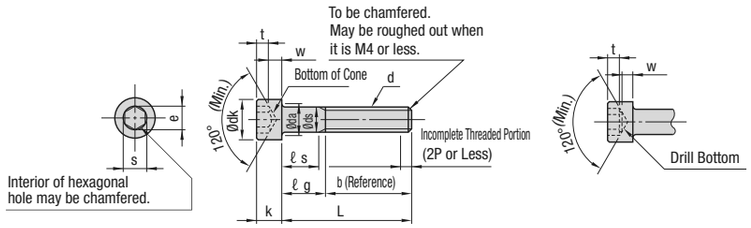
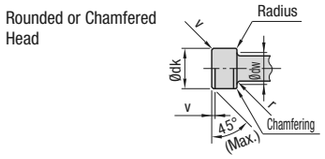
[Technical Data]
Hexagon Socket Head Cap Screws

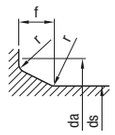
Excerpts from JIS B 1176 (1999, 2000)

1. Dimensions of Sections





Max. Rounding Beneath Neck



f (Max.)=1.7r (Max.)

$$r\ (\text{Max.}) = \frac{da\ (\text{Max.}) - ds\ (\text{Max.})}{2}$$

r (Min.)= Value in the Attached Table

Unit: mm

Nominal of Thread (d)(2)		M2	M2.5	M3	M4	M5	M6	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24	(M27)	M30
Pitch of Thread (P)		0.4	0.45	0.5	0.7	0.8	1	1.25	1.5	1.75	2	2	2.5	2.5	2.5	3	3	3.5
b	Reference	16	17	18	20	22	24	28	32	36	40	44	48	52	56	60	66	72
d_k	Max. (Basis)*	3.8	4.5	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
	Max.**	3.98	4.68	5.68	7.22	8.72	10.22	13.27	16.27	18.27	21.33	24.33	27.33	30.33	33.39	36.39	40.39	45.39
	Min.	3.62	4.32	5.32	6.78	8.28	9.78	12.73	15.73	17.73	20.67	23.67	26.67	29.67	32.61	35.61	39.61	44.61
d_a	Max.	2.6	3.1	3.6	4.7	5.7	6.8	9.2	11.2	13.7	15.7	17.7	20.2	22.4	24.4	26.4	30.4	33.4
d_s	Max. (Basis)	2	2.5	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
	Min.	1.86	2.36	2.86	3.82	4.82	5.82	7.78	9.78	11.73	13.73	15.73	17.73	19.67	21.67	23.67	26.67	29.67
e	Min.	1.73	2.30	2.87	3.44	4.58	5.72	6.86	9.15	11.43	13.72	16.00	16.00	19.44	19.44	21.73	21.73	25.15
f	Max.	0.51	0.51	0.51	0.60	0.60	0.68	1.02	1.02	1.45	1.45	1.45	1.87	2.04	2.04	2.04	2.89	2.89
k	Max. (Basis)	2	2.5	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
	Min.	1.86	2.36	2.86	3.82	4.82	5.70	7.64	9.64	11.57	13.57	15.57	17.57	19.48	21.48	23.48	26.48	29.48
r	Min.	0.1	0.1	0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.6	0.6	0.8	0.8	0.8	1	1
s	Nominal (Basis)	1.5	2	2.5	3	4	5	6	8	10	12	14	14	17	17	19	19	22
	Min.	1.52	2.02	2.52	3.02	4.02	5.02	6.02	8.025	10.025	12.032	14.032	14.032	17.05	17.050	19.065	19.065	22.065
	Max. (1) Column 1	1.560	2.060	2.580	3.080	4.095	5.140	6.140	8.175	10.175	12.212	14.212	14.212	17.230	17.230	19.275	19.275	22.275
	Max. (1) Column 2	1.545	2.045	2.560	3.080	4.095	5.095	6.095	8.115	10.115	12.142	14.142	14.142					
t	Min.	1	1.1	1.3	2	2.5	3	4	5	6	7	8	9	10	11	12	13.5	15.5
v	Max.	0.2	0.25	0.3	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.7	3
d_w	Min.	3.40	4.18	5.07	6.53	8.03	9.38	12.33	15.33	17.23	20.17	23.17	25.87	28.87	31.81	34.81	38.61	43.61
w	Min.	0.55	0.85	1.15	1.4	1.9	2.3	3.3	4	4.8	5.8	6.8	7.7	8.6	9.5	10.4	12.1	13.1

Note (1): Column 1 for s (max.) is applicable to strength class 8.8, 10.9, A 2-50 and A 2-70; Column 2 should be applied to strength class 12.9.
Column 1 may be applicable to strength class 12.9 in accordance with an agreement made between the delivering and receiving parties.
When the nominal of thread is M20 or larger, s (max.) should be applied to all strength classes.

Note (2): Nominal of thread in brackets should not be used unless it is absolutely necessary.

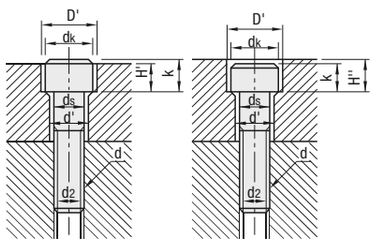
Reference 1. A side of the head should be knurled into a straight line or crisscross pattern [refer to JIS B 0951 (knurling pattern)]. dk (max.) should be the value marked with**.
If no knurled pattern is needed, purchasers can so specify. However, dk (max.) should be the value marked with*.
2. Recommended nominal lengths (L) for individual nominal of thread are shown within the bold lines.
If L is shorter than the dotted line, the thread should be fully threaded, and the incompletely threaded part length beneath the neck should be approximately 3P.
3. ℓg (max.) and ℓg (min.) for a screw, whose length (L) exceeds the dotted line, are obtained by the equations below:
ℓg(Max)=Nominal Length(L)-b
ℓs(Min)=ℓg(Max)-5P

2. L, s and g of Hexagon Socket Head Cap Screws

Unit: mm

Nominal of Thread (d)			M2		M2.5		M3		M4		M5		M6		M8		M10		M12		M14		M16		(M18)		M20		(M22)		M24		(M27)		M30	
L			ℓs min and ℓg max																																	
Nominal Length	min	max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max	ℓs min	ℓg max
5	4.76	5.24																																		
6	5.76	6.24																																		
8	7.71	8.29																																		
10	9.71	10.29																																		
12	11.65	12.35																																		
16	15.65	16.35																																		
20	19.58	20.42	2	4																																
25	24.58	25.42			5.75	8	4.5	7																												
30	29.58	30.42					9.5	12	6.5	10	4	8																								
35	34.5	35.5							11.5	15	9	13	6	11																						
40	39.5	40.5							16.5	20	14	18	11	16	5.75	12																				
45	44.5	45.5									19	23	16	21	10.75	17	5.5	13																		
50	49.5	50.5									24	28	21	26	15.75	22	10.5	18																		
55	54.4	55.6											26	31	20.75	27	15.5	23	10.25	19																
60	59.4	60.6											31	36	25.75	32	20.5	28	15.25	24	10	20														
65	64.4	65.6													30.75	37	25.5	33	20.25	29	15	25	11	21	4.5	17										
70	69.4	70.6													35.75	42	30.5	38	25.25	34	20	30	16	26	9.5	22										
80	79.4	80.6													45.75	52	40.5	48	35.25	44	30	40	26	36	19.5	32	15.5	28	11.5	24						
90	89.3	90.7															50.5	58	45.25	54	40	50	36	46	29.5	42	25.5	38	21.5	34	15	30	9	24		
100	99.3	100.7															60.5	68	55.25	64	50	60	46	56	39.5	52	35.5	48	31.5	44	25	40	19	34		
110	109.3	110.7																	66.25	74	60	70	56	66	49.5	62	45.5	58	41.5	54	35	50	29	44	20.5	38
120	119.3	120.7																	75.25	84	70	80	66	76	59.5	72	55.5	68	51.5	64	45	60	39	54	30.5	48
130	129.2	130.8																			80	90	76	86	69.5	82	65.5	78	61.5	74	55	70	49	64	40.5	58
140	139.2	140.8																			90	100	86	96	79.5	92	75.5	88	71.5	84	65	80	59	74	50.5	68
150	149.2	150.8																					96	106	89.5	102	85.5	98	81.5	94	75	90	69	84	60.5	78
160	159.2	160.8																					106	116	99.5	112	95.5	108	91.5	104	85	100	79	94	70.5	88
180	179.2	180.8																							119.5	132	115.5	128	111.5	124	105	120	99	114	90.5	108
200	199.05	200.95																									135.5	148	131.5	144	125	140	119	134	110.5	128
220	219.05	220.95																															139	154	130.5	148
240	239.05	240.95																															159	174	150.5	168
260	258.95	261.05																															179	194	170.5	188
280	278.95	281.05																															199	214	190.5	208
300	298.95	301.05																															219	234	210.5	228

Reference: Dimensions of Counterbore and Bolt Hole for the Hexagon Socket Head Cap Screws



Unit: mm

Nominal of Thread (d)	M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
d_s	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
d'	3.4	4.5	5.5	6.6	9	11	14	16	18	20	22	24	26	30	33
d_k	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
D'	6.5	8	9.5	11	14	17.5	20	23	26	29	32	35	39	43	48
k	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
H'	2.7	3.6	4.6	5.5	7.4	9.2	11	12.8	14.5	16.5	18.5	20.5	22.5	25	28
H''	3.3	4.4	5.4	6.5	8.6	10.8	13	15.2	17.5	19.5	21.5	23.5	25.5	29	32
d_2	2.6	3.4	4.3	5.1	6.9	8.6	10.4	12.2	14.2	15.7	17.7	19.7	21.2	24.2	26.7