Technical Data [ข้อมูลทางเทคนิค] [อ้างอิงจาก JSS II 09 -1996]

S10T High Strength T.C. Bolts

1. Classes and Grades

Table 1. Class of Bolt Set

Classes of Sets		Grades according to mechanical properties		
Class according to mechanical properties	Class according to torque coefficient values	Bolt	Nut	Washer
Class 1	A	S8T	F10 (F8)	F35
	B			
Class 2	A	S10T	F10	F35
	B			
Class 3	A	S11T	F10	F35
	B			

2. Materials

Table 2. S10T Hex Head Set

F10T Hex Head Set	Bolt [S10T]	Nut [F10]	Washer [F35]
Material	SCM435	S45C	S45C

3. Mechanical Properties

3.1 Machined Test Pieces

Table 3. Bolt Test Pieces

Grade of Bolt	Yeild Strength, min. [MPa]	Tensile Strength, min. [MPa]	Elongation, min [%]	Reduction of area, min [%]
S10T	900	1000 ~ 1200	14	40

3.2 Full Size Bolts

Table 4. Full Size Bolts

Grade of Bolt	Tensile Load (minimum) [MPa]						Hardness [HRC]
	Nominal size of threads						
	M16	M20	M22	M24	M27	M30	
S10T	157	245	303	353	459	561	27 ~ 38

3.3 Nuts & Washers

Table 5. Hardness of Nuts

Grade of Nut	Hardness [minimum]	Hardness [maximum]	Proof Load
F10	95 HRB	35 HRC	The same as the tensile load (minimum) of the bolt of Table 4.

Table 6. Hardness of Washers

Grade of Nut	Hardness [HRC]
F35	35 ~ 45

4. Shape and Dimensions

4.1 T.C. Bolts

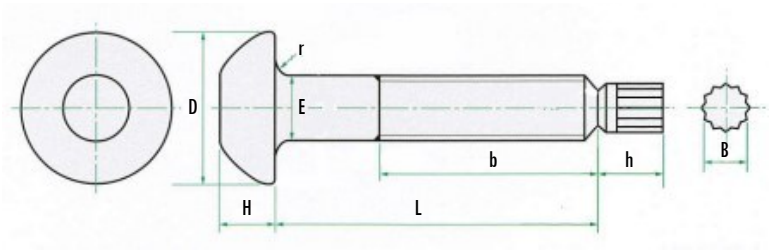


Table 7. Dimension of Bolt

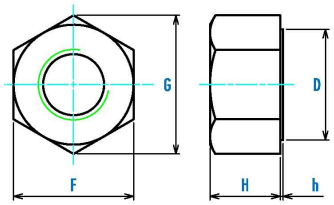
Size	E Basic	E Tolerance	H Basic	H Tolerance	D <min.>	r	b Basic	b Tolerance	h <Approx.>	B Basic	B Tolerance
M16	16	+0.7 ~ -0.2	10	±0.8	26	1.2 ~ -2.0	30	+5 ~ -0	15	11.3	±0.3
M20	20	+0.8 ~ -0.4	13	±0.9	33	1.2 ~ -2.0	35	+6 ~ -0	18	14.1	±0.3
M22	22	+0.8 ~ -0.4	14	±0.9	37	1.2 ~ -2.0	40	+6 ~ -0	19	15.4	±0.3
M24	24	+0.8 ~ -0.4	15	±0.9	41	1.6 ~ -2.4	45	+6 ~ -0	20	16.8	±0.3
M27	27	+0.8 ~ -0.4	17	±0.9	47	1.6 ~ -2.4	50	+6 ~ -0	22	19.0	±0.3
M30	30	+0.8 ~ -0.4	19	±1.0	53	2.0 ~ -2.8	55	+6 ~ -0	24	21.1	±0.3

Length of Bolt (L)	Tolerance
30 up to 50	±1.0
55 up to 120	±1.4
125 up to 180	±1.8

4.2 Hexagon Nuts

Table 8. Dimension of Nut

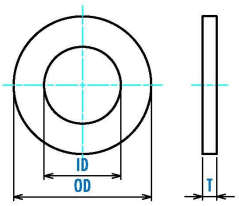
Size	F		G	H		D	h
	Basic	Tolerance	<Approx.>	Basic	Tolerance	<min.>	<Approx.
M12	22.0	+0 ~ -0.8	25.4	12.0	±0.35	20.0	0.4 ~ 0.8
M16	27.0	+0 ~ -0.8	31.2	16.0	±0.35	25.0	0.4 ~ 0.8
M20	32.0	+0 ~ -1.0	37.0	20.0	±0.40	30.0	0.4 ~ 0.8
M22	36.0	+0 ~ -1.0	41.6	22.0	±0.40	33.0	0.4 ~ 0.8
M24	41.0	+0 ~ -1.0	47.3	24.0	±0.40	38.0	0.4 ~ 0.8
M27	46.0	+0 ~ -1.0	53.1	27.0	±0.40	43.0	0.4 ~ 0.8
M30	50.0	+0 ~ -1.0	57.7	30.0	±0.40	47.0	0.4 ~ 0.8



4.3 Plain Washers

Table 9. Dimension of Washer

Size	ID		OD		T	
	Basic	Tolerance	Basic	Tolerance	Basic	Tolerance
M12	13.0	+0.7 ~ -0	26.0	+0 ~ -0.8	3.2	±0.40
M16	17.0	+0.7 ~ -0	32.0	+0 ~ -1.0	4.5	±0.50
M20	21.0	+0.8 ~ -0	40.0	+0 ~ -1.0	4.5	±0.50
M22	23.0	+0.8 ~ -0	44.0	+0 ~ -1.0	6.0	±0.70
M24	25.0	+0.8 ~ -0	48.0	+0 ~ -1.0	6.0	±0.70
M27	28.0	+0.8 ~ -0	56.0	+0 ~ -1.0	6.0	±0.70
M30	31.0	+1.0 ~ -0	60.0	+0 ~ -1.2	8.0	±0.70

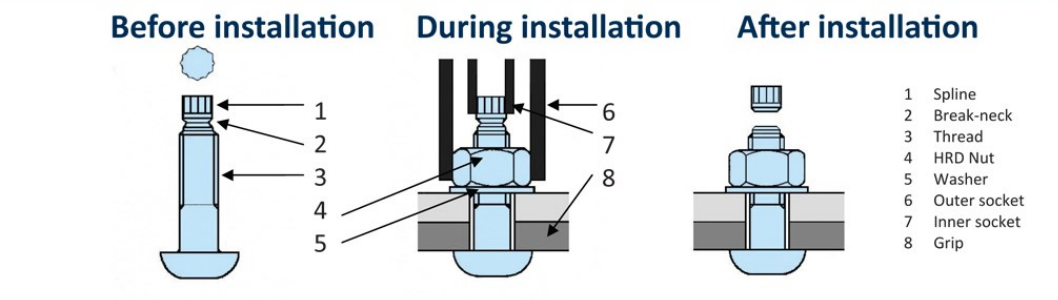


5. Fastener Tension

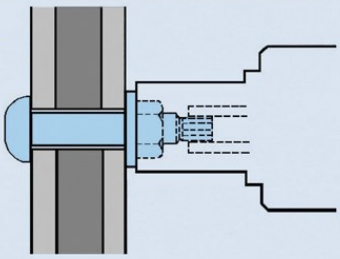
Table 10. Fastener Tension

Nominal size of Threads	M16	M20	M22	M24	M27	M30
Minimum Tension for S10T [kN]	106	165	205	238	310	379

Features of High Strength T.C. [Tension Control] Bolts

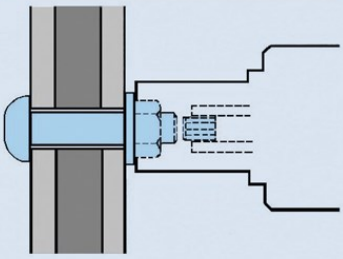


1



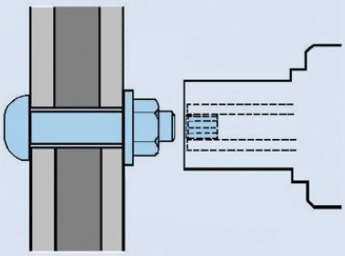
The inner socket of the shear wrench fits over the bolts spline while the outer socket fits over the nut.

2



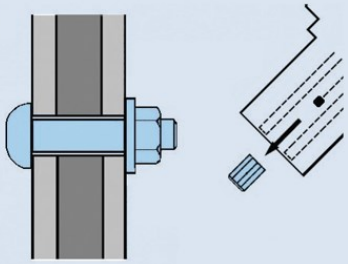
Press the trigger switch. The outer socket rotates clockwise and tightens the nut. When the correct preload is reached the outer socket stops rotating, the inner socket counter rotates and shears the spline off.

3



Stop the wrench and pull the outer socket off the nut. The spline is retained in the inner socket.

4



The wrench has a second trigger to eject the spline safely. The bolt is now properly installed with the correct tension.