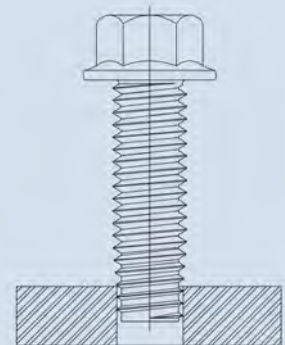
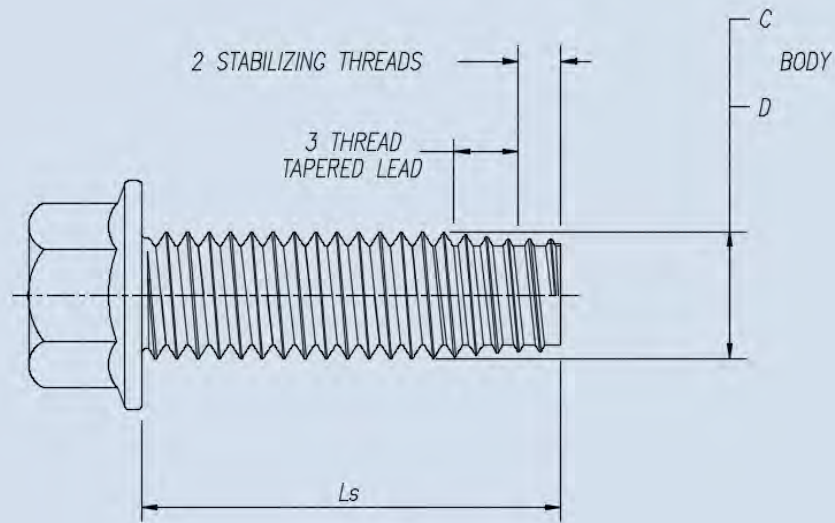


LEADERS IN LOWERING THE COST OF ASSEMBLY

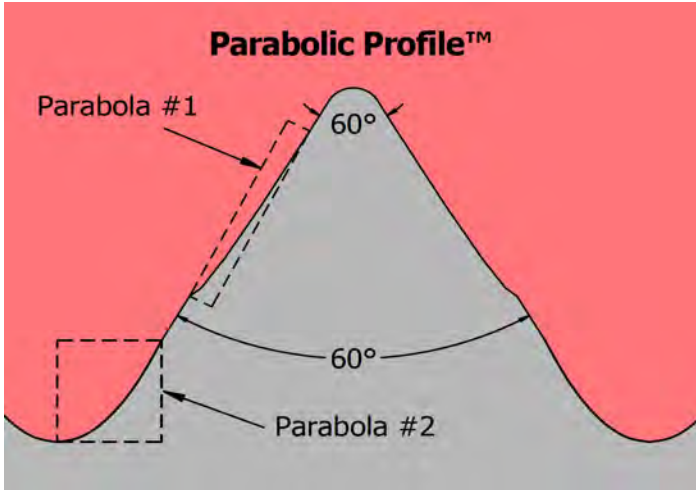


Thread Rolling Fasteners





TAPTITE[®] PRO[™] Fasteners



TAPTITE[®] PRO[™] thread forming fasteners, the next evolution of TAPTITE[®] fasteners, advances current thread forming technology with the development of the Parabolic Profile[™] thread form. The innovative new thread form, when combined with the proven

TRILOBULAR[®] cross section, provides low thread forming torque, excellent resistance to vibrational loosening along with high axial pull-out, and reduced overall cost of assembly. In addition to these great benefits, TAPTITE[®] PRO[™] fasteners maintain torque tension relationships comparable to machine screws of equivalent size, as well as an improved failure mode, as a result of overtightening, in standard lengths of engagement; the screw will fracture within the screw threads.

This preferred failure mode greatly reduces the risk of costly assembly line repairs and scrap due to stripped nut members or castings, along with the associated waste due to line downtime. This is an important de-sign improvement that is effective in both steel and soft white metal applications ensuring a continued savings on the Big 85[™] in a wide range of your current and future fastened joints.

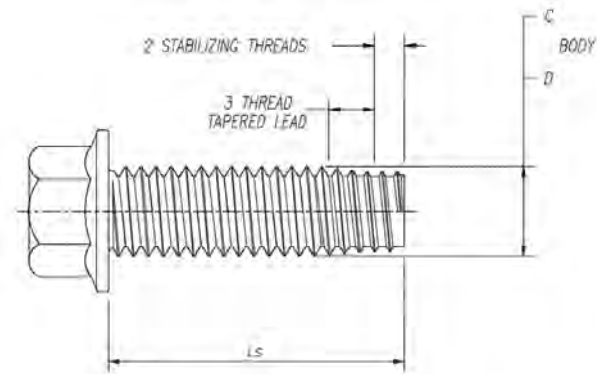
ADVANTAGES OF USING TAPTITE[®] PRO[™] TECHNOLOGY

- Preferable Failure Mode - when the screw is overtightened, in standard lengths of engagement, the screw will fracture within the screw threads
- Eases Assembly - low end load to initiate thread forming, less operator fatigue
- Low Thread Forming Torque - increased out of round point threads
- Speeds up Assembly - no assembly line cross-threading
- Superior Vibration Resistance - eliminates need for add-on locking devices
- High Prevailing Torque - provided by the TRILOBULAR[®] shape
- Deep Thread Engagements - generates strong mating threads with uninterrupted grain flow
- High Axial Pull-Out Loads - similar to that achieved using machine screws and bolts
- Various Metals & Hole Types - works in punched, drilled, cored and extruded holes
- No Secondary Clean-Up - forms threads in nut members contaminated with paint, primer or weld splatter
- Support - provided by REMINC/CONTI and fastener supplier personnel worldwide
- Availability - procurement available around the world
- Quality - official fasteners manufactured to strict standards

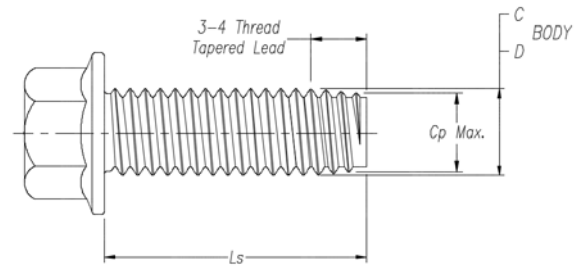


TAPTITE® PRO™ DESIGNS

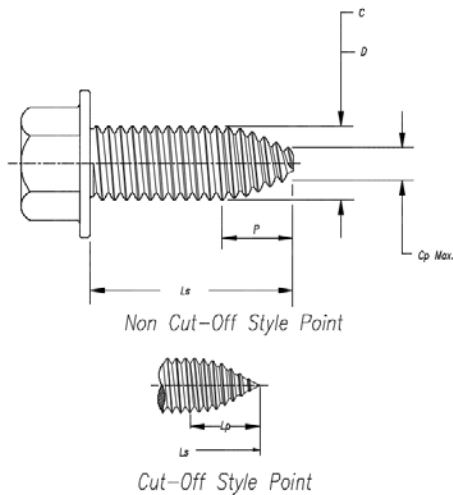
TAPTITE® PRO™ bolts M6 (1/4-20) & above



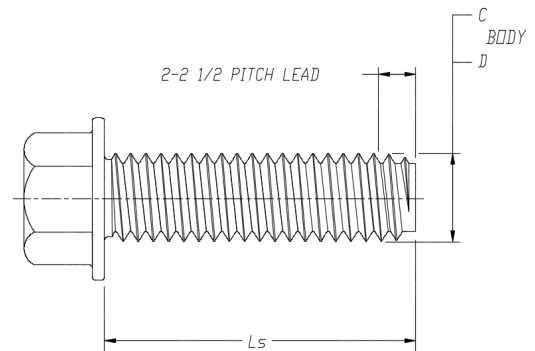
TAPTITE® PRO™ screws M5 (12-24) & below



TAPTITE® PRO™ "CA"™ screws & bolts Rapid Hole Finding, Floating Nut Members & Difficult to Access Applications



TAPTITE® PRO™ "SP"™ screws & bolts For Use in Aluminum & Zinc Die Castings





TAPTITE® PRO™ Fasteners - Cost Savings

TAPTITE® PRO™ Fasteners Reduce the Cost of Assembly

When installing a simple screw, most of the assembly cost is composed of preparing the hole, tapping, cleaning, applying locking compound, driving the screw, operator cost, etc. All of these elements make up what we term the "Big 85™". The actual fastener makes up only 15% of assembly costs.

A fastener, which reduces the "Big 85™", will lower assembly costs far more effectively than buying a cheaper fastener.

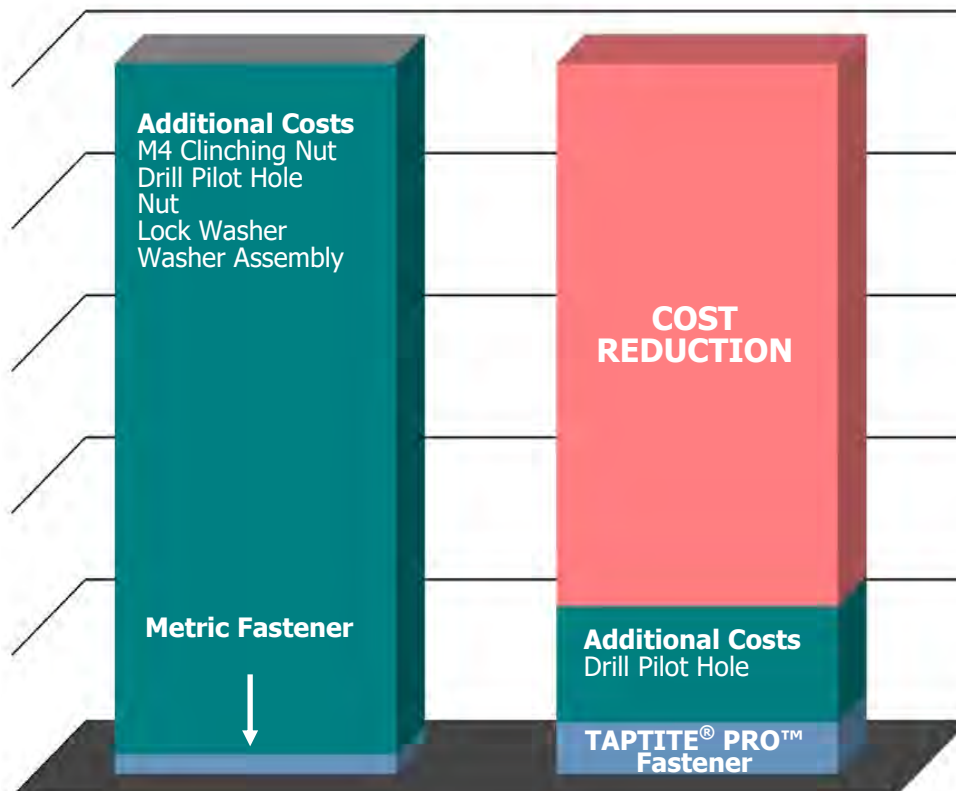
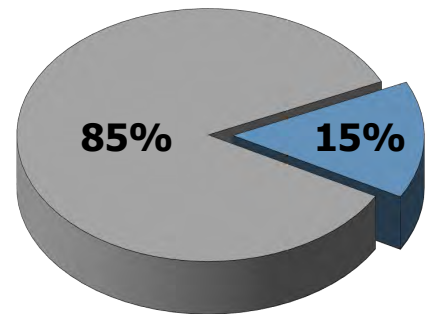
The TAPTITE® thread rolling screw family has been reducing the "Big 85™" in automotive, white goods, lawn equipment and electronics for decades. From a history of use beginning with the 1964 Ford Mustang to the latest cell phone, one major idea has been constant with TAPTITE® products - "In-Place Cost Savings".

TAPTITE® PRO™ screws eliminate the costs of tapping, washers and locking compounds or even the use of a nut. To find out how TAPTITE® PRO™ thread rolling screws can save on your assembly costs, contact our application engineers or any of our highly-qualified licensed manufacturers listed on www.taptite.com.

Standard Fastener Installation Components

- Labor
- Overhead
- Preparation of assembly
- Drilling and tapping the hole
- Application of locking device or adhesive
- Driving and tightening the screw

THESE COSTS MAKE UP THE **BIG 85™**





Joint Costs: Lighting Appliance



3 fastening elements
 2 assembly directions
 Manual assembly (complex)
 2 assembly processes

1 fastening element
 1 assembly direction
 Automated assembly
 1 assembly process

	Standard Screw (\$/100)	TAPTITE® PRO™ (\$/100)
Screw M4 x 8	1.15	3.39
Clinching Process	9.07	—
Drill/Punch Pilot Hole	12.73	12.73
Clinch Nut	14.54	—
Lock Washer	0.87	—
Washer Assembly	3.64	—
Total:	42.00	16.12
SAVINGS	61%	



TAPTITE® PRO™ Fasteners - 54 Ways

TAPTITE® PRO™ FASTENERS

Here is a partial list of the ways

TAPTITE® PRO™ screws save on tapping costs.



TAPTITE® PRO™ screws eliminate tapping. You save all of these avoidable costs common to assemblies where holes must be tapped for machine screws.

Check Below

Check list of TAPTITE® PRO™ screw savings and advantages

Estimated Savings Per M Fasteners

The elimination of tapping saves the cost of:

- | | |
|--|----------|
| <input type="checkbox"/> Direct labor | \$ _____ |
| <input type="checkbox"/> Indirect labor | _____ |
| <input type="checkbox"/> Taps | _____ |
| <input type="checkbox"/> Jigs and fixtures | _____ |
| <input type="checkbox"/> Tapping lubricants | _____ |
| <input type="checkbox"/> Gauges | _____ |
| <input type="checkbox"/> Setup time of tapping equipment | _____ |
| <input type="checkbox"/> Downtime on automated equipment due to tapping station malfunction | _____ |
| <input type="checkbox"/> Downtime to replace broken or malfunctioning taps | _____ |
| <input type="checkbox"/> Low machine efficiency due to loading, galling and binding of taps in gummy materials | _____ |
| <input type="checkbox"/> Cleaning away oil and chips | _____ |
| <input type="checkbox"/> Inspection for class of fit in tapped holes | _____ |
| <input type="checkbox"/> Loss or repair of tapped assemblies due to undersize or oversize tapped threads | _____ |
| <input type="checkbox"/> Loss or repair of tapped assemblies due to tap breakage or malfunction | _____ |
| <input type="checkbox"/> Moving, storage and scheduling of parts to and from the tapping department | _____ |

The elimination of tapping avoids these costly problems:

- | | |
|---|-------|
| <input type="checkbox"/> Cross threading of machine screws into pretapped holes | _____ |
| <input type="checkbox"/> Installing machine screws into tapped holes clogged with paint or other foreign material | _____ |
| <input type="checkbox"/> The need to maintain class of fit on assembled pieces | _____ |
| <input type="checkbox"/> The need to distort heads or threads to secure screw against looseness | _____ |
| <input type="checkbox"/> The need for locking type nylon inserts and collars | _____ |
| <input type="checkbox"/> The need for lock nuts and lockwashers | _____ |

The elimination of tapping makes possible:

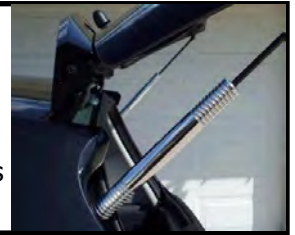
- | | |
|---|-------|
| <input type="checkbox"/> Use of punched or cored holes - eliminates drilling | _____ |
| <input type="checkbox"/> Use of drilling and tapping stations for other needed operations on multi-operation, automated equipment | _____ |
| <input type="checkbox"/> Release of tapping machinery for other tapping requirements - thus avoiding capital expenditure for additional tapping equipment | _____ |
| <input type="checkbox"/> Threading directly into untapped, less expensive, tubular rivets and inserts | _____ |
| <input type="checkbox"/> Use in less expensive plain unthreaded weld nuts | _____ |
| <input type="checkbox"/> Use of punch-extruded holes - eliminates staked weld and clinch nuts | _____ |

See how many ways TAPTITE® PRO™ screws can reduce "The Big 85™" on your assemblies.

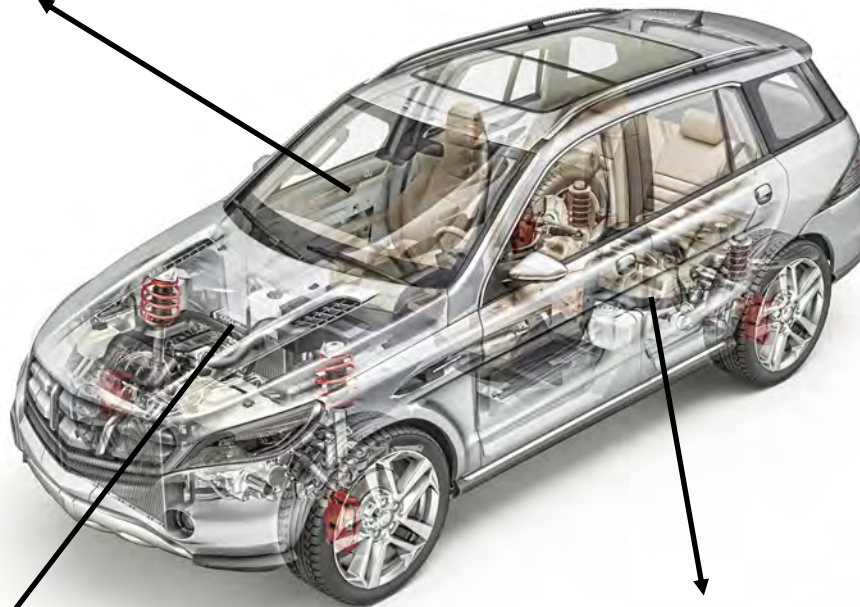
Typical TAPTITE® Product Applications



APPLICATION: "Hatch Back" Strut
FASTENER: M6 TAPTITE® bolt with shoulder
PROBLEM: Limited access prevented repair nut replacement
BENEFIT: Eliminated need for nut & consequential repair costs
Reduced fastener costs



APPLICATION: Mounting Amplifier to Carrier Frame
FASTENER: TAPTITE® screw w/ captive isolation washer
PROBLEM: Vibrational loosening
BENEFIT: Excellent fastening values & high process capability
Assembly complete & ready-to-fit
Reduced materials management system costs



APPLICATION: Seat Belt Bolts, Front and Shoulder Harness
FASTENER: M12 x 35mm TAPTITE® screws
PROBLEM: Cross threading during assembly
BENEFIT: Eliminates tapping operation
Eliminates cross threading and scrap/rework

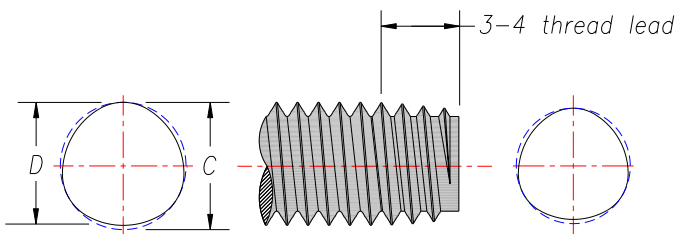


APPLICATION: TAPTITE® Screws Used to Assemble Aluminum Power Transfer Unit
FASTENER: M8 x 1.25 x 35 hex flange head TAPTITE® screws
PROBLEM: Expensive secondary tapping operation
BENEFIT: Elimination of all tapping associated costs
Reduction in capital equipment

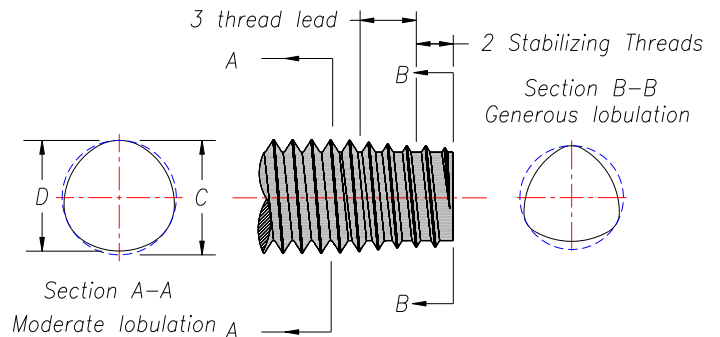


TAPTITE[®] PRO[™] Fasteners

For M5 & #12 or Smaller

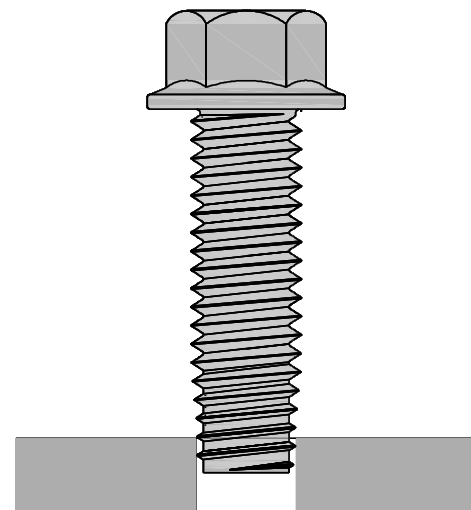


For M6 & 1/4" or Larger



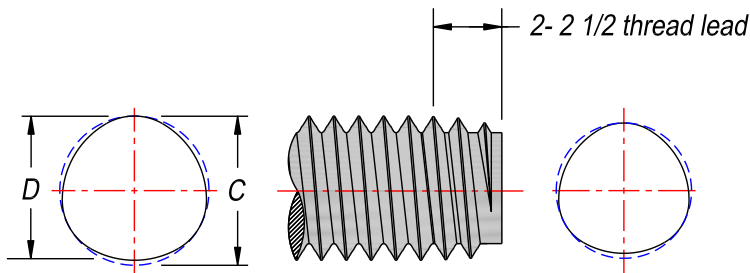
SCREW SIZE	SCREW BODY DIMENSIONS			
	C		D	
	Max	Min	Max	Min
Metric Sizes (mm)				
M1.0 x 0.25	1.000	0.955	0.975	0.924
M1.2 x 0.25	1.200	1.155	1.175	1.124
M1.4 x 0.30	1.405	1.355	1.375	1.317
M1.6 x 0.35	1.61	1.53	1.58	1.49
M1.8 x 0.35	1.81	1.73	1.78	1.69
M2.0 x 0.40	2.01	1.93	1.97	1.88
M2.2 x 0.45	2.21	2.12	2.17	2.06
M2.5 x 0.45	2.52	2.43	2.48	2.37
M3.0 x 0.50	3.02	2.93	2.97	2.87
M3.5 x 0.60	3.52	3.42	3.46	3.35
M4.0 x 0.70	4.02	3.92	3.95	3.83
M4.5 x 0.75	4.52	4.41	4.45	4.32
M5.0 x 0.80	5.02	4.91	4.94	4.81
M6.0 x 1.00	6.10	5.97	6.00	5.85
M7.0 x 1.00	7.10	6.97	7.00	6.85
M8.0 x 1.25	8.13	7.97	8.00	7.81
M9.0 x 1.25	9.13	8.97	9.00	8.81
M10 x 1.50	10.15	9.97	10.00	9.78
M12 x 1.75	12.18	11.97	12.00	11.75
M14 x 2.00	14.20	13.97	14.00	13.72
M16 x 2.00	16.20	15.97	16.00	15.72
M18 x 2.50	18.25	17.97	18.00	17.66
M20 x 2.50	20.25	19.97	20.00	19.66

SCREW SIZE	SCREW BODY DIMENSIONS			
	C		D	
	Max	Min	Max	Min
Inch Sizes (in)				
0 - 80	0.0626	0.0586	0.0613	0.0570
2 - 56	0.0880	0.0840	0.0862	0.0818
3 - 48	0.1010	0.0970	0.0989	0.0944
4 - 40	0.1138	0.1098	0.1113	0.1067
5 - 40	0.1268	0.1228	0.1243	0.1197
6 - 32	0.1413	0.1353	0.1382	0.1314
8 - 32	0.1674	0.1614	0.1643	0.1575
10 - 24	0.1934	0.1874	0.1892	0.1822
10 - 32	0.1936	0.1876	0.1905	0.1837
12 - 24	0.2194	0.2134	0.2152	0.2082
1/4 - 20	0.2550	0.2490	0.2500	0.2440
5/16 - 18	0.3180	0.3120	0.3125	0.3065
3/8 - 16	0.3810	0.3750	0.3745	0.3685
7/16 - 14	0.4445	0.4385	0.4375	0.4315
7/16 - 20	0.4425	0.4365	0.4375	0.4315
1/2 - 13	0.5075	0.5015	0.5000	0.4940
9/16 - 12	0.5710	0.5630	0.5625	0.5545
5/8 - 11	0.6340	0.6260	0.6250	0.6170



Stabilizing threads provide excellent axial alignment.
(sizes M6 and larger)

TAPTITE® PRO™ "SP"™ Fasteners



The TAPTITE® PRO™ "SP"™ fastener is well suited for use in blind holes in "white metal" applications. The TAPTITE® PRO™ fastener has a shorter than standard point (2-2½ threads). TAPTITE® PRO™ fasteners, maximize full thread engagement in shallow blind holes in die castings, which is often critical in shallow depth holes. This feature along with the TAPTITE® PRO™ Parabolic Profile™ thread form allows the end user to eliminate excess assembly costs, and expensive secondary operations while still maintaining strength, torque-tension relationships and the preferable failure mode of an equivalent machine screw - see page 14 for hole sizing information.

TAPTITE® PRO™ "SP"™ fasteners are used in "white metals" and therefore are supplied with CORFLEX®-'N' heat treatment to minimize the potential of stress corrosion - see page 19 for more details.

SCREW SIZE	SCREW BODY DIMENSIONS			
	C		D	
	Max	Min	Max	Min
Metric Sizes (mm)				
M1.0 x 0.25	1.000	0.955	0.975	0.924
M1.2 x 0.25	1.200	1.155	1.175	1.124
M1.4 x 0.30	1.405	1.355	1.375	1.317
M1.6 x 0.35	1.61	1.53	1.58	1.49
M1.8 x 0.35	1.81	1.73	1.78	1.69
M2.0 x 0.40	2.01	1.93	1.97	1.88
M2.2 x 0.45	2.21	2.12	2.17	2.06
M2.5 x 0.45	2.52	2.43	2.48	2.37
M3.0 x 0.50	3.02	2.93	2.97	2.87
M3.5 x 0.60	3.52	3.42	3.46	3.35
M4.0 x 0.70	4.02	3.92	3.95	3.83
M4.5 x 0.75	4.52	4.41	4.45	4.32
M5.0 x 0.80	5.02	4.91	4.94	4.81
M6.0 x 1.00	6.10	5.97	6.00	5.85
M7.0 x 1.00	7.10	6.97	7.00	6.85
M8.0 x 1.25	8.13	7.97	8.00	7.81
M9.0 x 1.25	9.13	8.97	9.00	8.81
M10 x 1.50	10.15	9.97	10.00	9.78
M12 x 1.75	12.18	11.97	12.00	11.75
M14 x 2.00	14.20	13.97	14.00	13.72
M16 x 2.00	16.20	15.97	16.00	15.72
M18 x 2.50	18.25	17.97	18.00	17.66
M20 x 2.50	20.25	19.97	20.00	19.66

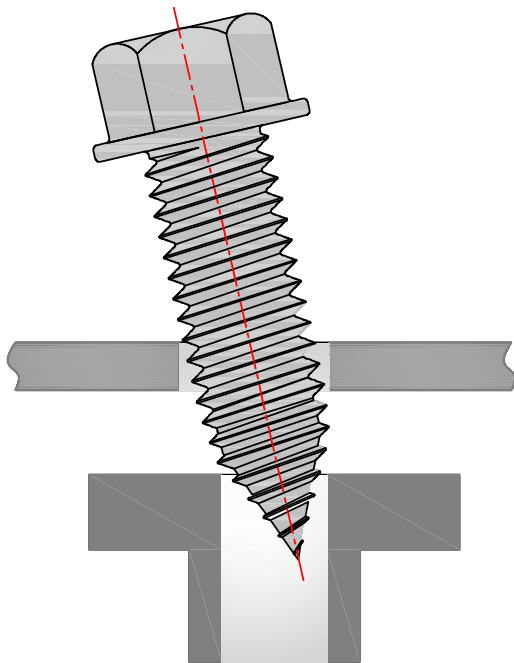
SCREW SIZE	SCREW BODY DIMENSIONS			
	C		D	
	Max	Min	Max	Min
Inch Sizes (in)				
0 - 80	0.0626	0.0586	0.0613	0.0570
2 - 56	0.0880	0.0840	0.0862	0.0818
3 - 48	0.1010	0.0970	0.0989	0.0944
4 - 40	0.1138	0.1098	0.1113	0.1067
5 - 40	0.1268	0.1228	0.1243	0.1197
6 - 32	0.1413	0.1353	0.1382	0.1314
8 - 32	0.1674	0.1614	0.1643	0.1575
10 - 24	0.1934	0.1874	0.1892	0.1822
10 - 32	0.1936	0.1876	0.1905	0.1837
12 - 24	0.2194	0.2134	0.2152	0.2082
1/4 - 20	0.2550	0.2490	0.2500	0.2427
5/16 - 18	0.3180	0.3120	0.3124	0.3051
3/8 - 16	0.3810	0.3750	0.3747	0.3672
7/16 - 14	0.4445	0.4385	0.4374	0.4296
7/16 - 20	0.4425	0.4365	0.4375	0.4302
1/2 - 13	0.5075	0.5015	0.4998	0.4919
9/16 - 12	0.5710	0.5630	0.5627	0.5526
5/8 - 11	0.6340	0.6260	0.6249	0.6146

NOTE: "SP"™ designates Short Point



TAPTITE® PRO™ "CA" Fasteners

The CA point can be supplied with a sharp point or a slightly truncated blunt point - which is desirable for situations when the sharp point could be a potential hazard to wires, components or assembly line and service personnel.



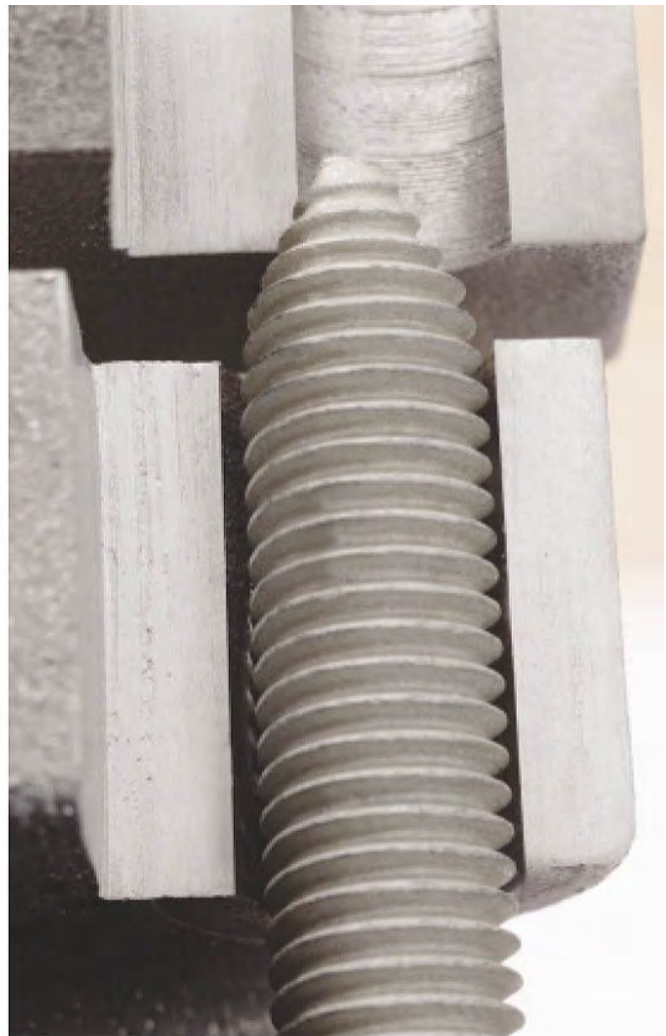
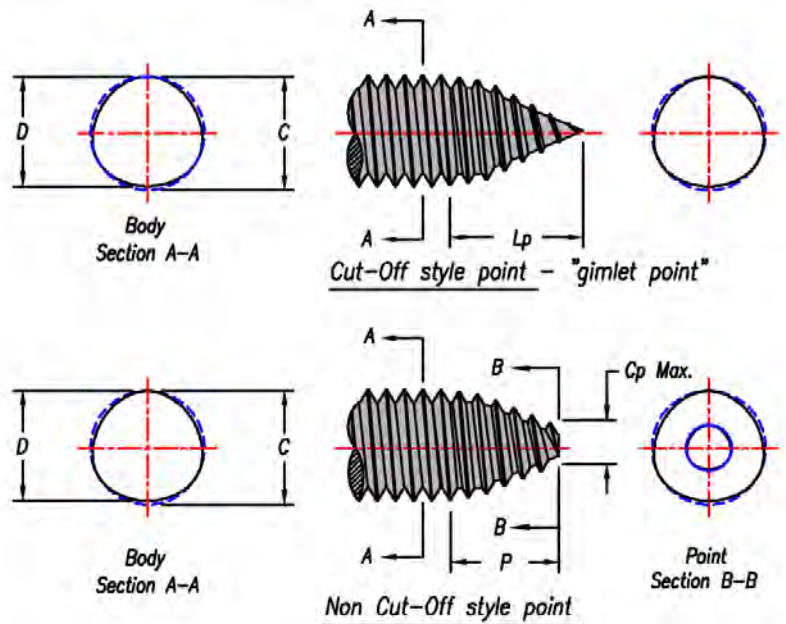
CA Point Hole-Finding Capability

TAPTITE® PRO™ CA fasteners have a gimlet point for use when clearance holes and pilot holes do not align.

The CA point is ideal for rapid hole finding, floating nut members or difficult access applications.

TAPTITE® PRO™ CA fasteners can be produced with any of our heat treatment processes; case hardened - our standard heat treatment for sizes M5 (#12) or smaller, CORFLEX®-'Y' induction hardened for structural or demanding applications or CORFLEX®-'N', neutral hardened non-ferrous applications.

See page 19 for a more detailed description of the available heat treat options.



TAPTITE® PRO™ Fasteners - Pilot Holes



Recommended Pilot Hole Sizes for TAPTITE® PRO™ Screws and Bolts at Various Percentages of Thread Engagement

Metric Sizes (mm)

SCREW SIZE	PERCENT THREAD											
	100	95	90	85	80	75	70	65	60	55	50	45
PILOT HOLE SIZES												
M1.2 x 0.25	1.038	1.046	1.054	1.062	1.070	1.078	1.086	1.094	1.103	1.111	1.119	1.127
M1.4 x 0.30	1.205	1.215	1.225	1.234	1.244	1.254	1.264	1.273	1.283	1.293	1.303	1.312
M1.6 x 0.35	1.37	1.38	1.40	1.41	1.42	1.43	1.44	1.45	1.46	1.47	1.49	1.50
M1.8 x 0.35	1.57	1.58	1.60	1.61	1.62	1.63	1.64	1.65	1.66	1.67	1.69	1.70
M2 x 0.4	1.74	1.75	1.77	1.78	1.79	1.81	1.82	1.83	1.84	1.86	1.87	1.88
M2.5 x 0.45	2.21	2.22	2.24	2.25	2.27	2.28	2.30	2.31	2.32	2.34	2.35	2.37
M3 x 0.5	2.68	2.69	2.71	2.72	2.74	2.76	2.77	2.79	2.81	2.82	2.84	2.85
M3.5 x 0.6	3.11	3.13	3.15	3.17	3.19	3.21	3.23	3.25	3.27	3.29	3.31	3.32
M4 x 0.7	3.55	3.57	3.59	3.61	3.64	3.66	3.68	3.70	3.73	3.75	3.77	3.80
M5 x 0.8	4.48	4.51	4.53	4.56	4.58	4.61	4.64	4.66	4.69	4.71	4.74	4.77
M6 x 1.0	5.35	5.38	5.42	5.45	5.48	5.51	5.55	5.58	5.61	5.64	5.68	5.71
M7 x 1.0	6.35	6.38	6.42	6.45	6.48	6.51	6.55	6.58	6.61	6.64	6.68	6.71
M8 x 1.25	7.19	7.23	7.27	7.31	7.35	7.39	7.43	7.47	7.51	7.55	7.59	7.63
M10 x 1.5	9.03	9.07	9.12	9.17	9.22	9.27	9.32	9.37	9.42	9.46	9.51	9.56
M12 x 1.75	10.86	10.92	10.98	11.03	11.09	11.15	11.20	11.26	11.32	11.37	11.43	11.49
M14 x 2.0	12.70	12.77	12.83	12.90	12.96	13.03	13.09	13.16	13.22	13.29	13.35	13.42
M16 x 2.0	14.70	14.77	14.83	14.90	14.96	15.03	15.09	15.16	15.22	15.29	15.35	15.42

Inch Sizes (in)

SCREW SIZE	PERCENT THREAD											
	100	95	90	85	80	75	70	65	60	55	50	45
PILOT HOLE SIZES												
1 - 32	0.0629	0.0634	0.0639	0.0644	0.0649	0.0654	0.0659	0.0664	0.0669	0.0674	0.0679	0.0684
2 - 56	0.0744	0.0750	0.0756	0.0761	0.0767	0.0773	0.0779	0.0785	0.0790	0.0796	0.0802	0.0808
3 - 48	0.0855	0.0861	0.0868	0.0875	0.0882	0.0889	0.0895	0.0902	0.0909	0.0916	0.0922	0.0929
4 - 40	0.0958	0.0966	0.0974	0.0982	0.0990	0.0998	0.1006	0.1014	0.1023	0.1031	0.1039	0.1047
5 - 40	0.1088	0.1096	0.1104	0.1112	0.1120	0.1128	0.1136	0.1144	0.1153	0.1161	0.1169	0.1177
6 - 32	0.1177	0.1187	0.1197	0.1207	0.1218	0.1228	0.1238	0.1248	0.1258	0.1268	0.1279	0.1289
8 - 32	0.1437	0.1447	0.1457	0.1467	0.1478	0.1488	0.1498	0.1508	0.1518	0.1528	0.1539	0.1549
10 - 24	0.1629	0.1643	0.1656	0.1670	0.1684	0.1697	0.1711	0.1724	0.1738	0.1751	0.1765	0.1778
10 - 32	0.1697	0.1707	0.1717	0.1727	0.1738	0.1748	0.1758	0.1768	0.1778	0.1788	0.1799	0.1809
12 - 24	0.1889	0.1903	0.1916	0.1930	0.1944	0.1957	0.1971	0.1984	0.1998	0.2011	0.2025	0.2038
1/4 - 20	0.2175	0.2191	0.2208	0.2224	0.2240	0.2256	0.2273	0.2289	0.2305	0.2321	0.2338	0.2354
5/16 - 18	0.2764	0.2782	0.2800	0.2818	0.2836	0.2854	0.2872	0.2890	0.2909	0.2927	0.2945	0.2963
3/8 - 16	0.3344	0.3364	0.3385	0.3405	0.3425	0.3446	0.3466	0.3486	0.3506	0.3527	0.3547	0.3567
7/16 - 14	0.3911	0.3934	0.3957	0.3981	0.4004	0.4027	0.4050	0.4073	0.4097	0.4120	0.4143	0.4166
7/16 - 20	0.4050	0.4066	0.4083	0.4099	0.4115	0.4131	0.4148	0.4164	0.4180	0.4196	0.4213	0.4229
1/2 - 13	0.4500	0.4525	0.4550	0.4575	0.4600	0.4625	0.4650	0.4675	0.4700	0.4725	0.4750	0.4775

EXAMPLE - Pilot Hole Tolerance:

Minimum diameter hole = nominal hole thread percentage + 10%, maximum hole = nominal thread percentage - 5%

Example: For M5-0.8 Size: The blue shaded area indicates a nominal hole diameter of 4.64mm, which yields 70% thread engagement.

Minimum diameter hole = 70% + 10% = 80% engagement. A 80% hole for the M5-0.8 size = 4.58mm.

Maximum diameter hole = 70% - 5% = 65% engagement. A 65% hole for the M5-0.8 size = 4.66mm.

NOTES:

All data tables in this brochure are for guidance purposes only.

Because thread percentage values are based on a linear relationship, the percentages are less accurate for engagements less than 70%.



TAPTITE[®] PRO[™] Fasteners - Steel

Recommended Pilot Hole Sizes for TAPTITE[®] PRO[™] Screws and Bolts in Steel

Metric Sizes (mm)

Application	Light		Medium-Light		Medium-Heavy		Full Strength		Extended		Hole Tolerances for all Thread %
Duty Class	0.3 Diameter of Material		0.5 Diameter of Material		0.75 Diameter of Material		1.0 Diameter of Material		1.25 Diameter of Material		
Thread %	90%		80%		70%		65%		60%		
Nominal Size	Material Thickness	Hole Size	Material Thickness	Hole Size	Material Thickness	Hole Size	Material Thickness	Hole Size	Material Thickness	Hole Size	
M2.5 x 0.45	0.5 - 1.0	2.24	1.0 - 1.56	2.27	1.56 - 2.19	2.30	2.19 - 2.81	2.31	2.81-3.44	2.32	+ .015 - .029
M3 x 0.50	0.6 - 1.2	2.71	1.2 - 1.88	2.74	1.88 - 2.63	2.77	2.63 - 3.38	2.79	3.38-4.13	2.80	+ .016 - .032
M3.5 x 0.60	0.7 - 1.4	3.15	1.4 - 2.19	3.19	2.19 - 3.06	3.23	3.06 - 3.94	3.25	3.94-4.81	3.27	+ .019 - .039
M4 x 0.70	0.8 - 1.6	3.59	1.6 - 2.50	3.64	2.50 - 3.50	3.68	3.50 - 4.50	3.70	4.50-5.50	3.73	+ .023 - .045
M5 x 0.80	1.0 - 2.0	4.53	2.0 - 3.13	4.58	3.13 - 4.38	4.64	4.38 - 5.63	4.66	5.63-6.88	4.69	+ .026 - .052
M6 x 1.00	1.2 - 2.4	5.42	2.4 - 3.75	5.48	3.75 - 5.25	5.55	5.25 - 6.75	5.58	6.75-8.25	5.61	+ .032 - .065
M7 x 1.00	1.4 - 2.8	6.42	2.8 - 4.38	6.48	4.38 - 6.13	6.55	6.13 - 7.88	6.58	7.88-9.63	6.61	+ .032 - .065
M8 x 1.25	1.6 - 3.2	7.27	3.2 - 5.00	7.35	5.00 - 7.00	7.43	7.00 - 9.00	7.47	9.00-11.00	7.51	+ .041 - .081
M10 x 1.50	2.00-4.00	9.12	4.00-6.25	9.22	6.25-8.75	9.32	8.75-11.25	9.37	11.25-13.75	9.42	+ .049 - .097
M12 x 1.75	2.40-4.80	10.98	4.80-7.50	11.09	7.50-10.50	11.20	10.50-13.50	11.26	13.50-16.50	11.32	+ .057 - .114
M14 x 2.00	2.80-5.60	12.83	5.60-8.75	12.96	8.75-12.25	13.09	12.25-15.75	13.16	15.75-19.25	13.22	+ .065 - .130

Inch Sizes (in)

2 - 56	.017 - .034	.0756	.034 - .052	.0767	.054 - .075	.0779	.075 - .097	.0785	.097 - .118	.0790	+ .0006 - .0012
3 - 48	.020 - .040	.0868	.040 - .062	.0882	.062 - .087	.0895	.087 - .111	.0902	.111 - .136	.0909	+ .0007 - .0014
4 - 40	.022 - .045	.0974	.045 - .070	.0990	.070 - .098	.1006	.098 - .126	.1014	.126 - .154	.1023	+ .0008 - .0016
6 - 32	.028 - .055	.1197	.055 - .086	.1218	.086 - .121	.1238	.121 - .155	.1248	.155 - .190	.1258	+ .0010 - .0020
8 - 32	.033 - .066	.1457	.066 - .103	.1478	.103 - .144	.1498	.144 - .185	.1508	.185 - .226	.1518	+ .0010 - .0020
10 - 24	.038 - .076	.1656	.076 - .119	.1684	.119 - .166	.1711	.166 - .214	.1724	.214 - .261	.1738	+ .0014 - .0027
10 - 32	.038 - .076	.1717	.076 - .119	.1738	.119 - .166	.1758	.166 - .214	.1768	.214 - .261	.1778	+ .0010 - .0020
12 - 24	.043 - .086	.1916	.086 - .135	.1944	.135 - .189	.1971	.189 - .243	.1984	.243 - .297	.1998	+ .0014 - .0027
1/4 - 20	.050 - .100	.2208	.100 - .156	.2240	.156 - .219	.2273	.219 - .281	.2289	.281 - .344	.2305	+ .0016 - .0032
5/16 - 18	.063 - .125	.2800	.125 - .195	.2836	.195 - .273	.2872	.273 - .352	.2890	.352 - .430	.2909	+ .0018 - .0036

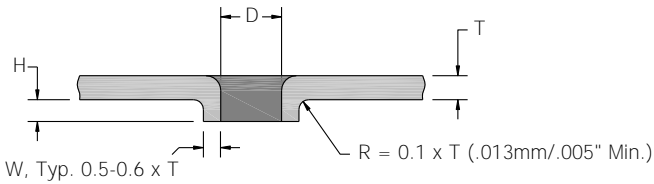
APPLICATION DUTY CLASS - A general term used here to group material thickness in terms of screw diameters.

For example, the average material thickness listed under "medium-heavy" equals 75% of the screw diameter which equates to 70% thread engagement. See Page 11 for hole tolerance explanation.

TAPTITE® PRO™ Fasteners - Light-Gauge Steel



Recommended Extruded Pilot Hole Sizes for TAPTITE® PRO™ Screws and Bolts in Light-Gauge Steel



Extruding holes for fasteners in light-gauge steel nearly doubles the length of thread engagement over the original material thickness. TAPTITE® PRO™ screws and bolts develop almost twice the failure torque in extruded holes, providing maximum joint integrity.

Metric Sizes (mm)

Application	Very Light Approx. 0.15-0.19 x Nom. Dia.			Light Approx. 0.20-0.29 x Nom. Dia.			Medium-Light Approx. 0.3-0.39 x Nom. Dia.			Medium Approx. 0.40-0.50 x Nom. Dia.			Hole Tolerances for all Thread %
	Nominal Size	Material Thickness	Hole Size	H Ref.	Material Thickness	Hole Size	H Ref.	Material Thickness	Hole Size	H Ref.	Material Thickness	Hole Size	
M1.6 - 0.35	0.24 - 0.30	1.40	0.40	0.32 - 0.46	1.40	0.35	0.48 - 0.62	1.41	0.35	0.64 - 0.80	1.42	0.35	+0.011 -0.023
M1.8 - 0.35	0.27 - 0.34	1.60	0.45	0.36 - 0.52	1.60	0.45	0.54 - 0.70	1.61	0.40	0.72 - 0.90	1.62	0.40	+0.011 -0.023
M2.0 - 0.40	0.30 - 0.38	1.77	0.50	0.40 - 0.58	1.77	0.45	0.60 - 0.78	1.78	0.45	0.80 - 1.00	1.79	0.45	+0.013 -0.026
M2.5 - 0.45	0.38 - 0.48	2.24	0.65	0.50 - 0.73	2.24	0.60	0.75 - 0.98	2.25	0.55	1.00 - 1.25	2.27	0.55	+0.015 -0.029
M3.0 - 0.50	0.45 - 0.57	2.71	0.75	0.60 - 0.87	2.71	0.75	0.90 - 1.17	2.72	0.70	1.20 - 1.50	2.74	0.65	+0.016 -0.032
M3.5 - 0.60	0.53 - 0.67	3.15	0.90	0.70 - 1.02	3.15	0.85	1.05 - 1.37	3.17	0.80	1.40 - 1.75	3.19	0.75	+0.019 -0.039
M4.0 - 0.70	0.60 - 0.76	3.59	1.00	0.80 - 1.16	3.59	0.95	1.20 - 1.56	3.61	0.90	1.60 - 2.00	3.64	0.90	+0.023 -0.045
M5.0 - 0.80	0.75 - 0.95	4.53	1.25	1.00 - 1.45	4.53	1.20	1.50 - 1.95	4.56	1.15	2.00 - 2.50	4.58	1.10	+0.026 -0.052
M6.0 - 1.00	0.90 - 1.14	5.42	1.50	1.20 - 1.74	5.42	1.45	1.80 - 2.34	5.45	1.40	2.40 - 3.00	5.48	1.35	+0.032 -0.065
M8.0 - 1.25	1.20 - 1.52	7.27	2.05	1.60 - 2.32	7.27	1.95	2.40 - 3.12	7.31	1.85	3.20 - 4.00	7.35	1.80	+0.041 -0.081

Inch Sizes (in)

0 - 80	.009 - .011	.0527	.015	.012 - .017	.0527	.015	.018 - .023	.0531	.015	.024 - .030	.0535	.015	+0.0004 -0.0008
1 - 64	.011 - .014	.0639	.020	.015 - .021	.0639	.015	.022 - .028	.0644	.015	.029 - .037	.0649	.015	+0.0005 -0.0010
2 - 56	.013 - .016	.0756	.020	.017 - .025	.0756	.020	.026 - .034	.0761	.020	.034 - .043	.0767	.020	+0.0006 -0.0012
3 - 48	.015 - .019	.0868	.025	.020 - .029	.0868	.025	.030 - .039	.0875	.020	.040 - .050	.0882	.020	+0.0007 -0.0014
4 - 40	.017 - .021	.0974	.025	.022 - .032	.0974	.025	.034 - .044	.0982	.025	.045 - .056	.0990	.025	+0.0008 -0.0016
6 - 32	.021 - .026	.1197	.035	.028 - .040	.1197	.030	.041 - .054	.1207	.030	.055 - .069	.1218	.030	+0.0010 -0.0020
8 - 32	.025 - .031	.1457	.040	.033 - .048	.1457	.040	.049 - .064	.1467	.035	.066 - .082	.1478	.035	+0.0010 -0.0020
10 - 32	.029 - .036	.1717	.050	.038 - .055	.1717	.045	.057 - .074	.1727	.045	.076 - .095	.1738	.040	+0.0010 -0.0020
12 - 24	.032 - .041	.1916	.055	.043 - .063	.1916	.050	.065 - .084	.1930	.050	.086 - .108	.1944	.045	+0.0014 -0.0027
1/4 - 20	.038 - .048	.2208	.060	.050 - .073	.2208	.060	.075 - .098	.2224	.055	.100 - .125	.2240	.055	+0.0016 -0.0032
5/16 - 18	.047 - .059	.2800	.080	.063 - .091	.2800	.075	.094 - .122	.2818	.070	.125 - .156	.2836	.070	+0.0018 -0.0036



TAPTITE PRO[®] "SP"[™] Fasteners - Pilot Holes

Recommended Pilot Hole Sizes for Aluminum or Zinc Alloy Die Castings for TAPTITE[®] PRO[™] "SP"[™] Fasteners

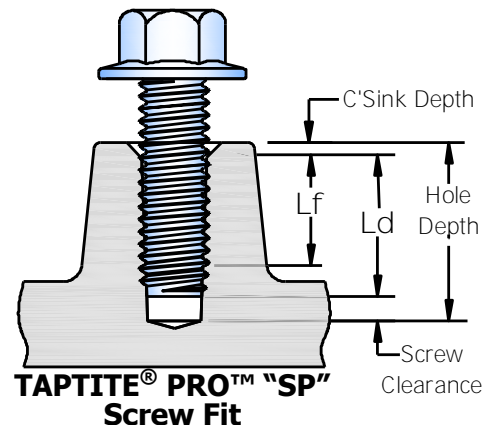
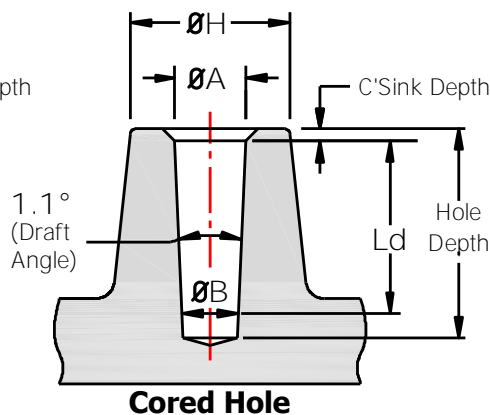
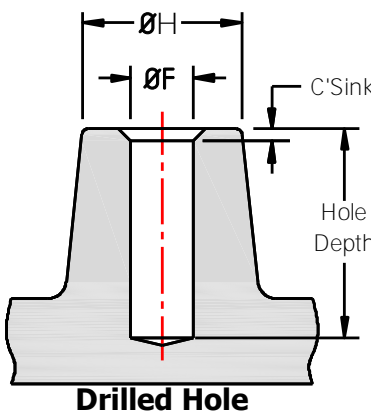
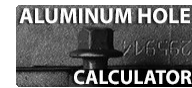


Screw Size	ØF Hole Dia. Drilled	Hole Diameter as Cast				Engagement Length		ØH Boss Dia. Min.
		Top ØA		Bottom ØB		Lf - Full Thread	Ld - With Point	
		Max.	Min.	Max.	Min.			
Metric Sizes (mm)								
M2 x 0.40	1.82	1.90	1.86	1.80	1.76	4.0	5.00	3.32
M2.5 x 0.45	2.29	2.40	2.36	2.27	2.23	5.0	6.13	4.15
M3 x 0.5	2.77	2.90	2.85	2.75	2.70	6.0	7.25	4.98
M3.5 x 0.6	3.23	3.38	3.32	3.20	3.14	7.0	8.50	5.81
M4 x 0.7	3.68	3.85	3.78	3.65	3.58	8.0	9.75	6.64
M5 x 0.8	4.64	4.85	4.77	4.60	4.52	10.0	12.00	8.30
M6 x 1.0	5.54	5.79	5.71	5.49	5.41	12.0	14.50	9.96
M8 x 1.25	7.43	7.75	7.67	7.35	7.27	16.0	19.13	13.28
M10 x 1.5	9.32	9.71	9.63	9.21	9.13	20.0	23.75	16.60
M12 x 1.75	11.20	11.67	11.59	11.07	10.99	24.0	28.38	19.92
Inch Sizes (in)								
2 - 56	0.078	0.082	0.080	0.077	0.075	0.172	0.217	0.143
4 - 40	0.101	0.105	0.103	0.099	0.097	0.224	0.287	0.186
6 - 32	0.124	0.130	0.127	0.122	0.119	0.276	0.354	0.229
8 - 32	0.150	0.157	0.154	0.148	0.145	0.328	0.406	0.272
10 - 24	0.171	0.179	0.176	0.169	0.165	0.380	0.485	0.315
10 - 32	0.176	0.184	0.181	0.174	0.171	0.380	0.458	0.315
12 - 24	0.197	0.206	0.203	0.195	0.191	0.432	0.537	0.359
1/4 - 20	0.227	0.237	0.234	0.224	0.221	0.500	0.625	0.415
5/16 - 18	0.287	0.299	0.296	0.283	0.280	0.624	0.764	0.518
3/8 - 16	0.347	0.361	0.358	0.342	0.339	0.750	0.908	0.623
1/2 - 13	0.465	0.484	0.481	0.459	0.456	1.000	1.193	0.830



The above table is based upon the recommended length of engagement of 2x, which allows for maximum screw strength. Depending upon casting material, screw hardness and screw strength requirements, different depths of engagement, both deeper and shallower, may be used.

Please visit our website (taptite.com) to use our aluminum hole calculator.



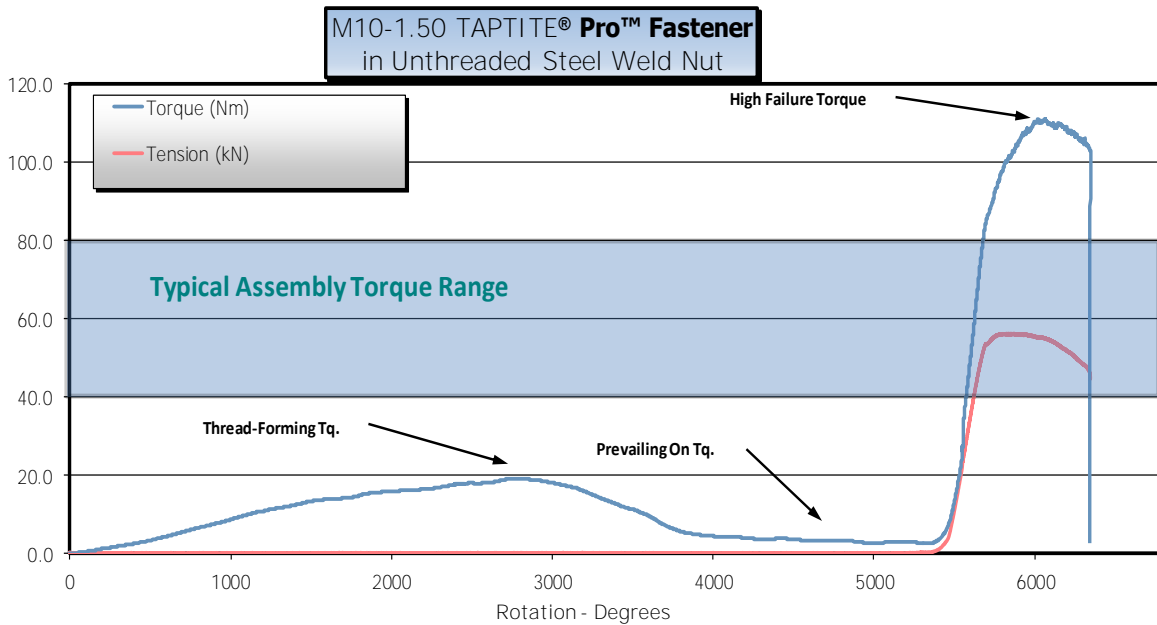
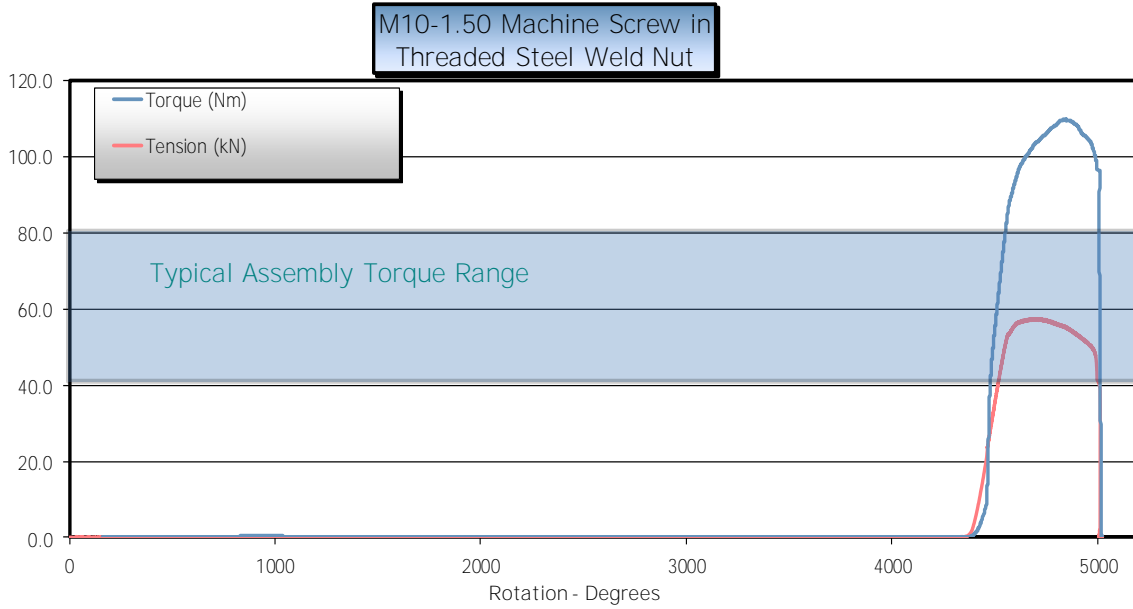
*For Drilled hole tolerances see example on page 11

* For sizes not in table, contact Engineering

TAPTITE[®] PRO[™] Fasteners - Torque Performance



The thread body lobulation and Parabolic Profile[™] thread design of TAPTITE[®] PRO[™] fasteners provide torque-tension relationships similar to those that are achieved using machine screws.





TAPTITE[®] PRO[™] Fasteners - Torque Performance

Inch Sizes (lb-in)

Screw Size	Plate Thickness	Hole Size	Nearest Drill Size	Thread Forming Torque	Recommended Assembly Torque	Failure Torque
2 - 56	0.0469	0.075	1.9mm	0.9 - 1.8	4	6.5 - 7.5
	0.0625	0.076	#48	0.9 - 2.0	5	9.0 - 11.0
	0.0938	0.079	#47	1.0 - 2.2	7	12.0 - 16.0
3 - 48	0.0625	0.087	2.2mm	1.8 - 3.6	9	15.0 - 17.0
	0.0938	0.089	#43	1.8 - 4.5	10	15.5 - 18.0
	0.1250	0.090	#43	3.6 - 7.2	10	16.0 - 20.0
4 - 40	0.0312	0.098	#40	1.8 - 4.5	5	9.0 - 12.0
	0.0625	0.102	2.6mm	2.5 - 3.6	10	16.0 - 20.0
	0.0938	0.102	2.6mm	2.7 - 3.8	15	24.0 - 30.0
5 - 40	0.0625	0.111	#34	3.6 - 4.5	15	24.0 - 32.0
	0.0938	0.113	#33	3.6 - 6.3	24	38.0 - 45.0
	0.1250	0.116	#32	5.4 - 9.0	27	42.0 - 50.0
6 - 32	0.0625	0.120	#31	3.6 - 7.9	17	27.0 - 33.0
	0.0938	0.120	#31	5.0 - 8.1	25	39.0 - 50.0
	0.1250	0.125	1/8	5.5 - 8.5	27	43.0 - 50.0
8 - 32	0.0938	0.147	#26	9.0 - 13.5	46	72.0 - 83.0
	0.1250	0.150	3.8mm	9.9 - 14.5	53	82.0 - 94.0
	0.1875	0.150	3.8mm	14.5 - 20.0	53	82.0 - 105.0
10 - 24	0.0938	0.172	11/64	12.5 - 16.0	45	70.0 - 90.0
	0.1250	0.172	11/64	13.0 - 17.0	55	85.0 - 100.0
	0.1875	0.172	11/64	15.0 - 22.0	78	120.0 - 125.0
10 - 32	0.0938	0.173	#17	10.0 - 15.0	58	90.0 - 105.0
	0.1250	0.177	#16	10.8 - 16.0	78	120.0 - 130.0
	0.1875	0.177	#16	17.0 - 22.0	81	125.0 - 155.0
12 - 24	0.1250	0.196	#9	17.0 - 22.0	67	104.5 - 130.0
	0.1875	0.199	#8	18.0 - 24.0	97	150.0 - 170.0
	0.2500	0.203	13/64	19.0 - 28.0	107	165.0 - 185.0
1/4 - 20	0.1250	0.224	5.7mm	27.0 - 35.0	120	185.0 - 215.0
	0.1875	0.224	5.7mm	40.0 - 51.0	146	225.0 - 260.0
	0.2500	0.228	#1	50.0 - 60.0	146	225.0 - 260.0
5/16 - 18	0.1875	0.281	K	65.0 - 75.0	269	415.0 - 450.0
	0.2500	0.285	7.25mm	68.0 - 77.0	305	470.0 - 510.0
	0.3125	0.285	7.25mm	72.0 - 85.0	325	500.0 - 550.0
3/8 - 16	0.2500	0.348	S	81.0 - 92.0	591	910.0 - 965.0
	0.3125	0.348	S	85.0 - 100.0	676	1040.0 - 1100.0
	0.3750	0.354	9mm	90.0 - 115.0	676	1040.0 - 1100.0
7/16 - 14	0.3125	0.404	Y	130.0 - 150.0	715	1100.0 - 1260.0
	0.3750	0.406	13/32	130.0 - 155.0	858	1320.0 - 1480.0
	0.5000	0.406	13/32	175.0 - 199.8	1001	1540.0 - 1760.0
1/2 - 13	0.2500	0.465	29/64	135.0 - 165.0	695	1070.0 - 1180.0
	0.3750	0.469	15/32	165.0 - 200.0	1144	1760.0 - 1980.0
	0.5000	0.469	15/32	210.0 - 250.0	1358	2090.0 - 2420.0

Note: See Page 17 for applicable notes.

TAPTITE® PRO™ Fasteners - Torque Performance



Metric Sizes (Nm)

Screw Size	Plate Thickness	Hole Size	Nearest Drill Size	Thread Forming Torque	Recommended Assembly Torque	Failure Torque
M3 x 0.5	1.0	2.71	#36	0.3 - 0.4	1.0	1.6 - 2.2
	2.0	2.77	7/64	0.3 - 0.5	1.1	1.7 - 2.8
	3.0	2.77	7/64	0.5 - 0.7	1.7	2.7 - 3.9
M4 x 0.7	2.0	3.64	#27	0.6 - 0.8	2.0	3.1 - 4.2
	3.0	3.68	3.7	0.8 - 1.2	3.9	6.0 - 8.2
	4.0	3.70	3.7	1.1 - 1.5	5.0	7.7 - 11.0
M5 x 0.8	2.5	4.58	#15	1.2 - 1.8	3.7	5.8 - 8.8
	3.5	4.64	#14	1.4 - 2.5	7.1	11.0 - 13.5
	5.0	4.66	4.65mm	1.8 - 2.7	7.8	12.0 - 15.5
M6 x 1.0	3.0	5.48	5.5mm	1.8 - 2.5	6.4	9.9 - 14.5
	4.5	5.55	7/32	2.9 - 4.0	11.3	17.5 - 23.0
	6.0	5.58	5.6mm	3.2 - 4.3	13.0	20.0 - 27.5
M8 x 1.25	4.0	7.35	L	4.3 - 6.3	23.4	36.0 - 46.0
	6.0	7.43	7.4	5.0 - 8.5	30.5	47.0 - 58.0
	8.0	7.47	M	6.3 - 10.8	39.3	60.5 - 71.5
M10 x 1.5	5.0	9.22	9.2mm	10.0 - 13.5	37.7	58.0 - 70.0
	8.0	9.32	9.3mm	12.5 - 17.0	57.2	88.0 - 100.0
	10.0	9.37	U	13.5 - 20.0	65.0	100.0 - 115.0
M12 x 1.75	6.0	11.09	11.1	20.5 - 26.0	78.0	120.0 - 145.0
	9.0	11.20	11.2	22.5 - 28.0	81.2	125.0 - 150.0
	12.0	11.26	11.3	27.0 - 34.0	123.5	190.0 - 220.0

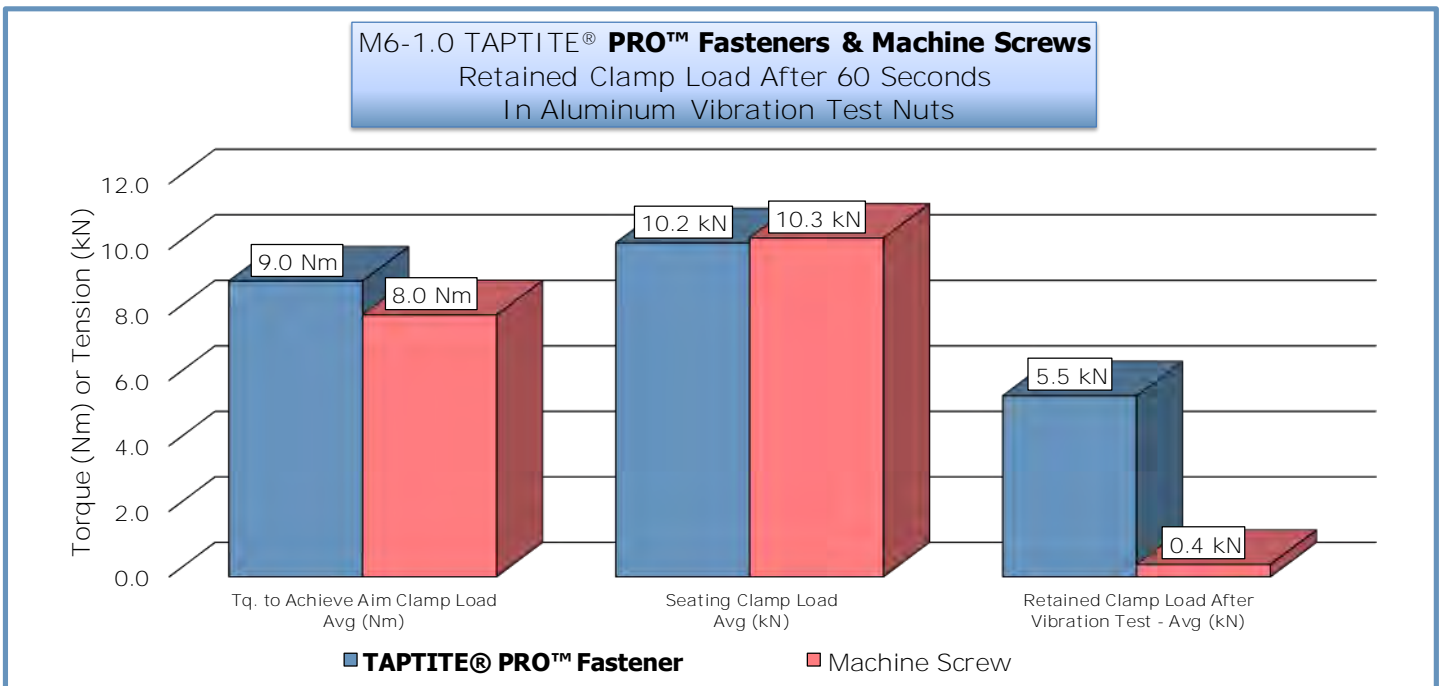
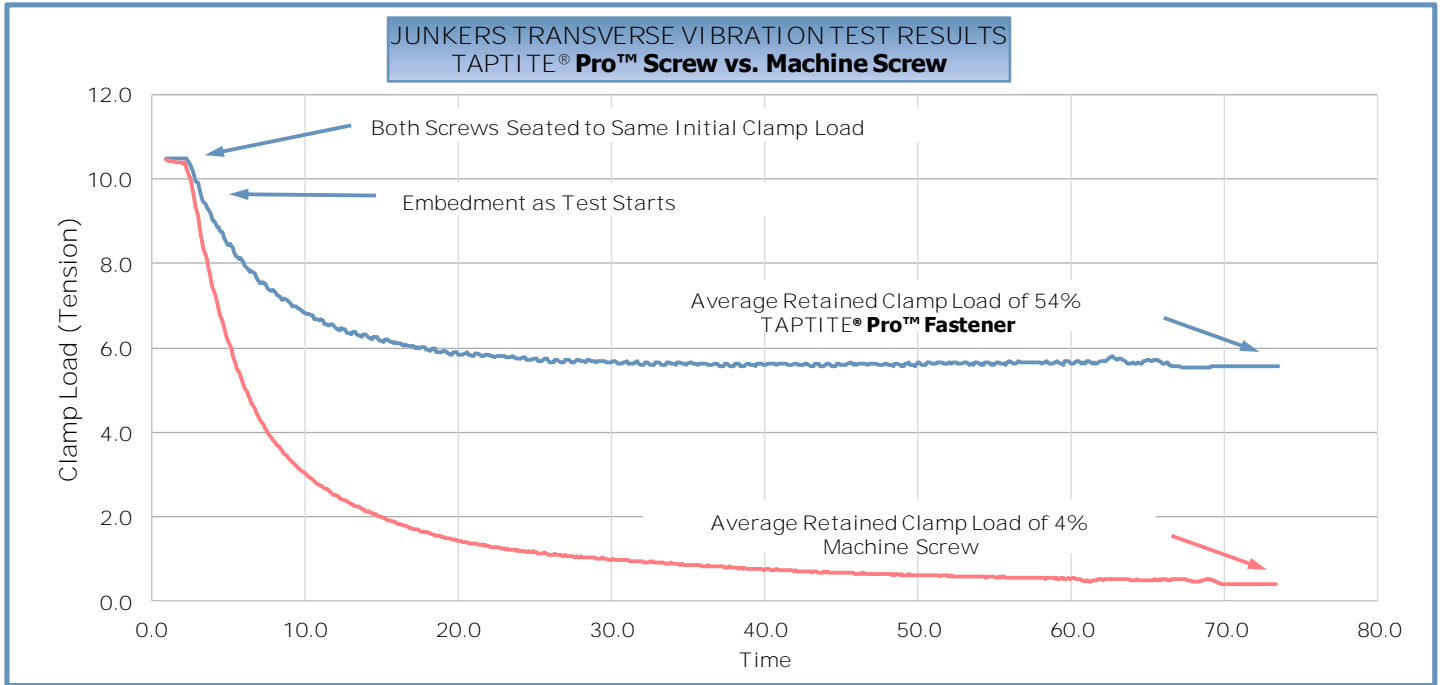
Notes:

1. Failure mode is comparable to that of an equivalent machine screw.
2. Performance was developed using Hex Flange head screws, zinc plated plus wax, driven at low speed under laboratory conditions into cold rolled steel test plates with plain flat steel washers under screw head to absorb tightening.
3. Values shown represent the above conditions only and should not be used in lieu of proper application testing. Having a thicker/thinner nut member, harder/softer material, different hole, can all contribute to variations in torque performance.



TAPTITE[®] PRO[™] Fasteners - Vibrational Resistance

TAPTITE[®] PRO[™] fasteners demonstrate excellent resistance to vibrational loosening, as illustrated by the chart below.





FASTENER HEAT TREATMENT

TAPTITE® PRO™ screws and bolts are available with three different types of heat treatment, making the fasteners adaptable to a wider variety of applications.

CORFLEX® -'I' Heat Treatment

CORFLEX® -'I' TAPTITE® PRO™ bolts are neutral hardened to grade strength, metric 8.8, 9.8, 10.9 or any intermediate value. The thread forming zone is selectively in-duction hardened in order to form threads in steel untapped nuts. CORFLEX® -'I' heat treatment allows TAPTITE® PRO™ thread rolling bolts to provide in-place cost savings in large structural applications with strength, ductility and toughness equal to grade strength machine screws or bolts.

CORFLEX® -'N' Heat Treatment

CORFLEX® -'N' TAPTITE® PRO™ fasteners are neutral hardened to grade 8.8, 9.8, and 10.9 strength level. Designed to be used in "soft white" metals such as aluminum or zinc alloys. Can be specified for any size TAPTITE® PRO™ screws or bolts intended to be used in aluminum or zinc alloys.

Case Hardening

Standard heat treatment for TAPTITE® PRO™ screws in sizes M5 (#12) and smaller.

SUCCESSFUL THREAD FORMING BASIC PRINCIPLE

"A thread rolling or thread forming screw must be harder than the nut material being thread formed to withstand the pressure that occurs when forming the nut material."



HEAT TAILORED FOR EXTRA TOUGHNESS

The pin-point precision of the high hardness, or induction zone is shown as the darkened portion of the picture on the left, a chemically etched and mounted axial section of a CORFLEX® -'I' fastener.

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