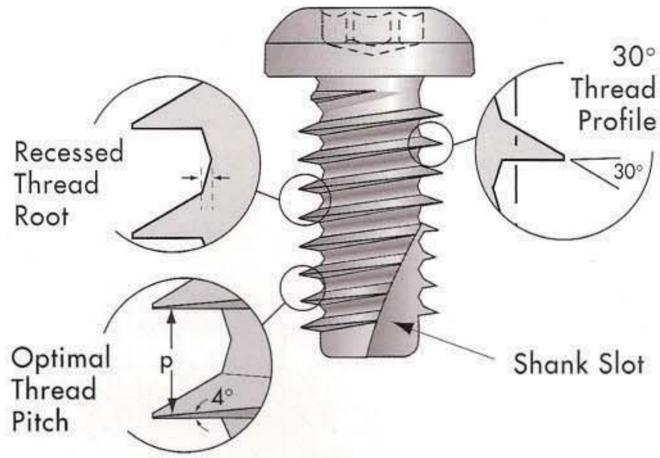
30° Thread-Cutting Fasteners

The 30° thread-cutting fastener is engineered to meet the demanding requirements of thermoset plastics, providing easy assembly and ensuring a strong, reliable joint to maximize assembly performance.



30° Thread-Cutting Fastener

Specifications

Sizes ◆ S22 to S80 in diameter; up to 152mm under head. Other sizes may be available upon request.

Head Styles ◆ Pan, flat, hex, round washer, hex washer, oval, button head, fillister

Specials ◆ Shoulder screws, sems, double end studs, collar studs, others as required

Drive Systems ◆ TORX Drive System is recommended to facilitate the proper amount of torque transfer required for cutting threads. Other styles are available.

Applications

Thermoset plastics

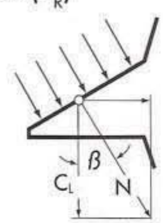
Key Advantages

- Cuts threads in stiffer plastics
- Minimizes installation torque
- Maximizes assembly performance

Features & Benefits

Asymmetrical 30° thread profile, inclined towards load surface to increase friction (F_R) between the application and the fastener

- Reduces radial stress
- Reduces back-out caused by relaxation
- Increases strip resistance
- Eliminates need for supplementary locking devices



$F_R = \mu \times N$

$N = C_L / \cos\beta$

Optimal thread pitch for deeper thread engagement

- Increases pull-out strength
- Increases resistance to vibration loosening
- Increases load-carrying capability

Recessed thread root provides space for displaced material

- Minimizes installation torque
- Minimizes risk of clogging and galling of threads during assembly

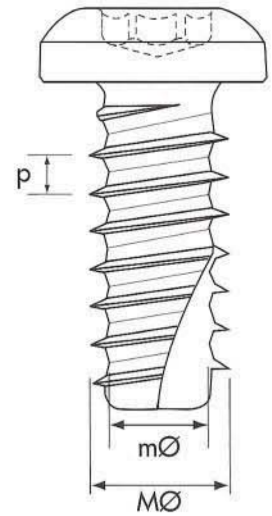
Shank slot minimizes chip production

Through hardened to Rc 33-39

30° Thread-Cutting Fasteners

Dimensional Data

Nom. Size	Metric Size	p Thread Pitch (mm)	MØ Major Diameter (mm)	mØ Minor Diameter (mm)
S22	M2.2	0.71	2.20	1.59
S25	M2.5	0.77	2.50	1.81
S30	M3	0.86	3.00	2.18
S35	M3.5	0.95	3.50	2.56
S40	M4	1.04	4.00	2.93
S50	M5	1.23	5.00	3.68
S60	M6	1.42	6.00	4.42
S70	M7	1.60	7.00	5.20
S80	M8	1.79	8.00	5.91



Hole Sizes for Various Percentages of Thread Engagement

Size	100%		90%		80%		70%		60%		50%		40%	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
S22	1.71	.067	1.77	.070	1.83	.072	1.88	.074	1.94	.076	1.99	.078	2.05	.081
S25	1.95	.077	2.01	.079	2.07	.082	2.13	.084	2.20	.086	2.26	.089	2.32	.091
S30	2.34	.092	2.41	.095	2.48	.098	2.56	.101	2.63	.104	2.70	.106	2.78	.109
S35	2.73	.107	2.81	.111	2.90	.114	2.99	.118	3.07	.121	3.16	.124	3.24	.128
S40	3.12	.123	3.21	.127	3.31	.130	3.41	.134	3.51	.138	3.60	.142	3.70	.146
S50	3.90	.153	4.01	.158	4.13	.163	4.25	.167	4.37	.172	4.49	.177	4.61	.182
S60	4.67	.184	4.82	.190	4.96	.195	5.10	.201	5.24	.206	5.38	.212	5.52	.217
S70	5.45	.215	5.62	.221	5.78	.228	5.95	.234	6.12	.241	6.28	.247	6.45	.254
S80	6.23	.245	6.42	.253	6.61	.260	6.80	.268	6.98	.275	7.17	.282	7.36	.290

Suggested Thread Engagement

Based on testing and past performance, a thread engagement of 50% to 60% is recommended.

30° Thread-Cutting Fasteners

Boss Design Recommendations

Laboratory testing and service applications have produced the general recommendations shown. Specific applications may, however, require some modification in order to allow for:

- molding conditions
- mold tool design
- type of resin
- type of filler
- material density

Determining Optimum Boss & Hole Sizes

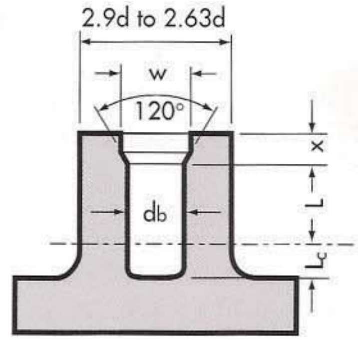
A hole diameter of .85d to .89d is permissible for most thermoset applications. In order to properly determine boss and hole sizes, it is recommended that testing be done on several different hole sizes. This will allow you to determine the optimum drive-to-strip ratio that is required for your application.

Boss Hole Diameter (db) — d = nominal screw diameter

Size	.85d		.86d		.87d		.88d		.89d	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
S22	1.87	.074	1.89	.074	1.91	.075	1.94	.076	1.96	.077
S25	2.12	.083	2.15	.085	2.17	.085	2.20	.087	2.23	.088
S30	2.55	.100	2.58	.102	2.61	.103	2.64	.104	2.67	.105
S35	2.97	.117	3.01	.119	3.04	.120	3.08	.121	3.12	.123
S40	3.40	.134	3.44	.135	3.48	.137	3.52	.139	3.56	.140
S50	4.25	.167	4.30	.169	4.35	.172	4.40	.173	4.45	.175
S60	5.10	.201	5.16	.203	5.22	.206	5.28	.208	5.34	.210
S70	5.95	.234	6.02	.237	6.09	.240	6.16	.243	6.23	.245
S80	6.80	.268	6.88	.271	6.96	.274	7.04	.277	7.12	.280

Boss Outer Diameter (O.D.) — d = nominal screw diameter

Size	.85d		.86d		.87d		.88d		.89d	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
S22	6.38	.251	6.23	.245	6.09	.240	5.94	.234	5.79	.228
S25	7.25	.285	7.08	.279	6.92	.272	6.75	.266	6.58	.259
S30	8.70	.343	8.50	.335	8.30	.327	8.10	.319	7.90	.311
S35	10.15	.400	9.92	.391	9.68	.381	9.45	.372	9.21	.363
S40	11.60	.457	11.33	.446	11.07	.436	10.25	.425	10.53	.415
S50	14.50	.571	14.15	.557	13.83	.544	13.50	.531	13.17	.519
S60	17.40	.685	17.00	.669	16.60	.654	16.20	.638	15.80	.622
S70	20.30	.799	19.38	.781	19.37	.763	18.90	.744	18.43	.726
S80	23.20	.913	22.67	.893	22.13	.871	21.60	.850	21.07	.830



d = nominal screw diameter

Boss Counterbore Size

High tightening torques and large tensile stresses may cause a cone-shaped expansion and failure at the bottom of the boss. Designing the boss with the appropriate counterbore (cb) reduces edge stress and alleviates cracking.

cb depth: $x = 0.5d$

cb width: $w = 1.08 \times d$

Length of Engagement

The length of engagement (L) should be 2 to 3 times the nominal screw diameter. This calculation should exclude counterbore depth.

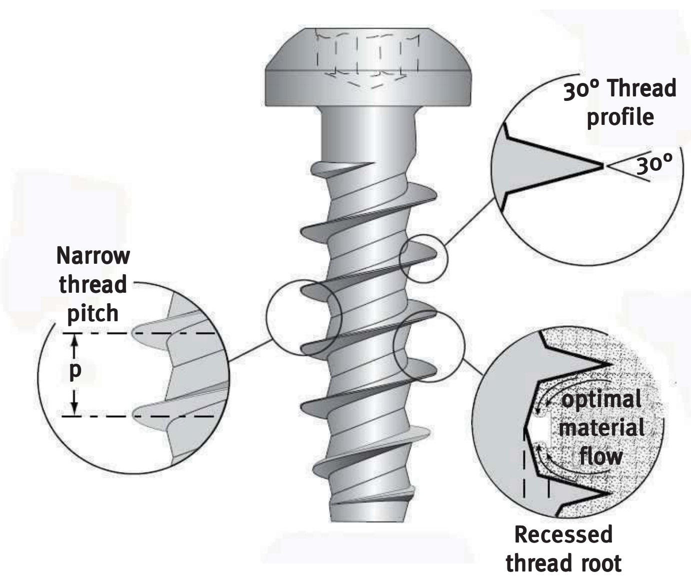
Chip Space Depth

The depth of space (L_c) for chips removed during thread cutting operations should be between 0.8 and 1.2 the nominal screw diameter.

With a high thread profile and recessed thread root, the 30 fastener provides increased thread engagement with minimal stress on the boss. It provides optimal performance in a wide range of thermoplastics.

Description

1. Optimizes performance in all types of thermoplastics
2. Provides maximum resistance to back-out and pull-out
3. Minimizes boss failure
4. Increases product reliability



Features and benefits

Narrow 30° thread profile minimizes radial expansion and stress in boss
- Permits use of thinner bosses, which can reduce cycling times and material usage
- Reduces back-out caused by relaxation
- Increases load-carrying capability through increased thread engagement
- Can be used in repeat assembly operations

Optimum thread pitch allows deeper thread engagement
- Provides increased pull-out values
- Optimizes non-reversibility
- Balances load ratio between plastic and screw

Recessed thread root allows optimal material flow
- Minimizes installation torque
- Improves clamp load
- Minimizes potential of boss cracking

Round body evenly distributes surface contact between application and screw
- Improves load ratio
- Reduces high points of stress on the boss

Specifications

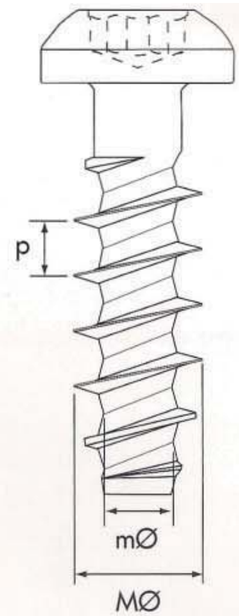
Sizes	ø 1.8 to 8; other sizes may be available upon request
Head Styles	Can be used with any external or internal head designs; pan, hex washer, and flat styles standard
Drive System	Can use any system. The Torx Drive is recommended to facilitate the proper amount of torque transfer required for forming thread
Finish	As required
Applications	Thermoplastics with a flexural modulus up to 5800 N/mm²

30° Thread-Forming Fasteners

Dimensional Data

* PT screw standards are true metric sizes.

Nom. Size	Metric Size	p Thread Pitch (mm)	MØ Major Diameter (mm)	mØ Minor Diameter (mm)
K15	M1.5	0.67	1.50	0.89
K18	M1.8	0.80	1.80	1.04
K22	M2.2	0.98	2.20	1.25
K25	M2.5	1.12	2.50	1.40
K30	M3.0	1.34	3.00	1.66
K35	M3.5	1.57	3.50	1.91
K40	M4.0	1.79	4.00	2.17
K50	M5.0	2.24	5.00	2.68
K60	M6.0	2.69	6.00	3.19
K70	M7.0	3.14	7.00	3.70
K100	M10.0	4.49	10.00	5.23



Hole Sizes for Various Percentages of Thread Engagement

Size	100%		90%		80%		70%		60%		50%		40%	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
K15	1.21	.048	1.24	.049	1.27	.050	1.30	.051	1.33	.052	1.35	.053	1.38	.054
K18	1.40	.055	1.44	.057	1.48	.058	1.52	.060	1.56	.061	1.60	.063	1.64	.065
K22	1.66	.065	1.71	.067	1.77	.070	1.82	.072	1.88	.074	1.93	.076	1.98	.078
K25	1.85	.073	1.92	.076	1.98	.078	2.05	.081	2.11	.083	2.18	.086	2.24	.088
K30	2.18	.086	2.26	.089	2.34	.092	2.42	.095	2.51	.099	2.59	.102	2.67	.105
K35	2.50	.098	2.60	.102	2.70	.106	2.80	.110	2.90	.114	3.00	.118	3.10	.122
K40	2.82	.111	2.94	.116	3.06	.120	3.17	.125	3.29	.130	3.41	.134	3.53	.139
K50	3.46	.136	3.62	.142	3.77	.148	3.92	.155	4.08	.161	4.23	.167	4.39	.173
K60	4.11	.162	4.30	.169	4.49	.177	4.68	.184	4.86	.192	5.05	.199	5.24	.206
K80	5.40	.212	5.66	.223	5.92	.233	6.18	.243	6.44	.253	6.70	.264	6.96	.274
K100	6.68	.263	7.02	.276	7.35	.289	7.68	.302	8.01	.315	8.34	.328	8.67	.341

30° Thread-Forming Fasteners

Boss Design Recommendations

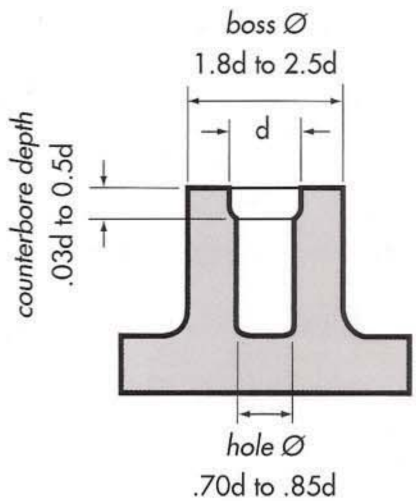
Laboratory testing and service applications have produced the general recommendations shown here. Specific applications may, however, require some modifications to allow for:

- molding conditions
- mold tool design
- feed distance from gate
- weld lines
- structural heterogeneity
- amount of reground material

In order to ensure optimal performance, we strongly recommend testing on initial samples.

Counterbore Size

The width of the counterbore should be equal to the major diameter of the screw (d). The height of the counterbore should be 0.3 to 0.5 times the nominal screw diameter.



d = major diameter of screw

PT Fasteners Boss Design Recommendations

Material	Hole Diameter	Boss Diameter	Min. Length of Engagement
ABS (acrylonitrile)	0.80 x d	2.00 x d	2.00 x d
ASA (acrylonitrile styrene acrylic)	0.78 x d	2.00 x d	2.00 x d
Nylon: PA6 (polyamide)	0.75 x d	1.85 x d	1.70 x d
Nylon: PA-GF30	0.80 x d	2.00 x d	1.90 x d
Nylon: PA6.6	0.75 x d	1.85 x d	1.70 x d
Nylon: PA6.6-GF30	0.82 x d	2.00 x d	1.80 x d
PBT (polybutylene terephthalate)	0.75 x d	1.85 x d	1.70 x d
PBT-GF30	0.80 x d	1.80 x d	1.70 x d
PC (polycarbonate)	0.85 x d	2.50 x d	2.20 x d
PC-GF30	0.85 x d	2.20 x d	2.00 x d
PE soft (polyethylene)	0.70 x d	2.00 x d	2.00 x d
PE hard (polyethylene)	0.75 x d	1.80 x d	1.80 x d
PET (polyethylene terephthalate)	0.75 x d	1.85 x d	1.70 x d
PET-GF30	0.80 x d	1.80 x d	1.70 x d
POM acetal	0.75 x d	1.95 x d	2.00 x d
PP (polypropylene)	0.70 x d	2.00 x d	2.00 x d
PPO (polyphenylene oxide)	0.85 x d	2.50 x d	2.20 x d
PS (polystyrene)	0.80 x d	2.00 x d	2.00 x d
PVC hard (polyvinyle chloride)	0.80 x d	2.00 x d	2.00 x d
SAN (styrene acrylonitrile)	0.77 x d	2.00 x d	1.90 x d

Boss Design Example

Material: ABS

To calculate boss size based on fastener size:

Screw size: K40

Major diameter: 4mm

Boss O.D. = 2 X screw dia.

2 X 4mm = 8mm

Boss I.D. = .8 X screw dia.

.8 X 4mm = 3.2mm

Min. length of engagement = 2 X screw dia.

2 X 4mm = 8mm

To calculate screw size based on (predetermined) boss size:

Boss O.D.: 8mm

Boss I.D.: 3.2mm

Screw dia. = Boss O.D. ÷ 2

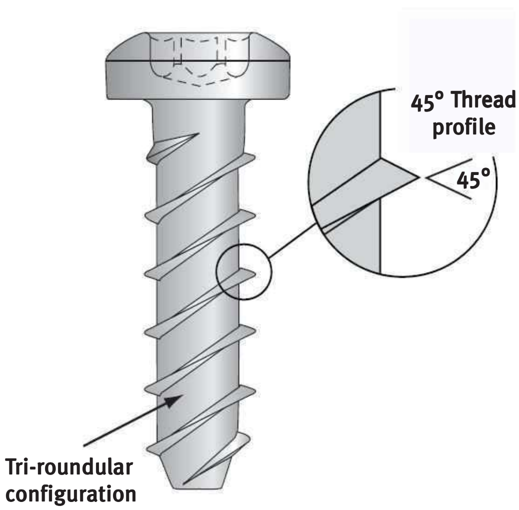
8mm ÷ 2 = 4mm

45° Thread Fastener

The 45 Thread fastener is designed to facilitate thread-forming in less-compressable plastics while providing high resistance to strip-out and pull-out.

Description

1. Can be used in small bosses
2. Increases product reliability
3. Lowers required drive torque when fastening stiffer thermoplastics



Features and benefits

Tri-roundular configuration allows displaced material to cold flow back into relief areas

- Minimizes radial stress
- Reduces possibility of boss failure
- Eliminates need for inserts and lock washers
- Allows design of thinner bosses

45° thread profile allows threads to penetrate deeply into plastic material

- Suits a wide choice of applications
- Generates strong mating threads
- Resists vibration loosening
- Increases resistance to strip-out
- Achieves wide differentials between drive and fail torque

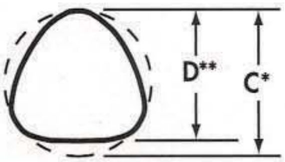
Single lead design and narrow helix angle lowers drive torque and failure torque in thermoplastics with a flexural modulus over 850,000 p.s.i.

- Creates less stress on the boss

Specifications

Sizes	ø 2 to 8; other sizes may be available upon request
Head Styles	Can be used with any external or internal head designs; pan, hex washer, and flat styles standard
Drive System	Can use any system, including Torx Drive
Finish	As required
Applications	Engineering-grade thermoplastics (with a flexural modulus over 5800 N/mm²)

45° Thread-Forming Fasteners



* C dimension measured with Tri-Flute Micrometer
** D diameter measured with Standard Micrometer

Dimensional Data - Inch Sizes

Nom. Size	Thread Pitch (per inch)	C Dimension max-min (in)	D Dimension max-min (in)	Screw Length Tolerance under 3/4" (in)	over 3/4" (in)
2	19	.0875 - .0835	.0845 - .0805	± .030	±.050
3	18	.101 - .097	.098 - .094	± .030	±.050
4	17	.1145 - .1095	.111 - .106	± .030	±.050
5	15	.1275 - .1225	.1235 - 1185	± .030	±.050
6	13	.141 - .136	.137 - .132	± .030	±.050
7	12	.153 - .148	.1485 - .1435	± .030	±.050
8	11	.167 - .161	.162 - .156	± .030	±.050
9	10	.179 - .173	.174 - .168	± .030	±.050
10	9	.194 - .188	.189 - .183	± .030	±.050
12	9	.220 - .214	.2145 - .2085	± .030	±.050
1/4	8	.253 - .247	.247 - .241	±.050	±.050
9/32	8	.284 - .278	.278 - .272	±.050	±.050
5/16	8	.316 - .308	.309 - .301	±.050	±.050
21/64	8	.332 - .324	.325 - .317	±.050	±.050
11/32	8	.349 - .341	.342 - .334	±.050	±.050
3/8	7	.379 - .371	.371 - .363	±.050	±.050

Dimensional Data - Metric Sizes

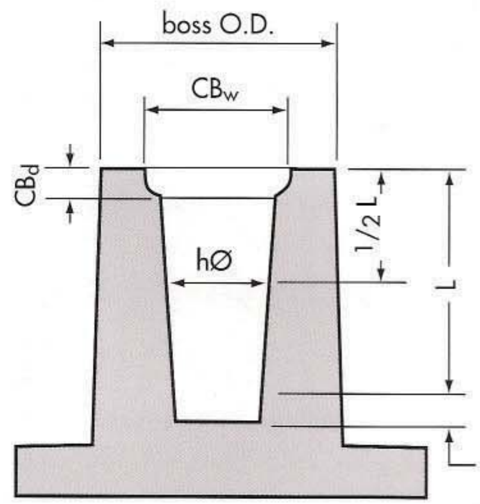
Nom. Size	Thread Pitch	C Dimension max-min (mm)	D Dimension max-min (mm)	Screw Length Tolerance under 20mm (mm)	over 20mm (mm)
2	1.35	2.04 - 1.92	1.99 - .0783	±.08	±1.3
2.5	1.4	2.53 - 2.41	2.49 - 2.37	±.08	±1.3
3	1.5	3.04 - 2.92	2.99 - 2.87	±.08	±1.3
3.5	1.65	3.54 - 3.42	3.48 - 3.34	±.08	±1.3
4	1.75	4.04 - 3.89	3.94 - 3.79	±.08	±1.3
4.5	2.0	4.54 - 4.39	4.43 - 4.28	±.08	±1.3
5	2.2	5.04 - 4.89	4.94 - 4.79	±1.3	±1.3
5	2.3	5.04 - 4.89	4.94 - 4.79	±1.3	±1.3
6	2.5	6.04 - 5.89	5.93 - 5.78	±1.3	±1.3
8	3	8.04 - 7.86	7.89 - 7.71	±1.3	±1.3

45° Thread-Forming Fasteners

Nominal Hole Sizes for Various Percentages of Thread Engagement

Inch Sizes	100% (in.)	90% (in.)	80% (in.)	70% (in.)	60% (in.)
2-19	.065	.067	.069	.071	.073
3-18	.076	.078	.081	.083	.085
4-17	.087	.090	.093	.095	.098
5-15	.099	.102	.104	.107	.110
6-13	.101	.105	.109	.112	.116
7-12	.112	.116	.120	.124	.128
8-11	.125	.129	.133	.137	.141
9-10	.131	.136	.141	.145	.150
10-9	.148	.152	.157	.161	.166
12-9	.167	.172	.177	.182	.187
1/4-8	.196	.202	.207	.213	.219
9/32-8	.221	.227	.233	.239	.245
5/16-8	.251	.257	.264	.270	.276
21/64-8	.265	.271	.278	.284	.291
11/32-8	.281	.288	.294	.301	.307
3/8-7	.302	.310	.317	.325	.332

Metric Sizes	100% (mm)	90% (mm)	80% (mm)	70% (mm)	60% (mm)
2 x 1.35	1.36	1.41	1.46	1.51	1.57
2.5 X 1.4	1.78	1.83	1.88	1.94	2.00
3 X 1.5	2.25	2.30	2.37	2.43	2.50
3.5 X 1.65	2.68	2.74	2.80	2.88	2.95
4 X 1.75	3.11	3.18	3.25	3.33	3.41
5 X 2.2	3.70	3.80	3.91	4.03	4.16
5 X 2.3	3.67	3.76	3.86	3.98	4.10
6 X 2.5	4.57	4.68	4.79	4.91	5.05
8 X 3.0	6.36	6.49	6.62	6.77	6.92



Boss Design Recommendations

The length of engagement (L) should be 2 to 3 times the fastener's C dimension. Testing should be done to determine optimal thread engagement on any application with a lower length of engagement.

The nominal hole size (hØ) must be established based on the amount of thread engagement (see chart above). For optimum performance, the hole size should provide a minimum 70% thread engagement.

The outside diameter of the boss (boss O.D.) should be 2.5 to 3 times the nominal diameter of the screw (C dimension). The boss height should not exceed 2 times the boss O.D.

The counterbore width (CB_w) should be slightly larger than the C dimension. Its depth (CB_d) should be 1/4 to 1/2 the thread pitch.

48° Thread-Forming Fasteners

The 48° fastener combines a unique tri-lobular body with a 48° thread profile to maximize performance and reliability. Two thread-forming styles are available to meet the specific requirements of a wide range of thermoplastics.

SPECIFICATIONS

Sizes ◆ #00 – 5/16"; other sizes may be available upon request

Head Styles ◆ Can be used with any external or internal head designs; pan, hex washer, and flat styles standard

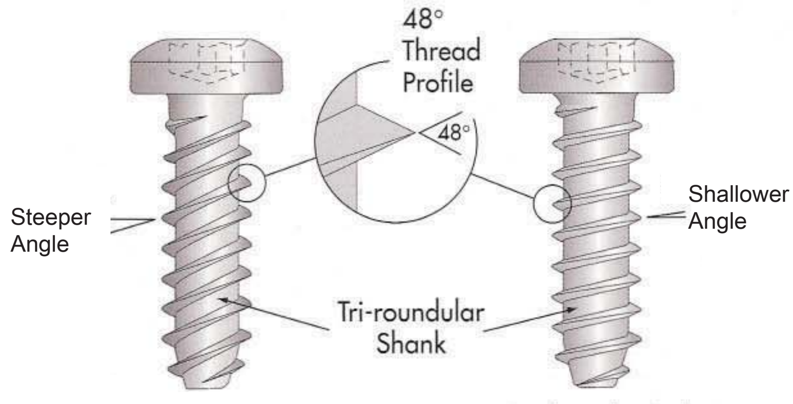
Drive System ◆ Can use any system, including TORX

Finish ◆ As required

APPLICATIONS

Twin Style:
Thermoplastics with a flexural modulus up to 850,000 p.s.i.

Single Style:
Thermoplastics with a flexural modulus between 850,000 p.s.i. and 1,400,000 p.s.i.



Twin Style   Single Style

48° Fasteners

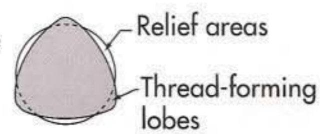
KEY ADVANTAGES

- ◆ Reduces possibility of boss failure
- ◆ Increases product reliability
- ◆ Eliminates need for inserts and lock washers

FEATURES & BENEFITS

Tri-roundular configuration allows displaced material to cold flow back into relief areas

- ◆ Minimizes radial stress
- ◆ Reduces possibility of boss failure
- ◆ Eliminates need for inserts and lock washers
- ◆ Allows design of thinner bosses



48° thread profile allows threads to penetrate deeply into plastic material

- ◆ Generates strong mating threads
- ◆ Resists vibration loosening
- ◆ Reduces probability of strip-out and pull-out

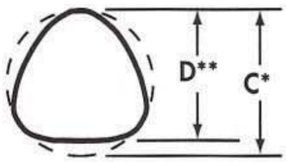
Twin lead design and steep angle provides
greater shear area in softer plastics (with a flexural modulus up to 850,000 p.s.i.

- ◆ Increases holding power
- ◆ Allows faster seating of fastener

Single lead design and narrow angle lowers
drive torque adn failure torque in stiffer thermoplastics (with flexural modulus between 850,000 and 1,300,000 p.s.i.)

- ◆ Creates less stress on the boss

48° Thread-Forming Fasteners



* C dimension measured with Tri-Flute Micrometer
** D diameter measured with Standard Micrometer

Dimensional Data - Inch Sizes

Nom. Size	Thread Pitch (per inch)	C Dimension max-min (in)	D Dimension max-min (in)	Screw Length Tolerance under 3/4" (in)	Screw Length Tolerance over 3/4" (in)
00	51	.0496 - .0466	.0475 - .0445	±.015	±.015
0	42	.0665 - .0635	.0635 - .0605	±.015	±.015
1	32	.081 - .078	.078 - .075	±.030	±.030
2	28	.092 - .086	.089 - .083	±.030	±.030
3	24	.110 - .104	.106 - .100	±.030	±.030
4	20	.127 - .121	.123 - .117	±.030	±.050
6	19	.147 - .141	.143 - .137	±.030	±.050
7	18	.166 - .160	.160 - .154	±.030	±.050
8	16	.185 - .179	.179 - .173	±.030	±.050
9	15	.199 - .193	.193 - .187	±.030	±.050
10	14	.212 - .206	.208 - .202	±.030	±.050
12	14	.232 - .226	.226 - .220	±.030	±.050
1/4	10	.276 - .270	.268 - .262	±.050	±.050
5/16	9	.345 - .335	.335 - .325	±.050	±.050

Dimensional Data - Metric Sizes*

*soft converted metric sizes

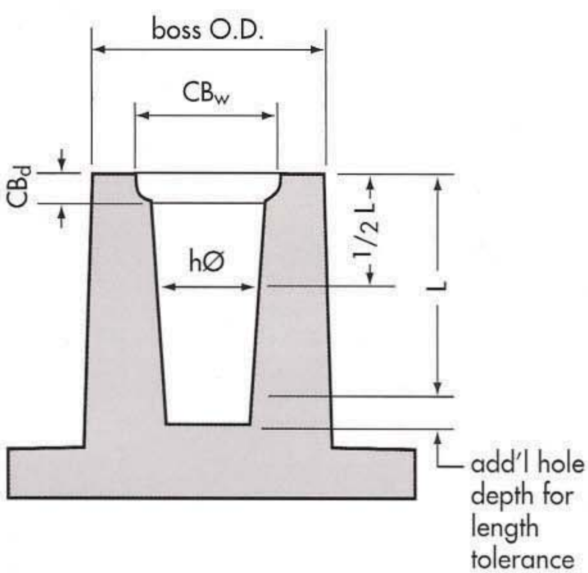
Nom. Size	Thread Pitch	C Dimension max-min (mm)	D Dimension max-min (mm)	Screw Length Tolerance under 19.05mm (mm)	Screw Length Tolerance over 19.05mm (mm)
1.12	0.50	1.26 - 1.18	1.21 - 1.13	±0.38	±0.38
1.59	0.60	1.69 - 1.61	1.61 - 1.54	±0.38	±0.38
1.91	0.79	2.06 - 1.98	1.98 - 1.91	±0.76	±0.76
2.26	0.91	2.34 - 2.18	2.26 - 2.11	±0.76	±0.76
2.63	1.06	2.79 - 2.64	2.69 - 2.54	±0.76	±0.76
3.12	1.27	3.23 - 3.07	3.12 - 2.97	±0.76	±1.27
3.63	1.34	3.73 - 3.58	3.63 - 3.48	±0.76	±1.27
4.06	1.41	4.22 - 4.06	4.06 - 3.91	±0.76	±1.27
4.55	1.59	4.70 - 4.55	4.55 - 4.39	±0.76	±1.27
4.90	1.69	5.05 - 4.90	4.90 - 4.75	±0.76	±1.27
5.28	1.81	5.38 - 5.23	5.28 - 5.13	±0.76	±1.27
5.74	1.81	5.89 - 5.74	5.74 - 5.59	±0.76	±1.27
6.81	2.54	7.01 - 6.86	6.81 - 6.65	±1.27	±1.27
8.51	2.82	8.76 - 8.51	8.51 - 8.26	±1.27	±1.27

* 48° fasteners are not available in true metric sizes. The chart above provides nominal inch dimensions converted to millimeters.

48° Thread-Forming Fasteners

Nominal Hole Sizes for Various Percentages of Thread Engagement

Size	100%		90%		80%		70%		60%		50%		40%	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
00-51	.0377	0.957	.0386	0.980	.0395	1.003	.0404	1.026	.0413	1.049	.0423	1.074	.0432	1.097
0-42	.0498	1.265	.0510	1.295	.0523	1.328	.0535	1.359	.0548	1.392	.0560	1.422	.0573	1.455
1-32	.0621	1.577	.0632	1.605	.0646	1.641	.0658	1.671	.0671	1.704	.0683	1.735	.0695	1.765
2-28	.0743	1.887	.0757	1.923	.0771	1.958	.0785	1.994	.0799	2.029	.0813	2.065	.0827	2.101
3-24	.0855	2.172	.0873	2.217	.0890	2.261	.0908	2.306	.0925	2.350	.0943	2.395	.0960	2.438
4-20	.0970	2.464	.1000	2.540	.1020	2.591	.1050	2.667	.1070	2.718	.1100	2.794	.1130	2.870
6-19	.1180	2.997	.1200	3.048	.1230	3.124	.1250	3.175	.1280	3.251	.1300	3.302	.1320	3.353
7-18	.1370	3.480	.1390	3.531	.1420	3.607	.1440	3.657	.1460	3.708	.1490	3.785	.1510	3.835
8-16	.1440	3.658	.1480	3.759	.1510	3.835	.1550	3.937	.1580	4.013	.1620	4.115	.1650	4.191
9-15	.1570	3.988	.1590	4.039	.1610	4.089	.1640	4.166	.1660	4.216	.1680	4.267	.1700	4.318
10-14	.1700	4.318	.1740	4.420	.1770	4.496	.1810	4.597	.1850	4.699	.1890	4.801	.1920	4.877
12-14	.1880	4.775	.1920	4.877	.1960	4.978	.1990	5.055	.2030	5.156	.2070	5.258	.2110	5.359
1/4-10	.2180	5.537	.2230	5.664	.2280	5.791	.2330	5.918	.2380	6.045	.2430	6.172	.2480	6.299
5/16-9	.2840	7.214	.2910	7.391	.2980	7.569	.3050	7.747	.3110	7.899	.3180	8.077	.3250	8.255



Boss Design Recommendations

The length of engagement (L) should be 2 to 3 times the fastener's C dimension. Testing should be done to determine optimal thread engagement on any application with a lower length of engagement.

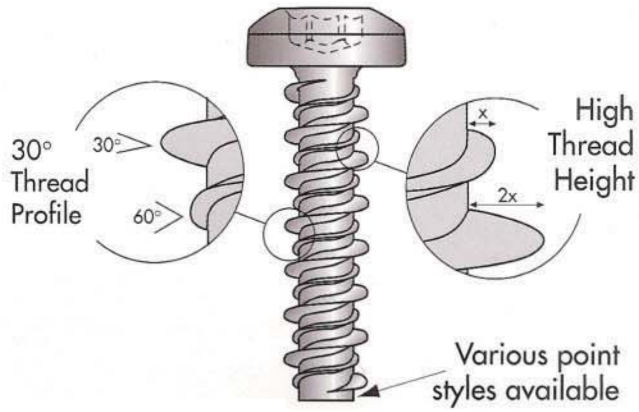
The nominal hole size (hØ) must be established based on the amount of thread engagement (see chart above). For optimum performance, the hole size should provide a minimum 70% thread engagement.

The outside diameter of the boss (boss O.D.) should be 2.5 to 3 times the nominal diameter of the screw (C dimension). The boss height should not exceed 2 times the boss O.D.

The counterbore width (CB_w) should be slightly larger than the C dimension. Its depth (CB_d) should be 1/4 to 1/2 the thread pitch.

HiLo Thread-Forming Fasteners

The high thread height and wide thread spacing of the HiLo fastener allows increased thread engagement in softer thermoplastics, increasing resistance to pull-out and improving product performance.



HiLo Fastener

SPECIFICATIONS

Sizes ◆ #2 to 5/16
(metric sizes 2.5 – 8.0)

Head Styles ◆ Pan, hex, flat, oval, hex washer

Point Styles ◆ Blunt, gimlet, pilot

Drive Systems ◆ Can use any system, including TORX

APPLICATIONS

Thermoplastics with a flexural modulus up to 600,000 p.s.i.

KEY ADVANTAGE

- Performs well in softer thermoplastics

FEATURES & BENEFITS

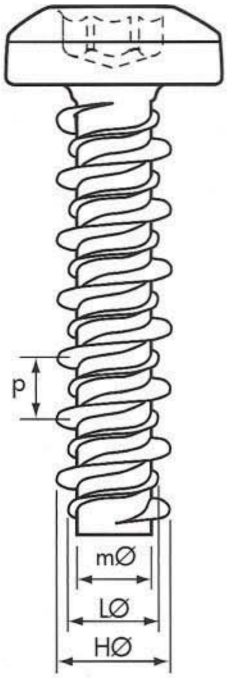
High thread with a 30° flank angle to reduce radial stress in the boss

- Requires lower driving torque
- Reduces cracking of boss
- Allows use of smaller bosses

Smaller minor diameter than standard screws allows greater shear area

- Increases thread engagement
- Increases resistance to pull-out

HiLo Thread-Forming Fastener



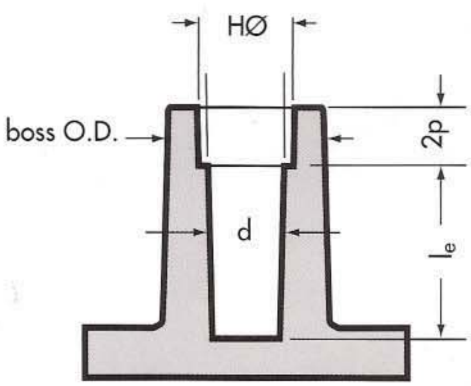
Dimensional Data – Inch

Screw Size	p Thd. Pitch	HØ High Thd. Dia.	LØ Low Thd. Dia.	mØ Ref. Minor Dia.
#5	20	.119 - .125	.100	.073
#6	19	.135 - .145	.108	.080
#7	19	.148 - .158	.130	.090
#8	18	.160 - .170	.130	.095
#10	16	.185 - .195	.145	.105
#12	16	.210 - .220	.167	.125
#13	16	.220 - .230	.180	.132
1/4"	15	.250 - .260	.200	.165
9/32"	16	.275 - .285	.230	.188
5/16"	14	.307 - .317	.250	.208

Dimensional Data – Metric

Screw Size	p Thd. Pitch	HØ High Thd. Dia.	LØ Low Thd. Dia.	mØ Ref. Minor Dia.
3.5	1.34	3.43 - .3.68	2.74	2.0
4.0	1.34	3.76 - 4.01	3.30	2.3
4.2	1.41	4.06 - 4.32	3.30	2.4
4.8	1.59	4.70 - 4.95	3.68	2.6
5.3	1.59	5.03 - 5.33	3.81	2.9
5.5	1.59	5.33 - 5.59	4.24	3.5
6.0	1.59	5.84 - 6.10	4.83	3.7
6.3	1.69	6.35 - 6.60	5.08	4.2
7.2	1.59	6.98 - 7.24	5.84	4.8
7.5	1.59	7.24 - 7.49	6.10	5.1
8.0	1.81	7.80 - 6.35	6.35	5.3

Boss Design Recommendations



The recommended hole size (d) can be found in the chart to the right.

The length of engagement (l_e) should be 3 times the high thread diameter (see chart above).

Counterbore depth is 1 to 2 times the thread pitch (see chart above). Counterbore depth is equal to the high thread diamter (HØ).

The boss O.D. should be at least 2 times the high thread diameter.

Recommended Hole Sizes

Screw Size (inch)	Hole Size (d) (in)	Screw Size (metric)	Hole Size (d) (mm)
#5	.099	3.5	2.79
#6	.110	4.0	3.17
#7	.125	4.2	3.26
#8	.128	4.8	3.65
#10	.144	5.3	3.96
#12	.166	5.5	4.21
#13	.180	6.0	4.85
1/4"	.201	6.3	5.10
9/32"	.234	7.2	5.95
5/16"	.250	7.5	6.14
		8.0	6.35