

F10T Hex Head Bolt

High Strength Hexagon Bolts (JIS B1186)

Classes and Grades

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



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 (%)
F 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							
	M12	M16	M20	M22	M24	M27	M30	
F 10 T	84	157	245	303	353	459	561	H _R C 27 ~ 38

Remark : When the tension test of full size bolts have been done, hardness test may be omitted concerned parties' agreement.

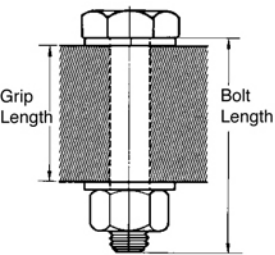
Nuts

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

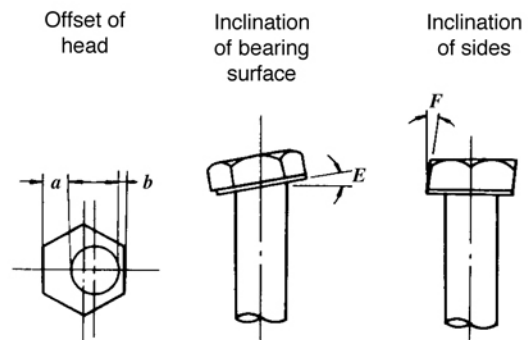
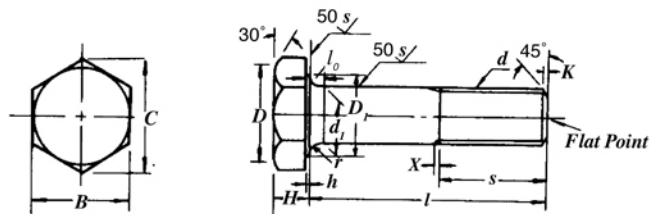


Nominal size of threads	To determine required bolt length add to grip
M12	25
M16	30
M20	35
M22	40
M24	45
M27	50
M30	55

Unit: mm

Shape and Dimensions

Hexagon Bolts



Nominal size of threads (d)	d_1		H		B		C	D	D_1	r	K	a - b	E	F	h	s	
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance	Approx.	Approx.	Min.		Approx.	Max.	Max.	Max.		Basic dimension	Tolerance
M12	12	+0.7 ~ -0.2	8	± 0.8	22	0 ~ -0.8	25.4	20	20	0.8 ~ 1.6	2	0.7 ~ 0.8				25	+5 ~ 0
M16	16		10		27		31.2	25	25							30	
M20	20		13		32		37.0	30	29	1.2 ~ 2.0	2.5	0.9				35	
M22	22		14		36		41.6	34	33			1.1	1°	2°	0.4 ~ 0.8	40	
M24	24	+0.8 ~ -0.4	15	± 0.9	41	0 ~ -1	47.3	39	38	1.6 ~ 2.4	3	1.2				45	+6 ~ 0
M27	27		17		46		53.1	44	43			1.3				50	
M30	30		19	± 1.0	50		57.7	48	47	2.0 ~ 2.8	3.5	1.5				55	

Unit: mm

Nominal bolt length (l)	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
Tolerance	± 1.0					± 1.4										
Nominal bolt length (l)	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	
Tolerance	± 1.4					± 1.8										

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

Remark : The length X of incomplete thread shall be about two threads, and in case of full thread, it shall be about three threads.

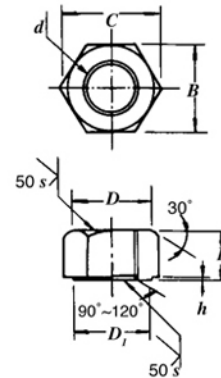
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Hexagon Nuts

Nominal size of threads (d)	Outside diameter external thread	H		B		C	D	D _t	a-b	E	F	h
		Basic dimension	Tolerance	Basic dimension	Tolerance	Approx.	Approx.	Min.	Max.	Max.	Max.	
M12	12	12	± 0.35	22	0 ~ -0.8	25.4	20	20	0.7	1°	2°	0.4 ~ 0.8
M16	16	16		27		31.2	25	25	0.8			
M20	20	20	± 0.40	32	0 ~ -1	37.0	30	30	0.9			
M22	22	22		36		41.6	34	33	1.1			
M24	24	24		41		47.3	39	38	1.2			
M27	27	27		46		53.1	44	43	1.3			
M30	30	30		50		57.7	48	47	1.5			

Remark : The chamfering of threaded part on facing side of nut should be made a slightly larger than root diameter of thread.

Unit: mm

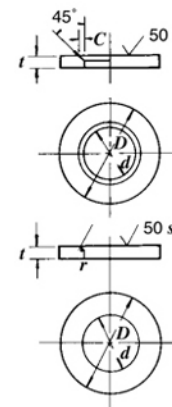


Plain Washers

Nominal size of washers	d		D		t		C or r
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance	Approx.
M12	13	+0.7 ~ 0	26	0 ~ -0.8	3.2	± 0.4	1.5
M16	17	+0.8 ~ 0	32	0 ~ -1	4.5	± 0.5	2.0
M20	21		40		6.0	± 0.7	2.4
M22	23		44				
M24	25		48				
M27	28		56		8.0		2.8
M30	31	+1.0 ~ 0	60	0 ~ -1.2			

Remark : On the figures above are shown washers with 45° chamfer, and with radius r the either of which may be used.

Unit: mm



Torque Coefficient of Set

Division	Class of set according to torque coefficient	
	A	B
Average value of torque coefficient of one manufacturing lot	0.110 ~ 0.150	0.150 ~ 0.190
Standard deviation of torque coefficient of one manufacturing lot	0.010 max.	0.013 max.

$$k = \frac{T}{d \times N} \times 1000$$

where,

k : torque coefficient
N : axial force of bolt (N)
T : torque (tightening moment of nut) (N.m)
d : basic dimensions of bolts (outside diameter of thread) (mm)

Threads

The screw threads of the bolts and nuts shall be metric coarse screw threads specified in JIS B 0205, and their grade shall be of 6 H/6g specified in JIS B 0209.
The screw threads of the bolts shall have been made by thread rolling.

Weights of JIS B-1186 Grade F10T High Strength Friction Grip Hex Bolts, Nuts and Plain Washers (w.e.f 1st April 2002)

Approximate weight per set (1 set includes 1 Bolt, 1 Nut and 2 Washers)

Diameter Length mm	M12		M 16		M 20		M 22		M 24		M 27		M 30	
	kg	sets per carton	kg	sets per carton	kg	sets per carton	kg	sets per carton	kg	sets per carton	kg	sets per carton	kg	sets per carton
35	0.103	270												
40	0.107	270	0.202	160	0.336	95								
45	0.112	250	0.210	150	0.348	95								
50	0.116	250	0.217	140	0.361	90	0.496	65						
55			0.225	130	0.373	85	0.510	65	0.666	45				
60			0.233	130	0.385	80	0.525	60	0.683	45				
65			0.241	120	0.398	75	0.540	55	0.701	40				
70			0.249	120	0.410	75	0.555	55	0.719	40				
75			0.257	110	0.422	70	0.570	50	0.737	40				
80			0.265	110	0.435	65	0.585	50	0.754	40	1.045	25	1.375	20
85			0.273	105	0.447	60	0.600	45	0.772	35	1.068	25	1.403	20
90			0.281	105	0.459	60	0.615	45	0.790	35	1.091	25	1.431	20
95			0.289	105	0.472	60	0.630	45	0.808	35	1.114	25	1.459	20
100			0.296	90	0.484	55	0.645	40	0.825	35	1.137	25	1.487	20
105			0.304	90	0.496	50	0.659	40	0.843	30	1.160	25	1.515	20
110			0.312	90	0.509	50	0.674	40	0.861	30	1.183	25	1.543	20
115			0.320	90	0.521	50	0.689	35	0.879	30	1.206	25	1.571	20
120			0.328	90	0.533	50	0.704	35	0.896	25	1.229	25	1.599	20
125			0.336	90	0.545	50	0.719	35	0.914	25	1.252	20	1.627	18
130			0.344	90	0.558	45	0.734	30	0.932	25	1.275	20	1.655	18
135			0.352	90	0.570	40	0.749	30	0.950	25	1.298	20	1.683	18
140			0.360	90	0.583	40	0.764	30	0.967	25	1.321	20	1.711	18
145					0.595	40	0.779	30	0.985	25	1.344	18	1.739	16
150					0.607	40	0.794	25	1.003	25	1.367	18	1.767	16
155					0.620	40	0.809	25	1.021	20	1.390	18	1.795	16
160					0.632	40	0.824	25	1.038	20	1.413	18	1.823	16
170							0.854	25	1.074	20	1.459	18	1.879	16
180							0.884	25	1.109	20	1.505	16	1.935	15
190							0.913	25	1.145	20	1.551	16	1.991	15
200							0.943	20	1.179	20	1.597	16	2.047	15
210							0.973	20	1.217	20			2.103	10
220							1.003	20	1.253	20			2.159	10

Remarks: Weight for Grade F8T Hot Dipped Galvanized Hex Bolt, nut & washers (1set) and Anti rust treated Hex Bolt, nut & washers (1 set) is the same as of plain finish (above).