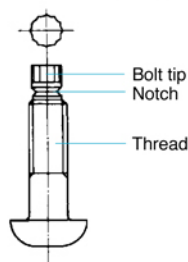


Features of High Strength T.C. (Tension Control) Bolts

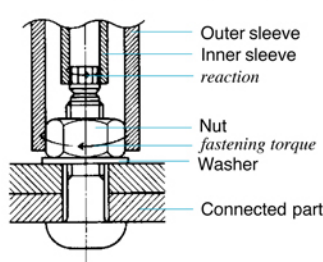
T.C. bolts, improved type of heavy hexagonal structural bolts, were developed for more simplified bolt fastening and more accurate performance and offer such excellent characteristics as shown below because no fastening technique of high level is required :

- ① Controlled clamping force can be ensured.
- ② Completion of bolt fastening can be confirmed by the shear-off of the notched end of the bolt.
- ③ Fastening can easily be done by electric wrench.
- ④ Noiseless installation and no need of wrench adjustment.
- ⑤ The bolt does not rotate when fastening.
- ⑥ No apprehension of bolts being left unfastened.

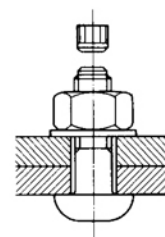
Before clamping



During clamping

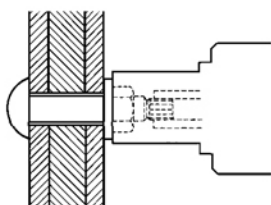


After clamping

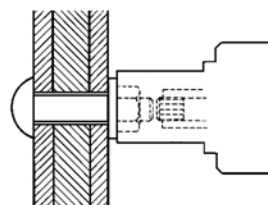


The bolt reacts to the fastening torque and the notched end of the bolt shears off. The required clamping force is thus given.

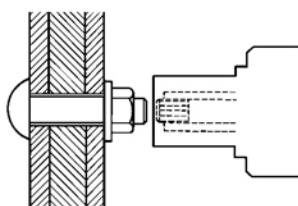
Installation Procedure



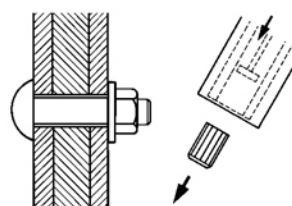
- 1** Fit the inner sleeve firmly over the bolt tip and engage the outer sleeve over the nut by slightly pushing the wrench.



- 2** Turn on the switch. The outer sleeve then rotates thereby tightening the bolt until the torque-controlled notched end of the bolt shears off.



- 3** Turn off the switch when the notched end of the bolt shears off. Pull the wrench back to remove the outer sleeve from the nut.



- 4** Pull the tip lever to discharge the severed bolt tip left inside the inner sleeve.

S10T T.C. Bolt

High Strength T.C. Bolts (JSS II 09)

Classes and Grades

Classes of sets	Combination of grade according to mechanical properties of component parts		
Class according to mechanical properties	Bolt	Nut	Washer
Class 2	S 10 T	F 10	F 35

Mechanical Properties

Machined Test Pieces

Grade of bolt according to mechanical properties	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Reduction of area (%)
S 10 T	900 min.	1000 ~ 1200 min.	14 min.	40 min.

Full Size Bolts

Grade of bolt according to mechanical properties	Tensile load (min.) (KN)						Hardness
	Nominal size of threads						
	M16	M20	M22	M24	M27	M30	
S 10 T	157	245	303	353	459	561	H _R C 27 ~ 38

Nuts

Grade of nut according to mechanical properties	Hardness		Proof load
	Min.	Max.	
F 10	H _R B 95	H _R C 35	Same as tensile load (min.) of bolt

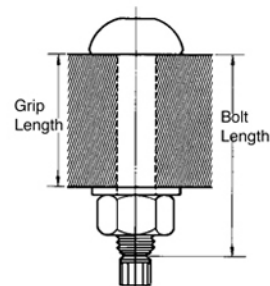
Hardness of Washers

Grade of washer according to mechanical properties	Hardness
F 35	H _R C 35 ~ 45

Determination of Bolt Length

Nominal size of threads	To determine required bolt length add to grip
M16	25
M20	30
M22	35
M24	40
M27	45
M30	50

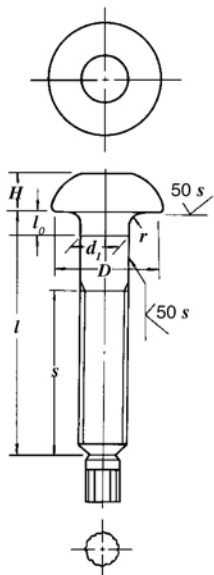
Unit: mm



B.S.N. the professional fastener

Shape and Dimensions

High Strength Tension Control Bolts



Nominal size of threads (d)	d_1		H		D Min.	r	s	
	Basic dimension	Tolerance	Basic dimension	Tolerance			Basic dimension	Tolerance
M16	16	+0.7 ~ -0.2	10	± 0.8	26	1.2 ~ 2.0	30	+5 ~ 0
M20	20	+0.8 ~ -0.4	13	± 0.9	33		35	+6 ~ 0
M22	22		14		37	1.6 ~ 2.4	40	
M24	24		15		41		45	
M27	27		17		47		50	
M30	30		19	± 1.0	53	2.0 ~ 2.8	55	

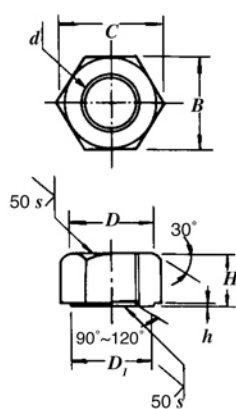
Unit: mm

Nominal bolt length (l)	Tolerance
30 up to 50	± 1.0
55 up to 120	± 1.4
125 up to 180	± 1.8

Note: The measuring point for d_1 should be $l_0 = d_1 / 4$

Unit: mm

Heavy Hexagon Nuts



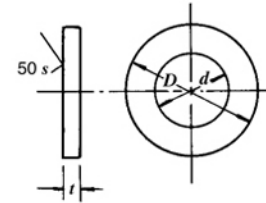
Nominal size of threads (d)	Outside diameter external thread	H		B		C	D	D_1	h
		Basic dimension	Tolerance	Basic dimension	Tolerance	Approx.	Approx.	Min.	
M16	16	16	± 0.35	27	0 ~ -0.8	31.2	25	25	0.4 ~ 0.8
M20	20	20	± 0.4	32	0 ~ -1	37.0	30	29	
M22	22	22		36		41.6	34	33	
M24	24	24		41		47.3	39	38	
M27	27	27		46		53.1	44	43	
M30	30	30		50		57.7	48	47	

Unit: mm

S10T T.C. Bolt

Plain Washers

Nominal size of washers	<i>d</i>		<i>D</i>		<i>t</i>	
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance
M16	17	+0.7 ~ 0	32	0 ~ -1	4.5	± 0.5
M20	21	+0.8 ~ 0	40		6	± 0.7
M22	23		44			
M24	25		48			
M27	28		56			
M30	31	+1.0 ~ 0	60	0 ~ -1.2	8	



Unit: mm

Fastener Tension

Nominal size of threads	Minimum fastener tension
	S 10 T
M16	106
M20	165
M22	205
M24	238
M27	310
M30	379

Unit: KN