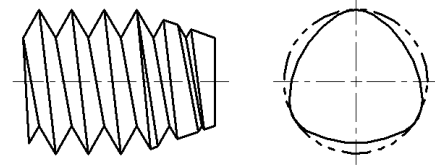


Installation of TA Thread-Rolling Screws for Metals

TA thread-rolling screws are an excellent choice for use with drilled, extruded, punched or molded holes in ductile metals and castings. The triangular out-of-round shape forms strong threads by work-hardening the metal host material without creating unwanted chips or slivers. The design requires low installation torque and provides excellent resistance to loosening caused by vibration.



Recommended Hole Diameters for Cold-Rolled Steel Sheets and Plates

All dimensions in inches

Inch	Application	Light		Medium-Light		Medium-Heavy		Full Strength		Extra Strength	
	Thread Engagement Percentage	90%		85%		80%		75%		70%	
	Thread	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter
	2-56	.017-.034	.0756	.034-.052	.0761	.052-.073	.0767	.073-.095	.0773	.095-.169	.0779
	4-40	.022-.045	.0974	.045-.067	.0982	.067-.095	.0990	.095-.126	.0998	.126-.157	.1006
	6-32	.028-.066	.1197	.066-.083	.1207	.083-.117	.1218	.117-.152	.1288	.152-.193	.1238
	8-32	.033-.066	.1457	.066-.098	.1467	.098-.141	.1478	.141-.180	.1488	.180-.230	.1498
	10-24	.038-.079	.1656	.079-.114	.1670	.114-.162	.1683	.162-.209	.1697	.209-.266	.1710
	10-32	.038-.079	.1717	.079-.114	.1727	.114-.162	.1738	.162-.209	.1748	.209-.266	.1758
	12-24	.043-.086	.1916	.086-.130	.1930	.130-.184	.1943	.184-.238	.1957	.238-.302	.1970
	1/4-20	.050-.100	.2208	.100-.150	.2224	.150-.213	.2240	.213-.275	.2256	.275-.350	.2273

All dimensions in millimeters

Metric	Application	Light		Medium-Light		Medium-Heavy		Full Strength		Extra Strength	
	Thread Engagement Percentage	90%		85%		80%		75%		70%	
	Thread	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter	Material Thickness	Hole Diameter
	M2.5 x 0.45	0.5-0.9	2.24	0.9-1.5	2.25	1.5-2.1	2.27	2.1-2.7	2.28	2.7-3.5	2.30
	M3 x 0.5	0.5-1.1	2.71	1.1-1.7	2.72	1.7-2.7	2.74	2.7-3.3	2.76	3.3-4.0	2.77
	M3.5 x 0.6	0.6-1.4	3.15	1.4-2.0	3.17	2.0-2.9	3.19	2.9-3.8	3.21	3.8-4.5	3.23
	M4 x 0.7	0.8-1.4	3.59	1.4-2.4	3.61	2.4-3.3	3.64	3.3-4.4	3.66	4.4-5.5	3.68
	M5 x 0.8	1.0-2.1	4.53	2.1-2.9	4.56	2.9-4.4	4.58	4.4-5.9	4.61	5.9-7.1	4.64
	M6 x 1	1.2-2.4	5.42	2.4-3.6	5.45	3.6-4.9	5.48	4.9-6.9	5.51	6.9-8.1	5.55

(1) Hole diameters are based on a calculation of .6495 x thread pitch x % thread engagement. PENCOM strongly recommends testing in the application to determine actual working dimensions.

Performance Data for Cold-Rolled Steel Sheets and Plates

All dimensions in inches unless noted

Inch	Thread	Material Thickness	Hole Diameter	Nearest Drill Size	Thread Forming Torque (in-lbs)	Prevailing First Removal Torque (in-lbs)	Rec. Assembly Torque (in-lbs)	Failure Torque (in-lbs)
	2-56		.0469	.075	1.9mm	1-2	.5-1	4
		.0625	.076	#48	1.2	.5-1	4	8-10 ³
		.0938	.079	#47	1.2	.5-1	5	11-14 ⁴
4-40		.0312	.098	#40	2-3	1-2	6	8-11 ³
		.0625	.102	2.6mm	3-4	1-2	9	15-18 ³
		.0938	.102	2.6mm	3-4	1-2	11	22-27 ⁴
6-32		.0625	.120	#31	4-7	3-4	14	25-30 ³
		.0938	.120	#31	6-9	3-5	20	35-45 ⁵
		.1250	.125	1/8	6-9	4-6	22	39-45 ⁴
8-32		.0938	.147	#26	10-13	5-7	30	65-75 ³
		.1250	.150	3.8mm	11-14	4-7	45	75-85 ⁵
		.1875	.150	3.8mm	16-20	8-11	45	75-95 ⁴
10-24		.0938	.172	11/64	14-18	5-8	35	65-80 ³
		.1250	.172	11/64	14-18	5-8	45	80-90 ³
		.1875	.172	11/64	17-22	9-13	55	110-115 ⁴
10-32		.0938	.173	#17	11-14	9-13	35	80-95 ³
		.1250	.177	#16	12-16	9-13	50	110-120 ³
		.1875	.177	#16	19-25	12-16	70	115-140 ³
12-24		.1250	.196	#9	19-24	9-12	65	95-115 ³
		.1875	.199	#8	21-26	9-13	75	135-155 ³
		.2500	.203	13/64	21-26	10-14	85	150-170 ⁴
1/4-20		.1250	.224	5.7mm	30-36	18-25	85	170-195 ³
		.1875	.224	5.7mm	45-55	25-35	125	205-235 ⁴
		.2500	.228	#1	55-65	25-35	125	205-235 ⁴

(1) Values determined under laboratory conditions using carbon steel hex washer head screws zinc plated and wax coated driven into cold-rolled steel members at low speeds. PENCOM strongly recommends testing in the application to determine actual working performance values.

(2) Recommended assembly torques represent approximately 30-50ksi clamping pressure.

(3) Failure most likely a result of threads stripping.

(4) Failure most likely a result of screw breakage.

(5) Failure most likely a result of threads stripping or screw breaking.

Performance Data for Cold-Rolled Steel Sheets and Plates (Cont.)

All dimensions in millimeters unless noted

Metric	Thread	Material Thickness	Hole Diameter	Nearest Drill Size	Thread Forming Torque (N-m)	Prevailing First Removal Torque (N-m)	Rec. Assembly Torque (N-m)	Failure Torque (N-m)
	Metric	M3 x 0.5	1.0	2.71	#36	0.30-0.45	0.15-0.30	1.0
2.0			2.75	2.75mm	0.35-0.55	0.15-0.30	1.0	1.6-2.5 ³
3.0			2.75	2.75mm	0.50-0.80	0.25-0.40	1.6	2.5-3.5 ⁵
M4 x 0.7		2.0	3.60	3.6mm	0.60-0.85	0.30-0.40	1.8	2.8-3.8 ³
		3.0	3.66	#27	0.90-1.3	0.50-0.70	3.3	5.5-7.5 ⁵
		4.0	3.66	#27	1.2-1.6	0.60-0.85	4.3	7.0-10 ⁵
M5 x 0.8		2.5	4.57	#15	1.3-2.0	0.60-0.80	2.8	5.3-8.0 ³
		3.5	4.57	#15	1.5-2.7	0.90-1.5	6.0	10-12 ³
		5.0	4.60	4.6mm	2.0-3.0	0.90-1.5	7.0	11-14 ⁵
M6 x 1	3.0	5.41	#3	2.0-2.8	0.60-1.2	5.0	9.0-13 ³	
	4.5	5.50	5.5mm	3.2-4.5	0.90-1.5	10.0	16-21 ³	
	6.0	5.50	5.5mm	3.5-4.8	1.0-1.7	10.0	18-25 ⁵	

- (1) Values determined under laboratory conditions using carbon steel hex washer head screws zinc plated and wax coated driven into cold-rolled steel members at low speeds. PENCOM strongly recommends testing in the application to determine actual working performance values.
- (2) Recommended assembly torques represent approximately 207-345MPa clamping pressure.
- (3) Failure most likely a result of threads stripping.
- (4) Failure most likely a result of screw breakage.
- (5) Failure most likely a result of threads stripping or screw breaking.

Recommended Extruded Hole Diameters for Light-Gauge Carbon Steel

All dimensions in inches

INCH	Material Thickness	.02	.03	.04	.06	.09	.13	.16	.19
	INCH	Thread	Hole Diameter						
6-32		.118-.120	.118-.121	.120	.120-.123	.122-.125	--	--	--
8-32		.140-.150	.140-.150	.150	.150	.147-.150	.148-.152	--	--
10-24		.160-.170	.160-.170	.164-.167	.165-.168	.166-.170	.168-.173	--	--
10-32		.170-.172	.170-.173	.171-.174	.172-.175	.173-.176	.174-.177	--	--
12-24		.190	.190	.190-.193	.191-.194	.192-.196	.193-.197	.195-.200	.198-.203
Material Thickness		.04	.06	.09	.13	.16	.19	.22	.25
Thread		Hole Diameter							
1/4-20		.218-.220	.218-.221	.219-.223	.221-.225	.224-.228	.227-.231	.228-.233	.230-.235

- (1) Dimensions are suggestions only. PENCOM strongly recommends testing in the application to determine actual working dimensions.

Recommended Extruded Hole Diameters for Light-Gauge Carbon Steel (Cont.)

All dimensions in millimeters

METRIC	Material Thickness	0.5	0.8	1.1	1.6	2.4	3.6	4.4
	Thread	Hole Diameter						
	M2.5 x 0.45	2.21-2.24	2.22-2.26	2.25-2.28	2.27-2.30	--	--	--
	M3 x 0.5	2.68-2.71	2.71-2.74	2.74-2.77	2.77-2.80	2.80-2.83	--	--
	M3.5 x 0.6	3.11-3.15	3.13-3.18	3.16-3.21	3.19-3.24	3.24-3.29	3.27-3.32	--
	M4 x 0.7	--	3.55-3.59	3.58-3.62	3.60-3.65	3.64-3.68	3.69-3.73	--
	M5 x 0.8	--	--	4.48-4.53	4.51-4.56	4.54-4.59	4.57-4.62	--
	M6 x 1	--	--	5.35-5.42	5.38-5.45	5.41-5.48	5.44-5.51	5.49-5.56

(1) Dimensions are suggestions only. PENCOM strongly recommends testing in the application to determine actual working dimensions.

Recommended Dimensions for Extruded Light-Gauge Carbon Steel

All dimensions in inches

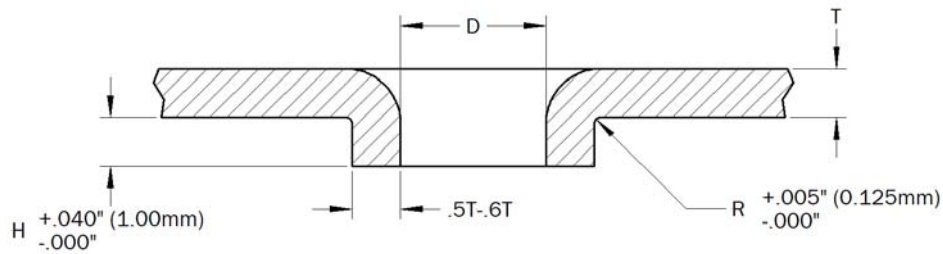
INCH	Hole Diameter	Material Thickness T											
		.024-.035		.042-.048		.060		.090		.106		.122	
		H	R	H	R	H	R	H	R	H	R	H	R
.081-.100	.040	.005	.040	.005	.040	.006	.043	.010	--	--	--	--	
.101-.130	.047	.005	.047	.005	.047	.006	.052	.010	.054	.010	--	--	
.131-.150	.053	.005	.053	.005	.053	.006	.060	.010	.063	.010	.072	.013	
.151-.180	--	--	.060	.005	.081	.006	.070	.010	.075	.010	.087	.013	
.181-.220	--	--	.070	.005	.070	.006	.090	.010	.095	.010	.104	.013	
.221-.260	--	--	--	--	.075	.006	.100	.010	.105	.010	.120	.013	
.261-.300	--	--	--	--	.083	.006	.116	.010	.125	.010	.140	.013	
.301-.340	--	--	--	--	--	--	.130	.010	.140	.010	.164	.013	
.341-.380	--	--	--	--	--	--	.140	.010	.155	.010	.170	.013	
.381-.430	--	--	--	--	--	--	.150	.010	.170	.010	.184	.013	

All dimensions in millimeters

METRIC	Hole Diameter	Material Thickness T											
		0.61-0.89		1.07-1.22		1.52		2.29		2.69		3.10	
		H	R	H	R	H	R	H	R	H	R	H	R
2.06-2.54	1.02	0.13	1.02	0.13	1.02	0.15	1.09	0.25	--	--	--	--	
2.57-3.30	1.19	0.13	1.19	0.13	1.19	0.15	1.32	0.25	1.37	0.25	--	--	
3.33-3.81	1.35	0.13	1.35	0.13	1.35	0.15	1.52	0.25	1.60	0.25	1.83	0.33	
3.84-4.57	--	--	1.52	0.13	1.55	0.15	1.78	0.25	1.91	0.25	2.21	0.33	
4.60-5.59	--	--	1.78	0.13	1.78	0.15	2.29	0.25	2.41	0.25	2.64	0.33	
5.61-6.60	--	--	--	--	1.91	0.15	2.54	0.25	2.67	0.25	3.05	0.33	
6.63-7.62	--	--	--	--	2.11	0.15	2.95	0.25	3.18	0.25	3.58	0.33	
7.65-8.64	--	--	--	--	--	--	3.30	0.25	3.56	0.25	3.91	0.33	
8.66-9.65	--	--	--	--	--	--	3.56	0.25	3.94	0.25	4.32	0.33	
9.68-10.92	--	--	--	--	--	--	3.81	0.25	4.32	0.25	4.67	0.33	

(1) Dimensions are suggestions only. PENCOM strongly recommends testing in the application to determine actual working dimensions.

Recommended Dimensions for Extruded Light-Gauge Carbon Steel (Cont.)



Recommended Hole Dimensions for Aluminum and Zinc Die-Castings

All dimensions in inches

INCH	Thread	Cast Hole Diameter ¹		Cast Boss Diameter C Min.	Drilled Hole Diameter D ¹	Edge Distance W Min.	Thread Engagement Length L Min.
		A	B				
	2-56	.078-.081	.074-.077	.197	.0779	.046	.172
	4-40	.102-.105	.096-.099	.220	.1006	.065	.224
	6-32	.125-.128	.119-.122	.242	.1238	.081	.276
	8-32	.152-.155	.145-.148	.272	.1498	.081	.328
	10-24	.174-.177	.165-.168	.315	.1710	.108	.380
	10-32	.179-.182	.171-.174	.315	.1758	.081	.380
	12-24	.200-.203	.191-.194	.359	.1970	.108	.432
	1/4-20	.232-.235	.221-.224	.415	.2273	.130	.500

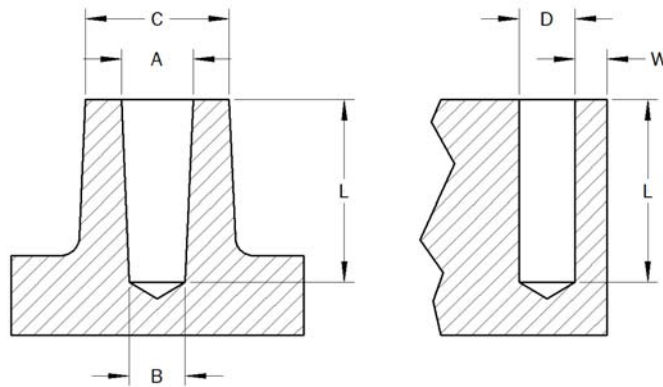
All dimensions in millimeters

METRIC	Thread	Cast Hole Diameter ¹		Cast Boss Diameter C Min.	Drilled Hole Diameter D ¹	Edge Distance W Min.	Thread Engagement Length L Min.
		A	B				
	M2 x 0.4	1.83-1.91	1.73-1.81	3.32	1.82	1.00	4.00
	M2.5 x 0.45	2.31-2.39	2.20-2.28	4.15	2.29	1.20	5.00
	M3 x 0.5	2.82-2.90	2.68-2.76	4.98	2.77	1.30	6.00
	M3.5 x 0.6	3.23-3.31	3.13-3.21	5.81	3.23	1.60	7.00
	M4 x 0.7	3.74-3.82	3.56-3.64	6.64	3.68	1.80	8.00
	M5 x 0.8	4.72-4.80	4.50-4.58	8.30	4.64	2.10	10.00
	M6 x 1	5.66-5.74	5.40-5.48	9.96	5.54	2.60	12.00

(1) Hole diameters provide approximately 65% to 75% of thread engagement.

(2) Dimensions are suggestions only. PENCOR strongly recommends testing in the application to determine actual working dimensions.

Recommended Hole Dimensions for Aluminum and Zinc Die-Castings (Cont.)



TA Thread-rolling screws are available in a variety of head styles, drives, lengths, materials and finishes. Visit PENCOTM's website www.pencomsf.com for more information. Custom configurations such as SEMS washers, dog points and partially threaded shanks for "captive" applications are possible as well. Speak with a PENCOTM Account Manager to learn more.

This information may be updated periodically. Contact PENCOTM for current information or see www.pencomsf.com