	15.88	
4.2×1.4		3.73	26	7.92	19.05	
4.8×1.6		4.22	19	7.92	25.40	
5.5×1.8		4.98	9	7.92	25.40	
6.3×1.8		5.79	1	11.13	25.40	
Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Min Penetration in Blind Holes	Hole Size	Drill Size ^a	Min Penetration in Blind Holes
In Phenol Formaldehyde						
2.2×0.8	1.98	47	4.78	1.98	47	4.78
2.9×1	2.54	39	6.35	2.39	42	6.35
3.5×1.3	3.25	30	6.35	3.05	32	6.35
4.2×1.4	3.81	25	7.92	3.66	27	7.92
4.8×1.6	4.50	16	7.92	4.32	18	7.92
5.5×1.8	5.05	8	9.52	4.85	11	9.52
6.3×1.8	5.94	...	9.52	5.61	2	9.52

All dimensions are in millimeters except drill sizes.

Table 10. Approximate Drilled or Clean-Punched Hole Sizes for Steel Type B Metric Thread Forming Tapping Screws in Sheet Metal and Cast Metals

Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Drill Size ^a	Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Drill Size ^a	Nominal Screw Size and Thread Pitch	Metal Thickness	Hole Size	Drill Size ^a		
In Steel, Stainless Steel, Monel, and Brass Sheet Metal													
2.2 × 0.8	0.38	1.63	52	3.5 × 1.3	1.90	3.05	31	5.5 × 1.8	0.61	4.22	19		
	0.46	1.63	52		2.67	3.25	30		0.76	4.22	19		
	0.61	1.70	51	4.2 × 1.4	0.61	3.18	...		0.91	4.22	19		
	0.76	1.78	50		0.76	3.18	...		1.22	4.32	18		
	0.91	1.85	49		0.91	3.18	...		1.52	4.50	16		
	1.22	1.85	49		1.22	3.25	30		1.90	4.62	14		
1.52	1.93	48	1.52		3.45	29	2.67	4.70	13				
1.90	2.18	44	1.90		3.56	28	3.18	4.98	9				
2.9 × 1	0.46	2.18	44	4.8 × 1.6	2.67	3.81	25	6.3 × 1.8	3.43	4.98	9		
	0.61	2.26	43		3.18	3.81	25		4.17	5.11	7		
	0.76	2.39	42		3.43	3.86	24		0.76	4.93	10		
	0.91	2.39	42		0.61	3.66	27		0.91	4.93	10		
	1.22	2.44	41		0.76	3.66	27		1.22	4.93	10		
	1.52	2.54	39		0.91	3.73	26		1.52	5.05	8		
3.5 × 1.3	1.90	2.59	38	4.8 × 1.6	1.22	3.86	24	6.3 × 1.8	1.90	5.18	6		
	0.38	2.64	37		1.52	3.86	24		2.67	5.31	4		
	0.46	2.64	37		1.90	3.99	22		3.18	5.79	1		
	0.61	2.69	36		2.67	4.09	20		3.43	5.79	1		
	0.76	2.69	36		3.18	4.32	18		4.17	5.94	...		
	0.91	2.79	35		3.43	4.32	18		4.75	5.94	...		
3.5 × 1.3	1.22	2.82	34	4.8 × 1.6	4.17	4.39	17	6.3 × 1.8	4.93	5.94	...		
	1.52	2.95	32		0.76	2.95	32		1.22	4.09	20		
	0.61	1.63	52		4.2 × 1.4	0.91	3.05		31	5.5 × 1.8	1.52	4.22	19
	0.76	1.63	52			1.22	3.25		30		1.90	4.39	17
	0.91	1.63	52			1.52	3.45		29		2.67	4.57	15
	1.22	1.70	51			1.90	3.56		28		3.18	4.62	14
1.52	1.78	50	2.67	3.73		26	3.43	4.62	14				
0.76	2.18	44	3.18	3.73		26	4.17	4.80	12				
2.9 × 1	0.91	2.18	44	4.8 × 1.6	3.43	3.78	25	6.3 × 1.8	5.08	to			
	1.22	2.18	44		4.11	to			9.52	4.98	9		
	1.52	2.26	43		9.52	3.86	24		1.52	5.05	8		
	1.90	2.26	43		0.91	3.66	27		1.90	5.11	7		
	2.67	2.39	42		1.22	3.66	27		2.67	5.18	6		
	0.76	2.64	37		1.52	3.66	27		3.18	5.31	4		
3.5 × 1.3	0.91	2.64	37	4.8 × 1.6	1.90	3.73	26	6.3 × 1.8	3.43	5.31	4		
	1.22	2.64	37		2.67	3.73	26		4.17	5.41	3		
	1.52	2.69	36		3.18	3.91	23		4.75	5.41	3		
	1.90	2.79	35		3.43	3.91	23		4.93	5.61	2		
	2.67	2.82	34		4.17	4.04	21		5.08	to			
	3.25	to			5.08	to			9.52	5.79	1		
4.2 × 1.4	3.05	31	9.52	4.22	19								

^a Customary drill size references have been retained where the metric hole diameters are direct conversions of their decimal inch equivalents.

In Aluminum, Magnesium, Zinc, Brass, and Bronze Cast Metals							
Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Min Penetration in Blind Holes	Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Min Penetration in Blind Holes
2.2 × 0.8	1.98	47	3.18	4.8 × 1.6	4.50	16	6.35
2.9 × 1	2.64	37	4.78	5.5 × 1.8	5.05	8	7.14
3.5 × 1.3	3.25	30	6.35	6.3 × 1.8	5.94	4	7.92
4.2 × 1.4	3.86	24	6.35	...	...	...	...

All dimensions are in millimeters, except drill sizes.

**Table 11. Approximate Hole Sizes for Steel Types BF and BT
Metric Thread Cutting Tapping Screws for Cast Metals and Plastics**

Nominal Screw Size and Thread Pitch	Material Thickness	Hole Size	Drill Size ^a	Nominal Screw Size and Thread Pitch	Material Thickness	Hole Size	Drill Size ^a
In Die Cast Zinc and Aluminum							
2.2 × 0.8	1.52	1.85	49	3.5 × 1.3	3.18	3.05	31
	2.11	1.85	49		3.56	3.05	31
	2.77	1.93	48		4.78	3.05	31
	3.18	1.93	48		6.35	3.18	...
	3.56	1.93	48		7.92	3.18	...
2.9 × 1	2.77	2.49	40	4.2 × 1.4	3.18	3.78	25
	3.18	2.54	39		3.56	3.78	25
	3.56	2.54	39		4.78	3.78	25
	4.78	2.54	39		6.35	3.86	24
	6.35	2.59	38		7.92	3.86	24
4.8 × 1.6	3.18	4.22	19	6.3 × 1.8	6.35	5.79	1
	3.56	4.22	19		7.92	5.79	1
	4.78	4.22	19		9.52	5.79	1
	6.35	4.32	18	8 × 2.1	3.18	7.14	K
	7.92	4.37	...		3.56	7.14	K
5.5 × 1.8	9.52	4.37	...	9.5 × 2.1	4.78	7.14	K
	3.18	4.85	11		6.35	7.14	K
	3.56	4.85	11		7.92	7.37	L
	4.78	4.85	11		9.52	7.37	L
	6.35	4.98	9		3.18	8.74	...
7.92	4.98	9	3.56	8.74	...		
9.52	4.98	9	4.78	8.74	...		
6.3 × 1.8	3.18	5.61	2	6.35	8.74	...	
	3.56	5.61	2	7.92	8.84	S	
	4.78	5.61	2	9.52	8.84	S	

^a Customary drill size references have been retained where the metric hole sizes are direct conversions of their decimal inch equivalents.

Nominal Screw Size and Thread Pitch	Hole Size	Drill Size ^a	Depth of Penetration	
			Min	Max
In Phenol Formaldehyde				
2.2 × 0.8	1.98	...	2.39	6.35
2.9 × 1	2.64	37	3.18	7.92
3.5 × 1.3	3.18	...	4.78	9.52
4.2 × 1.4	3.73	26	6.35	12.70
4.8 × 1.6	4.32	18	7.92	15.88
5.5 × 1.8	4.93	10	9.52	15.88
6.3 × 1.8	5.79	1	9.52	19.05
In Cellulose Acetate and Nitrate, Acrylic and Styrene Resins				
2.2 × 0.8	1.93	48	2.39	6.35
2.9 × 1	2.54	39	3.18	7.92
3.5 × 1.3	3.05	31	4.78	9.52
4.2 × 1.4	3.66	27	6.35	12.70
4.8 × 1.6	4.22	19	7.92	15.88
5.5 × 1.8	4.80	12	9.52	15.88
6.3 × 1.8	5.61	2	9.52	19.05

All dimensions are in millimeters except drill sizes.

The finish (plating or coating) on metric tapping screws and the material composition and hardness of the mating component are factors that affect assembly torques in individual applications. Although the recommended installation hole sizes given in Tables 7 through 9 were based on the use of plain unfinished carbon steel metric tapping screws, experience has shown that the specified holes are also suitable for screws having most types of commercial finishes. However, owing to various finishes providing different degrees of lubricity, some adjustment of installation torques may be necessary to suit individual applications. Also, where exceptionally heavy finishes are involved or screws are to be assembled into materials of higher hardness, some deviation from the specified hole sizes may be required to provide optimum assembly. The necessity and extent of such deviations can best be determined by experiment in the particular assembly environment.