

Minimum Thread & Helicoil Engagements, & Suggested Torques For Various Sizes

Assumptions & Clarifications:

- 1) Minimum thread engagements listed ensures screw will break at its threads before either internal or external threads strip.
- 2) Engineers should consider an additional factor of safety to thread engagement lengths.
- 3) As long as minimum engagements lengths are met, listed torque values are independent of base materials.
- 4) Torques listed are based on SHCS or Hex heads. Reduce for other types: Flat(x0.5), Button(x0.4), Low Head(x0.3), Shoulder(x0.2).

6-32	8-32	10-32	1/4-20	5/16-18	3/8-16	1/2-13	5/8-11	3/4-10	1-8
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Table for 18-8 stainless screws, 75ksi. (general floor stock)

Basic diameter of thread, (in)	0.138	0.164	0.190	0.250	0.313	0.375	0.500	0.625	0.750	1.000
Tensile stress area of screw, (in^2) ^a	0.009	0.014	0.020	0.032	0.052	0.077	0.142	0.226	0.334	0.606
Ultimate tensile load to break screw at threads, (lbs)	681	1051	1500	2387	3932	5812	10642	16950	25085	45431
Min. thread engagement for 18-8 screw into SST, (in) ^a	0.101	0.124	0.146	0.173	0.223	0.269	0.364	0.414	0.500	0.934
Min. thread engagement for 18-8 screw into Alum, (in) ^a	0.147	0.190	0.257	0.295	0.417	0.505	0.632	0.769	0.940	1.262
Min. Helicoil length for 18-8 screw in Alum plate, (in) ^b	0.138	0.164	0.190	0.250	0.313	0.375	0.500	0.625	0.750	1.000
Torque for dry 18-8 screws, (lb-in) {lb-ft} ^c	14 {1.2}	26 {2.2}	43 {3.6}	90 {7.5}	184 {15}	326 {27}	798 {67}	{132}	{235}	{568}
Torque for plated/lubricated 18-8 screws, (lb-in) {lb-ft} ^c	11 {0.9}	20 {1.6}	32 {2.7}	67 {5.6}	138 {12}	245 {20}	598 {50}	{99}	{176}	{425}

Table for med alloy, grade 8 bolts, 150ksi. (specialty)

Tensile stress area of bolt, (in^2) ^a	0.008	0.013	0.019	0.030	0.050	0.075	0.138	0.223	0.330	0.599
Ultimate tensile load to break bolt at threads, (lbs)	1273	1983	2854	4547	7550	11205	20635	33390	49488	89808
Min. thread engagement for alloy bolt into SST, (in) ^a	0.110	0.143	0.196	0.225	0.320	0.390	0.490	0.408	0.493	0.924
Min. thread engagement for alloy bolt into Alum, (in) ^a	0.275	0.358	0.490	0.562	0.800	0.974	1.224	1.514	1.855	2.496
Min. Helicoil length for alloy bolt in Alum plate, (in) ^b	0.207	0.246	0.285	0.375	0.469	0.563	0.750	0.938	1.125	1.500
Torque for dry gr-8 alloy bolts, (lb-in) {lb-ft} ^c	26 {2.2}	49 {4.0}	81 {6.8}	171 {14}	353 {29}	630 {53}	{129}	{260}	{464}	{1122}
Torque for plated/lubricated gr-8 alloy bolts, (lb-in) {ft-lb} ^c	20 {1.6}	37 {3.0}	61 {5.0}	128 {11}	265 {22}	472 {39}	{97}	{196}	{348}	{841}

^a Calculated from 'Machinery's Handbook', 23rd ed, pg 1278-9. **DOES NOT** include a factor of safety.

^b 'Helicoil Tensile Strength', Tech Pub 68-2.

^c Calculated from 'Standard Handbook of Fastening and Joining', sec 1-24. Torques base on 75% of screw tensile strength.