

Sets of high strength hexagon bolt, hexagon nut and plain washers for friction grip joints

1. Mechanical Property

■ Bolt

Grade	Mechanical property of the test piece				Mechanical property of the product		
	Proof stress(N/mm ²)	Tensile strength after fracture (N/mm ²)	Elongation (%)	reduction (%)	Designation of screw threads	Minimum load (k N)	Hardness
F10T	900~	1000~1200	14~	40~	M12	84.3	27~38 H R C
					M16	157	
					M20	245	
					M22	303	
					M24	353	
					M27	459	
					M30	561	

■ Washer

Grade	Hardness
F35	35~45HRC

■ Nut

Grade	Hardness	Proof load
F10	20HRC~35HRC	Same to the tensile load (min)

2. Torque coefficient and tightening torque coefficient value

■ Tightening torque value

Tightening torque value when tightening the structural material with a bolt and nut can be calculated by the following formula

$$T = k \cdot d \cdot N$$

T : Tightening

k : torque Value

d : Bolt dia mealer(Standard size)

N : Standard bolt axial force

■ torque value

Type of set		Designation of screw threads	torque value	
The grade by mechanical properties	The type by the torque coefficient		Average value	Standard deviation value
2種 (F 1 0 T)	B	M12・M16	0.150~0.190	0.013以下
	A	M20~M30	0.110~0.150	0.010以下

3. Basic dimension Quantity

■ Quantity

Nominal designation of thread	Set quantity						
	M12	M16	M20	M22	M24	M27	M30
T h r e a d l e n g t h (mm)	35	250					
	40	250	160				
	45	250	150	95			
	50	250	140	90	70	50	
	55	250	130	85	65	50	
	60	250	130	80	60	50	
	65	250	120	75	55	40	20
	70	200	120	75	55	40	20
	75	200	120	70	50	40	20
	80	200	120	65	50	40	20
	85	200	100	60	45	35	20
	90		100	60	45	35	20
	95		90	60	45	35	20
	100		90	55	40	35	20
	105		90	50	40	30	20
	110		90	50	40	30	20
	115		90	50	35	30	20
	120		90	50	35	25	20
125			50	30	25	20	
130			50	30	25	20	
135			50	25	25	20	
140			50	25	20	20	
145			50	20	20	20	
150			50	20	20	20	
155				20	20	15	
160				20	20	15	
165					20	15	
170					20	15	
175					20	15	
180					20	15	

■ standard bolt

Nominal designation of thread	Axial force
M12	62.6
M16	117
M20	182
M22	226
M24	262
M27	341
M30	417

■ Selection of bolt length

Nominal designation of thread	Length to be added to the clamping length
M12	25
M16	30
M20	35
M22	40
M24	45
M27	50
M30	55

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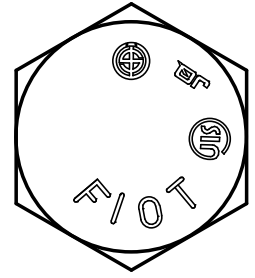
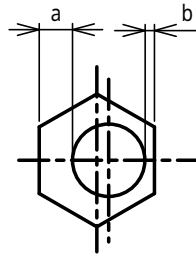
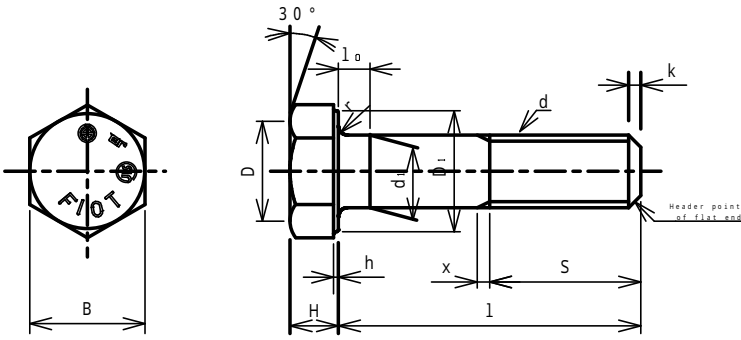
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Bolts

Eccentricity of head

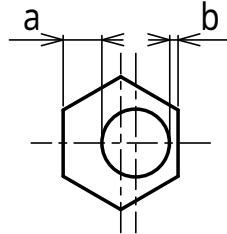
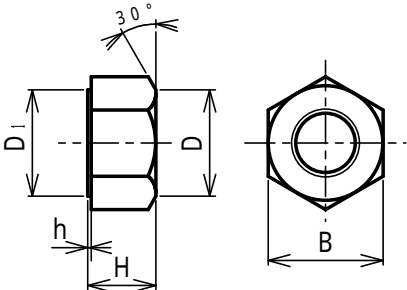


Nominal designation of thread (d)	d ₁		H		B		D	D ₁	r	K	a - b	h	S	
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance	Approx.	min.		Approx.			max.	Basic dimension
M 12	12	+0.7	8	±0.8	22	0	20	20	0.8-1.6	2	0.7	0.4-0.8	25	+5 0
M 16	16	-0.2	10		27		-0.8	25					25	
M 20	20	+0.8	13	32	0	30	29	1.6-2.4	3	0.9	35		+6 0	
M 22	22		14			36	34				33	1.6-2.4		3
M 24	24	-0.4	15	41	-1	39	38	2.0-2.8	3.5	1.2	45			
M 27	27		17			46	44				43	2.0-2.8		3.5
M 30	30		19	±1.0	50	48	47			1.5	55			

Nominal designation of thread (d)	l																																									
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	190	200	210	220							
M 12	○	○	○	○	○	○	○	○	○	○	○	○	○	○																												
M 16			○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○																					
M 20				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○																			
M 22					○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
M 24						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M 27							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M 30										○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Tolerance of l	±1.0					±1.4												±1.8																								

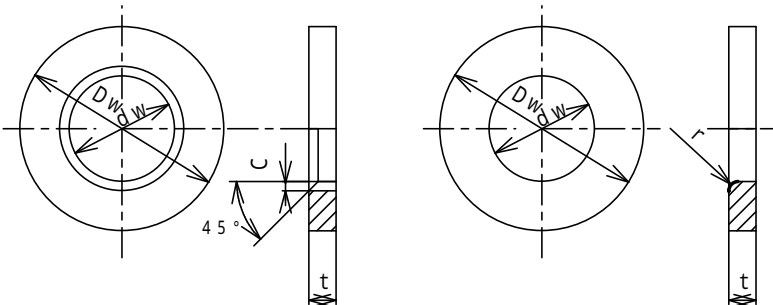
Nut

Eccentricity of screw hole



Nominal designation of thread (d)	Major diameter of external thread (d)	H		B		D	D ₁	a - b	h
		Basic dimension	Tolerance	Basic dimension	Tolerance	Approx.	min.	max.	
M 12	12	12	±0.35	22	0	20	20	0.7	0.4 ~ 0.8
M 16	16	16		27		-0.8	25	25	
M 20	20	20	±0.4	32	0	30	29	0.9	
M 22	22	22		36		-1	34	33	1.1
M 24	24	24	±0.4	41	-1	39	38	1.2	
M 27	27	27		46		-1	44	43	1.3
M 30	30	30		50		48	47	1.5	

Plain washers



Nominal size	dw		Dw		t		c or r
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance	Approx.
12	13	+0.7	26	0 -0.8	3.2	±0.4	1.5
16	17		32		0 -1		
20	21	40					
22	23	+0.8	44	6		±0.7	2.4
24	25		48				
27	28	+1.0 0	56	0 -1.2	8		2.8
30	31		60				