INTERNATIONAL STANDARD

ISO 4762

Fourth edition
2004-03-01

Hexagon socket head cap screws

Vis à tête cylindrique à six pans creux

Reference number
ISO 4762:2004(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 4762 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

This fourth edition cancels and replaces the third edition (ISO 4762:1997), which has been technically revised.

Hexagon socket head cap screws

1 Scope

This International Standard specifies the characteristics of hexagon socket head cap screws with coarse pitch thread from M1,6 up to and including M64 and product grade A.

For approximate masses of screws see Annex A.

If, in special cases, specifications other than those listed in this International Standard are required, they should be selected from existing International Standards, e.g ISO 261, ISO 888, ISO 898-1, ISO 965-2. ISO 3506-1, ISO 8839 and ISO 4759-1.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 225, *Fasteners — Bolts, screws, studs and nuts — Symbols and designations of dimensions*

ISO 261, *ISO general-purpose metric screw threads — General plan*

ISO 888, *Bolts, screws and studs — Nominal lengths, and thread lengths for general purpose bolts*

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

ISO 965-3, *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads*

ISO 3269, *Fasteners — Acceptance inspection*

ISO 3506-1, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs*

ISO 4042, *Fasteners — Electroplated coatings*

ISO 4753, *Fasteners — Ends of parts with external ISO metric thread*

ISO 4759-1, *Tolerances for fasteners — Part 1: Bolts, screws, studs and nuts — Product grades A, B and C*

ISO 6157-1, *Fasteners — Surface discontinuities — Part 1: Bolts, screws and studs for general requirements*

ISO 6157-3, *Fasteners — Surface discontinuities — Part 3: Bolts, screws and studs for special requirements*

ISO 8839, *Mechanical properties of fasteners — Bolts, screws, studs and nuts made of non-ferrous metals*

ISO 8992, *Fasteners — General requirements for bolts, screws, studs and nuts*

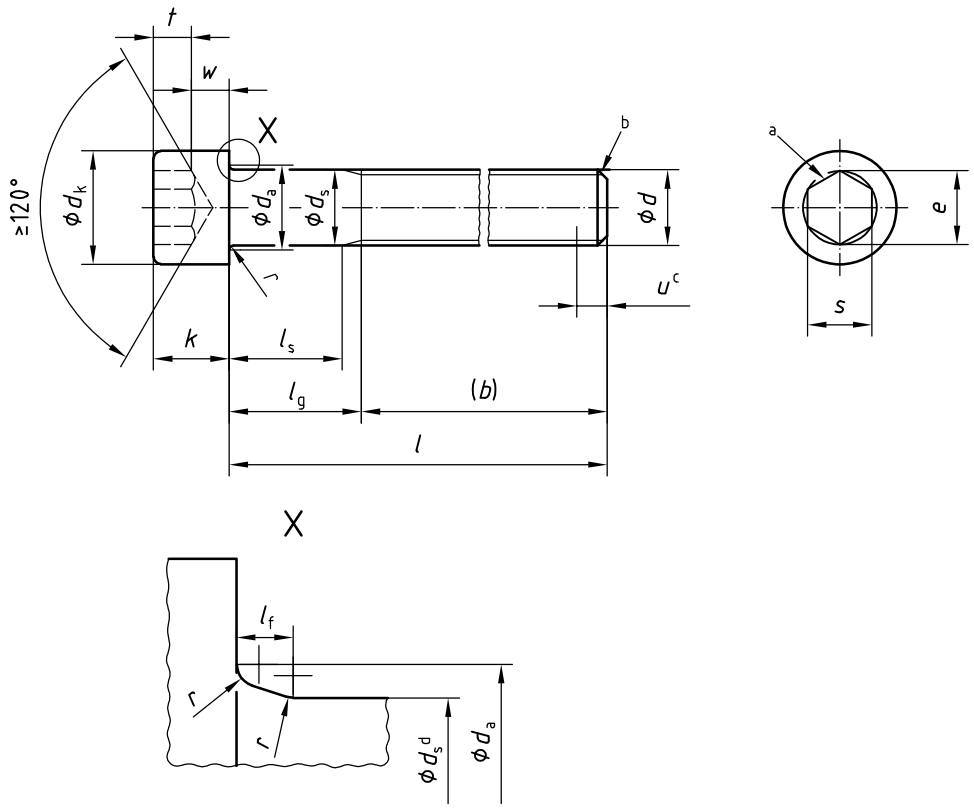
ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

ISO 23429, *Gauging of hexagon sockets*

3 Dimensions

See Figure 1 and Table 1.

Symbols and designations of dimensions are defined in ISO 225.



Maximum underhead fillet

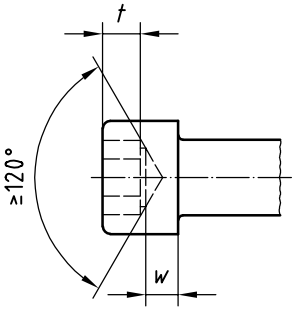
$l_{f,\,max} = 1{,}7\, r_{max}$

$r_{max} = \frac{d_{a,\,max} - d_{s,\,max}}{2}$

r_{min}, see Table 1

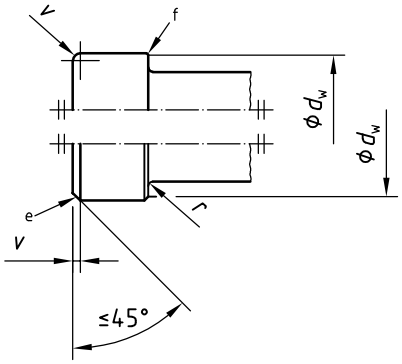
Figure 1

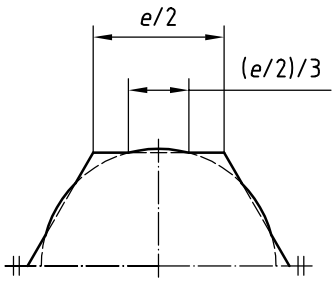
Permissible alternative form of socket



For broached sockets which are at the maximum limit of size the overcut resulting from drilling shall not exceed 1/3 of the length of any flat of the socket which is e/2.

Top and bottom edge opf the head





[a] A slight rounding or countersink at the mouth of the socket is permissible.

[b] Point chamfered or for sizes M4 and below “as rolled” according to ISO 4753.

[c] Incomplete thread $u \leqslant 2\ P$.

[d] d_s applies if values of $l_{s,\,min}$ are specified.

[e] Top edge of head may be rounded or chamfered as shown at the option of the manufacturer.

[f] Bottom edge of head may be rounded or chamfered to d_w but in every case shall be free from burrs.

Figure 1 (*continued*)

Table 1 — Dimensions

Dimensions in millimetres

Thread (d)		M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10	M12
P[a]		0,35	0,4	0,45	0,5	0,7	0,8	1	1,25	1,5	1,75
b[b]	ref.	15	16	17	18	20	22	24	28	32	36
d_k	max.[c]	3,00	3,80	4,50	5,50	7,00	8,50	10,00	13,00	16,00	18,00
	max.[d]	3,14	3,98	4,68	5,68	7,22	8,72	10,22	13,27	16,27	18,27
	min.	2,86	3,62	4,32	5,32	6,78	8,28	9,78	12,73	15,73	17,73
d_a	max.	2	2,6	3,1	3,6	4,7	5,7	6,8	9,2	11,2	13,7
d_s	max.	1,60	2,00	2,50	3,00	4,00	5,00	6,00	8,00	10,00	12,00
	min.	1,46	1,86	2,36	2,86	3,82	4,82	5,82	7,78	9,78	11,73
e[e, f]	min.	1,733	1,733	2,303	2,873	3,443	4,583	5,723	6,863	9,149	11,429
l_f	max	0,34	0,51	0,51	0,51	0,6	0,6	0,68	1,02	1,02	1,45
k	max.	1,60	2,00	2,50	3,00	4,00	5,00	6,0	8,00	10,00	12,00
	min.	1,46	1,86	2,36	2,86	3,82	4,82	5,7	7,64	9,64	11,57
r	min.	0,1	0,1	0,1	0,1	0,2	0,2	0,25	0,4	0,4	0,6
s[f]	nom.	1,5	1,5	2	2,5	3	4	5	6	8	10
	max.	1,58	1,58	2,08	2,58	3,08	4,095	5,14	6,14	8,175	10,175
	min.	1,52	1,52	2,02	2,52	3,02	4,020	5,02	6,02	8,025	10,025
t	min.	0,7	1	1,1	1,3	2	2,5	3	4	5	6
v	max.	0,16	0,2	0,25	0,3	0,4	0,5	0,6	0,8	1	1,2
d_w	min	2,72	3,48	4,18	5,07	6,53	8,03	9,38	12,33	15,33	17,23
w	min.	0,55	0,55	0,85	1,15	1,4	1,9	2,3	3,3	4	4,8

l^g			Shank length l_s and grip length l_g																			
			l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g
nom.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	2,3	2,7																				
3	2,8	3,2																				
4	3,76	4,24																				
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																				

Table 1 — Dimensions (*continued*)

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
65	64,4	65,6															30,75	37	25,5	33	20,25	29
70	69,4	70,6															35,75	42	30,5	38	25,25	34
80	79,4	80,6															45,75	52	40,5	48	35,25	44
90	89,3	90,7																	50,5	58	45,25	54
100	99,3	100,7																	60,5	68	55,25	64
110	109,3	110,7																			65,25	74
120	119,3	120,7																			75,25	84
130	129,2	130,8																				
140	139,2	140,8																				
150	149,2	150,8																				
160	159,2	160,8																				
180	179,2	180,8																				
200	199,075	200,925																				
220	219,075	220,925																				
240	239,075	240,925																				
260	258,95	261,05																				
280	278,95	281,05																				
300	298,95	301,05																				

Table 1 — Dimensions (*continued*)

Dimensions in millimetres

Thread (d)		(M14)[h]	M16	M20	M24	M30	M36	M42	M48	M56	M64
P[a]		2	2	2,5	3	3,5	4	4,5	5	5,5	6
b[b]	ref.	40	44	52	60	72	84	96	108	124	140
d_k	max.[c]	21,00	24,00	30,00	36,00	45,00	54,00	63,00	72,00	84,00	96,00
	max.[d]	21,33	24,33	30,33	36,39	45,39	54,46	63,46	72,46	84,54	96,54
	min.	20,67	23,67	29,67	35,61	44,61	53,54	62,54	71,54	83,46	95,46
d_a	max.	15,7	17,7	22,4	26,4	33,4	39,4	45,6	52,6	63	71
d_s	max.	14,00	16,00	20,00	24,00	30,00	36,00	42,00	48,00	56,00	64,00
	min.	13,73	15,73	19,67	23,67	29,67	35,61	41,61	47,61	55,54	63,54
e[e, f]	min.	13,716	15,996	19,437	21,734	25,154	30,854	36,571	41,131	46,831	52,531
l_f	max	1,45	1,45	2,04	2,04	2,89	2,89	3,06	3,91	5,95	5,95
k	max.	14,00	16,00	20,00	24,00	30,00	36,00	42,00	48,00	56,00	64,00
	min.	13,57	15,57	19,48	23,48	29,48	35,38	41,38	47,38	55,26	63,26
r	min.	0,6	0,6	0,8	0,8	1	1	1,2	1,6	2	2
s[f]	nom.	12	14	17	19	22	27	32	36	41	46
	max.	12,212	14,212	17,23	19,275	22,275	27,275	32,33	36,33	41,33	46,33
	min.	12,032	14,032	17,05	19,065	22,065	27,065	32,08	36,08	41,08	46,08
t	min.	7	8	10	12	15,5	19	24	28	34	38
v	max.	1,4	1,6	2	2,4	3	3,6	4,2	4,8	5,6	6,4
d_w	min	20,17	23,17	28,87	34,81	43,61	52,54	61,34	70,34	82,26	94,26
w	min.	5,8	6,8	8,6	10,4	13,1	15,3	16,3	17,5	19	22

l[g]			Shank length l_s and grip length l_g																			
			l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g
nom.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	2,3	2,7																				
3	2,8	3,2																				
4	3,76	4,24																				
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																				

Table 1 — Dimensions (*continued*)

16	15,65	16,35																				
20	19,58	20,42																				
25	24,58	25,42																				
30	29,58	30,42																				
35	34,5	35,5																				
40	39,5	40,5																				
45	44,5	45,5																				
50	49,5	50,5																				
55	54,4	55,6																				
60	59,4	60,6	10	20																		
65	64,4	65,6	15	25	11	21																
70	69,4	70,6	20	30	16	26																
80	79,4	80,6	30	40	26	36	15,5	28														
90	89,3	90,7	40	50	36	46	25,5	38	15	30												
100	99,3	100,7	50	60	46	56	35,5	48	25	40												
110	109,3	110,7	60	70	56	66	45,5	58	35	50	20,5	38										
120	119,3	120,7	70	80	66	76	55,5	68	45	60	30,5	48	16	36								
130	129,2	130,8	80	90	76	86	65,5	78	55	70	40,5	58	26	46								
140	139,2	140,8	90	100	86	96	75,5	88	65	80	50,5	68	36	56	21,5	44						
150	149,2	150,8			96	106	85,5	98	75	90	60,5	78	46	66	31,5	54						
160	159,2	160,8			106	116	95,5	108	85	100	70,5	88	56	76	41,5	64	27	52				
180	179,2	180,8					115,5	128	105	120	90,5	108	76	96	61,5	84	47	72	28,5	56		
200	199,075	200,925					135,5	148	125	140	110,5	128	96	116	81,5	104	67	92	48,5	76	30	60
220	219,075	220,925													101,5	124	87	112	68,5	96	50	80
240	239,075	240,925													121,5	155	107	132	88,5	116	70	100
260	258,95	261,05													141,5	164	127	152	108,5	136	90	120
280	278,95	281,05													161,5	184	147	172	128,5	156	110	140
300	298,95	301,05													181,5	204	167	192	148,5	176	130	160

Table 1 — Dimensions (*continued*)

[a] P is the pitch of the thread.
[b] For lengths between the bold stepped lines in the unshaded area.
[c] For plain heads.
[d] For knurled heads.
[e] $e_{min} = 1{,}14\ s_{min}$
[f] Combined gauging of socket dimensions e and s, see ISO 23429.
[g] The range of commercial lengths is between the bold stepped lines. Lengths in the shaded area are threaded to the head within 3 P. Lengths below the shaded area have values of l_g and l_s in accordance with the following formulae: $l_{g,\,max} = l_{nom} - b$ $l_{s,\,min} = l_{g,\,max} - 5\ P$
[h] The size in brackets should be avoided if possible.

4 Requirements and reference International Standards

See Table 2.

Table 2 — Requirements and reference International Standards

Materials		Steel	Stainless steel	Non-ferrous metal
General requirements	International Standard	ISO 8992		
Thread	Tolerances	5g6g for property class 12.9; for other property classes: 6g		
	International Standards	ISO 261, ISO 965-2, ISO 965-3		
Mechanical properties	Property class	M3: as agreed ⩾ M3 and ⩽ M39: 8.8, 10.9, 12.9 > M39: as agreed	⩽ M24: A2-70[a], A3-70, A4-70, A5-70 > M24 and ⩽ M39: A2-50[b], A3-50, A4-50, A5-50 > M39: as agreed	As agreed
	International Standards	ISO 898-1	ISO 3506-1	ISO 8839
Tolerances	Product grade	A		
	International Standard	ISO 4759-1		
Finish		As processed Requirements for electroplating are covered in ISO 4042. Requirements for non-electrolytically applied zinc flake coatings are covered in ISO 10683.	Plain —	Plain Requirements for electroplating are covered in ISO 4042.
Surface discontinuities		Limits for surface discontinuities are covered in ISO 6157-1 and ISO 6157-3 for property class 12.9.	—	—
Acceptability		Acceptance procedure is covered in ISO 3269.		

[a] For stainless steel screws machined from bat it is permissible to use grade A1-70 for sizes ⩽ M12 and the product shall be marked accordingly.

[b] For stainless steel screws machined from bar it is permissible to use grade A1-50 and the product shall be marked accordingly.

5 Designation

EXAMPLE A hexagon socket head cap screw with thread M5, nominal length $l = 20$ mm and property class 12.9 is designed as follows:

Hexagon socket head cap screw ISO 4762-M5×20-12.9

Annex A
(informative)

Masses

In Table A.1 approximate masses of screws with commercial lengths are given for information only.

Table A.1 — Masses

Thread	M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10	M12	(M14)	M16	M20	M24	M30	M36	M42	M48	M56	M64
Nominal length l mm	**Approximate mass, in kilograms per 1 000 pieces (ρ = 7,85 kg/dm^3)** (for information only)																			
2,5	0,085																			
3	0,090	0,155																		
4	0,100	0,175	0,345																	
5	0,110	0,195	0,375	0,67																
6	0,120	0,215	0,405	0,71	1,50															
8	0,140	0,255	0,465	0,80	1,65	2,45														
10	0,160	0,295	0,525	0,88	1,80	2,70	4,70													
12	0,180	0,355	0,585	0,96	1,95	2,95	5,07	10,9												
16	0,220	0,415	0,705	1,16	2,25	3,45	5,75	12,1	20,9											
20		0,495	0,825	1,36	2,65	4,01	6,53	13,4	22,9	32,1										
25			0,975	1,61	3,15	4,78	7,59	15,0	25,4	35,7	48,0	71,3								
30				1,86	3,65	5,55	8,30	16,9	27,9	39,3	53,0	77,8	128							
35					4,15	6,32	9,91	18,9	30,4	42,9	58,0	84,4	139							
40					4,65	7,09	11,0	20,9	32,9	46,5	63,0	91,0	150	270						
45						7,86	12,1	22,9	36,1	50,1	68,0	97,6	161	285	500					
50						8,63	13,2	24,9	39,3	54,5	73,0	106	172	300	527					
55							14,3	26,9	42,5	58,9	78,0	114	183	316	554	870				
60							15,4	28,9	45,7	63,4	84,0	122	194	330	581	910	1 370			
65								31,0	48,9	67,8	90,0	130	205	345	608	950	1 420			
70								33,0	52,1	71,3	96,0	138	216	363	635	990	1 470	2 040		
80								37,0	58,5	80,2	108	154	241	399	690	1 070	1 580	2 180	3 340	
90									64,9	89,1	120	170	266	435	745	1 150	1 680	2 320	3 530	5 220
100									71,2	98,0	132	186	291	471	800	1 230	1 790	2 460	3 720	5 470
110										107	144	202	316	507	855	1 310	1 890	2 600	3 920	5 730
120										116	156	218	341	543	910	1 390	2 000	2 740	4 110	5 980
130											168	234	366	579	965	1 470	2 100	2 880	4 300	6 230
140											180	250	391	615	1 020	1 550	2 210	3 020	4 490	6 490
150												266	416	651	1 080	1 630	2 320	3 160	4 680	6 740
160												282	441	687	1 130	1 710	2 420	3 300	4 880	6 900
180													491	759	1 240	1 870	2 640	3 590	5 270	7 250
200													541	831	1 350	2 030	2 860	3 870	5 650	7 750
220														903	1 460	2 190	3 080	4 150	6 040	8 250
240														975	1 570	2 250	3 300	4 430	6 420	8 750
260															1 680	2 410	3 520	4 710	6 810	9 260
280															1 790	2 570	3 740	4 990	7 200	9 760
300															1 900	2 730	3 960	5 270	7 580	10 300

ICS 21.060.10

Price based on 11 pages