
Hexagon socket head cap screws

Vis à tête cylindrique à six pans creux

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[ISO 4762:1997](https://standards.iteh.ai/catalog/standards/sist/266745a7-f5c9-456a-9f67-bc1fb283ac8e/iso-4762-1997)

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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.

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.

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

This third edition cancels and replaces the second edition (ISO 4762:1989), which has been technically revised.

Annex A forms an integral part of this International Standard. Annex B is for information only.

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Hexagon socket head cap screws

1 Scope

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

Gauging of hexagon sockets is specified in annex A. For approximate masses of screws see annex B.

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

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 225:1983, *Fasteners – Bolts, screws, studs and nuts – Symbols and designations of dimensions.*

ISO 261:–¹⁾, *ISO general purpose metric screw threads – General plan.*

ISO 888:1976, *Bolts, screws and studs – Nominal lengths and thread lengths for general purpose bolts.*

ISO 898-1:–²⁾, *Mechanical properties of fasteners made of carbon and alloy steel – Part 1: Bolts, screws and studs.*

ISO 965-2:–³⁾, *ISO general purpose metric screw threads – Tolerances – Part 2: Limits of sizes for general purpose bolt and nut threads – Medium quality.*

ISO 965-3:–⁴⁾, *ISO general purpose metric screw threads – Tolerances – Part 3: Deviations for constructional threads.*

ISO 3269:1988, *Fasteners – Acceptance inspection.*

ISO 3506-1:1997, *Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs.*

ISO 4042:–⁵⁾, *Fasteners – Electroplated coatings.*

ISO 4753:1983, *Fasteners – Ends of parts with external metric ISO threads.*

ISO 4759-1:–⁶⁾, *Tolerances for fasteners – Part 1: Bolts, screws, studs and nuts – Product grades A, B and C.*

ISO 6157-1:1988, *Fasteners – Surface discontinuities – Part 1: Bolts, screws and studs for general requirements.*

ISO 6157-3:1988, *Fasteners – Surface discontinuities – Part 3: Bolts, screws and studs for special requirements.*

ISO 8839:1986, *Mechanical properties of fasteners – Bolts, screws, studs and nuts made of non-ferrous metals.*

ISO 8992:1986, *Fasteners – General requirements for bolts, screws, studs and nuts.*

1) To be published. (Revision of ISO 261:1973)

2) To be published. (Revision of ISO 898-1:1988)

3) To be published. (Revision of ISO 965-2:1980)

4) To be published. (Revision of ISO 965-3:1980)

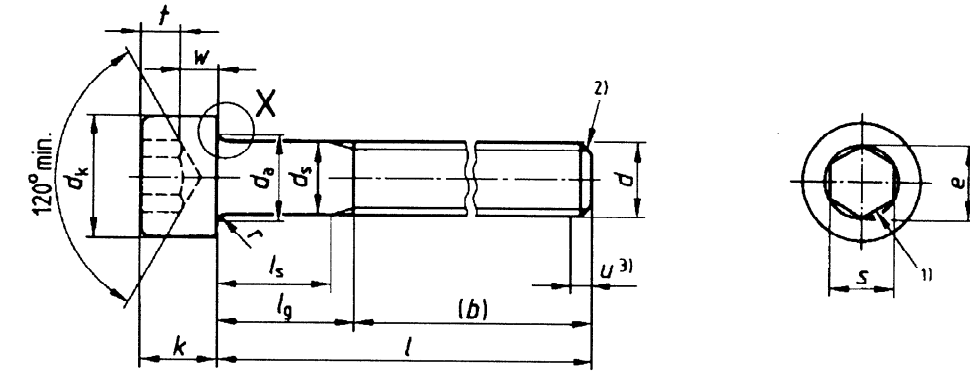
5) To be published. (Revision of ISO 4042:1989)

6) To be published. (Revision of ISO 4759-1:1978)

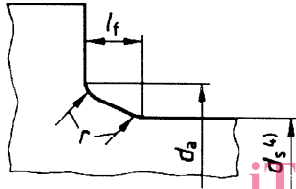
3 Dimensions

See figure 1 and table 1.

Symbols and designations of symbols are defined in ISO 225.



X



Maximum underhead fillet

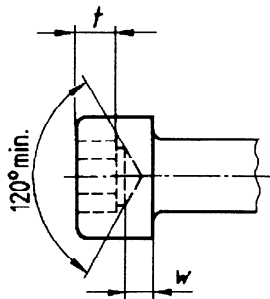
$$l_f \max = 1,7 r_{\max}$$

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

STANDARD PREVIEW r_{min}, see table 1

Permissible alternative form of socket

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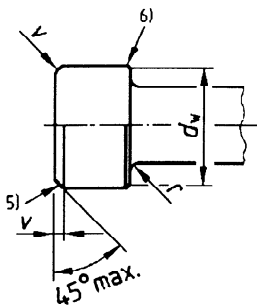
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NOTE — For broached sockets which are at the maximum limit of size

the overcut resulting from drilling shall not exceed 20 % of the length of any flat of the socket.

Top and bottom edge of the head



1) A slight rounding or countersink at the mouth of the socket is permissible.

2) Point chamfered or for sizes M4 and below "as rolled", see ISO 4753.

3) Incomplete thread $u \leq 2 P$.

4) d_s applies if values of $l_{s \min}$ are specified.

5) Top edge of head may be rounded or chamfered as shown at the discretion of the manufacturer.

6) Bottom edge of head may be rounded or chamfered to d_w but in every case must be free from burrs.

Figure 1

Table 1 — Dimensions

Dimensions in millimetres

Thread (<i>d</i>)	M1,6	M2	M2,5	M3	M4	M5	M6	M8														
<i>P</i> ¹⁾	0,35	0,4	0,45	0,5	0,7	0,8	1	1,25														
<i>b</i> ²⁾ ref.	15	16	17	18	20	22	24	28														
<i>d_k</i>	max. ³⁾	3,00	3,80	4,50	5,50	7,00	8,50	10,00	13,00													
	max. ⁴⁾	3,14	3,98	4,68	5,68	7,22	8,72	10,22	13,27													
	min.	2,86	3,62	4,32	5,32	6,78	8,28	9,78	12,73													
<i>d_a</i>	max.	2	2,6	3,1	3,6	4,7	5,7	6,8	9,2													
<i>d_s</i>	max.	1,60	2,00	2,50	3,00	4,00	5,00	6,00	8,00													
	min.	1,46	1,86	2,36	2,86	3,82	4,82	5,82	7,78													
<i>e</i>	min. ⁵⁾	1,73	1,73	2,3	2,87	3,44	4,58	5,72	6,86													
<i>l_f</i>	max.	0,34	0,51	0,51	0,51	0,6	0,6	0,68	1,02													
<i>k</i>	max.	1,60	2,00	2,50	3,00	4,00	5,00	6,0	8,00													
	min.	1,46	1,86	2,36	2,86	3,82	4,82	5,7	7,64													
<i>r</i>	min.	0,1	0,1	0,1	0,1	0,2	0,2	0,25	0,4													
<i>s</i>	nom.	1,5	1,5	2	2,5	3	4	5	6													
	max. ⁶⁾	1,545	1,545	2,045	2,56	3,071	4,084	5,084	6,095													
	max. ⁷⁾	1,560	1,560	2,060	2,58	3,080	4,095	5,140	6,140													
	min.	1,520	1,520	2,020	2,52	3,020	4,020	5,020	6,020													
<i>t</i>	min.	0,7	1	1,1	1,3	2	2,5	3	4													
<i>v</i>	max.	0,16	0,2	0,25	0,3	0,4	0,5	0,6	0,8													
<i>d_w</i>	min.	2,72	3,48	4,18	5,07	6,53	8,03	9,38	12,33													
<i>w</i>	min.	0,55	0,55	0,85	1,15	1,4	1,9	2,3	3,3													
<i>l</i> ⁸⁾	Shank length <i>l_s</i> and grip length <i>l_g</i>																					
	nom.	min.	max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> 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																				
16	15,65	16,35																				
20	19,58	20,42			2	4																
25	24,58	25,42					5,75	8														
30	29,58	30,42							4,5	7												
35	34,5	35,5							9,5	12												
40	39,5	40,5									6,5	10	4	8								
45	44,5	45,5									11,5	15	9	13	6	11						
50	49,5	50,5									16,5	20	14	18	11	16	5,75	12				
55	54,4	55,6											19	23	16	21	10,75	17				
60	59,4	60,6											24	28	21	26	15,75	22				
65	64,4	65,6													26	31	20,75	27				
70	69,4	70,6													31	36	25,75	32				
80	79,4	80,6																	30,75	37		
																				35,75	42	
																					45,75	52

1) *P* is the pitch of the thread.

2) For lengths below the thick dashed line.

3) For plain heads.

4) For knurled heads.

5) $e_{\min} = 1,14 s_{\min}$

6) For property class 12.9.

7) For all other property classes.

8) The range of commercial lengths is between the thick stepped lines. Lengths above the dashed stepped line are threaded to the head within 3 *P*. Lengths below the dashed stepped line have values of *l_g* and *l_s* in accordance with the following formulae:

$$l_{g \max} = l_{\text{nom}} - b$$

$$l_{s \min} = l_{g \max} - 5 P$$

Table 1 (continued)

Dimensions in millimetres

Thread (d)			M10	M12	(M14) ⁹⁾	M16	M20	M24	M30	M36								
$p^{1)}$			1,5	1,75	2	2	2,5	3	3,5	4								
$b^{2)}$	ref.		32	36	40	44	52	60	72	84								
d_k	max. ³⁾		16,00	18,00	21,00	24,00	30,00	36,00	45,00	54,00								
	max. ⁴⁾		16,27	18,27	21,33	24,33	30,33	36,39	45,39	54,46								
	min.		15,73	17,73	20,67	23,67	29,67	35,61	44,61	53,54								
d_a	max.		11,2	13,7	15,7	17,7	22,4	26,4	33,4	39,4								
d_s	max.		10,00	12,00	14,00	16,00	20,00	24,00	30,00	36,00								
	min.		9,78	11,73	13,73	15,73	19,67	23,67	29,67	35,61								
e	min. ⁵⁾		9,15	11,43	13,72	16	19,44	21,73	25,15	30,85								
l_f	max.		1,02	1,45	1,45	1,45	2,04	2,04	2,89	2,89								
k	max.		10,00	12,00	14,00	16,00	20,00	24,00	30,00	36,00								
	min.		9,64	11,57	13,57	15,57	19,48	23,48	29,48	35,38								
r	min.		0,4	0,6	0,6	0,6	0,8	0,8	1	1								
s	nom.		8	10	12	14	17	19	22	27								
	max. ⁶⁾		8,115	10,115	12,142	14,142	17,23	19,275	22,275	27,275								
	max. ⁷⁾		8,175	10,175	12,212	14,212												
	min.		8,025	10,025	12,032	14,032	17,05	19,065	22,065	27,065								
t	min.		5	6	7	8	10	12	15,5	19								
v	max.		1	1,2	1,4	1,6	2	2,4	3	3,6								
d_w	min.		15,33	17,23	20,17	23,17	28,87	34,81	43,61	52,54								
w	min.		4	4,8	5,8	6,8	8,6	10,4	13,1	15,3								
$l^{8)}$			Shank length l_s and grip length l_g															
nom.	min.	max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.
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	5,5	13														
50	49,5	50,5	10,5	18														
55	54,4	55,6	15,5	23	10,25	19												
60	59,4	60,6	20,5	28	15,25	24	10	20										
65	64,4	65,6	25,5	33	20,25	29	15	25	11	21								
70	69,4	70,6	30,5	38	25,25	34	20	30	16	26								
80	79,4	80,6	40,5	48	35,25	44	30	40	26	36	15,5	28						
90	89,3	90,7	50,5	58	45,25	54	40	50	36	46	25,5	38	15	30				
100	99,3	100,7	60,5	68	55,25	64	50	60	46	56	35,5	48	25	40				
110	109,3	110,7			65,25	74	60	70	56	66	45,5	58	35	50	20,5	38		
120	119,3	120,7			75,25	84	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
150	149,2	150,8							96	106	85,5	98	75	90	60,5	78	46	66
160	159,2	160,8							106	116	95,5	108	85	100	70,5	88	56	76
180	179,2	180,8									115,5	128	105	120	90,5	108	76	96
200	199,075	200,925									135,5	148	125	140	110,5	128	96	116

NOTE — For footnotes 1) to 8) see table 1, page 4.

9) The size in brackets should be avoided if possible.

Table 1 (concluded)

Dimensions in millimetres

Thread (<i>d</i>)		M42	M48	M56	M64					
P^1		4,5	5	5,5	6					
b^2	ref.	96	108	124	140					
d_k	max. ³⁾	63,00	72,00	84,00	96,00					
	max. ⁴⁾	63,46	72,46	84,54	96,54					
	min.	62,54	71,54	83,46	95,46					
d_a	max.	45,6	52,6	63	71					
d_s	max.	42,00	48,00	56,00	64,00					
	min.	41,61	47,61	55,54	63,54					
e	min. ⁵⁾	36,57	41,13	46,83	52,53					
l_f	max.	3,06	3,91	5,95	5,95					
k	max.	42,00	48,00	56,00	64,00					
	min.	41,38	47,38	55,26	63,26					
r	min.	1,2	1,6	2	2					
s	nom.	32	36	41	46					
	max. ⁷⁾	32,33	36,33	41,33	46,33					
	min.	32,08	36,08	41,08	46,08					
t	min.	24	28	34	38					
v	max.	4,2	4,8	5,6	6,4					
d_w	min.	61,34	70,34	82,26	94,26					
w	min.	16,3	17,5	19	22					
iTeh STANDARD PREVIEW (standards.iteh.ai) ISO 4762:1997 https://standards.iteh.ai/catalog/standards/sist/266745a7-15c9-456a-9f67-bc1fb283ac8e/iso-4762-1997										
		Shank length l_s and grip length l_g								
nom.	min.	max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.
50	49,5	50,5								
55	54,4	55,6								
60	59,4	60,6								
65	64,4	65,6								
70	69,4	70,6								
80	79,4	80,6								
90	89,3	90,7								
100	99,3	100,7								
110	109,3	110,7								
120	119,3	120,7								
130	129,2	130,8								
140	139,2	140,8	21,5	44						
150	149,2	150,8	31,5	54						
160	159,2	160,8	41,5	64	27	52				
180	179,2	180,8	61,5	84	47	72	28,5	56		
200	199,075	200,925	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	144	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
NOTE — For footnotes 1) to 5), 7) and 8) see table 1, page 4.										

4 Requirements and reference International Standards

See table 2.

Table 2 — Requirements and reference International Standards

Material		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, A4-70 ²⁾ > M24 and ≤ M39: A2-50, A4-50 ²⁾ > M39: as agreed	all defined materials
	International Standards	ISO 898-1 ¹⁾	ISO 3506-1	ISO 8839
Tolerances	Product grade	A		
	International Standard	ISO 4759-1		
Finish		Black oxide (thermal or chemical)	Plain	Plain
		Requirements for electroplating are covered in ISO 4042		Requirements for electroplating are covered in ISO 4042
		If different electroplating requirements are desired or if requirements are needed for other finishes, they should be agreed between customer and supplier.		
		Limits for surface discontinuities are covered in ISO 6157-1 and ISO 6157-3.		
Acceptability		Acceptance procedure is dealt with in ISO 3269.		
<p>1) For screws unsuitable for tensile testing, the hardness requirements shall be fulfilled throughout the section of the screw.</p> <p>2) For stainless steel screws machined from bar it is permissible to use grade A1-70 for sizes ≤ M12 and A1-50 for sizes > M12 but they should be marked according to their property class.</p>				

5 Designation

EXAMPLE

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

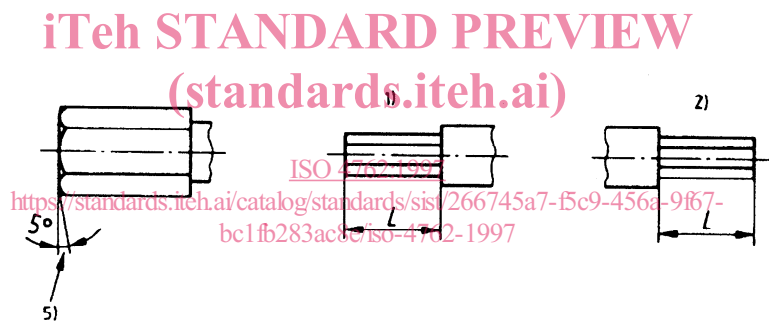
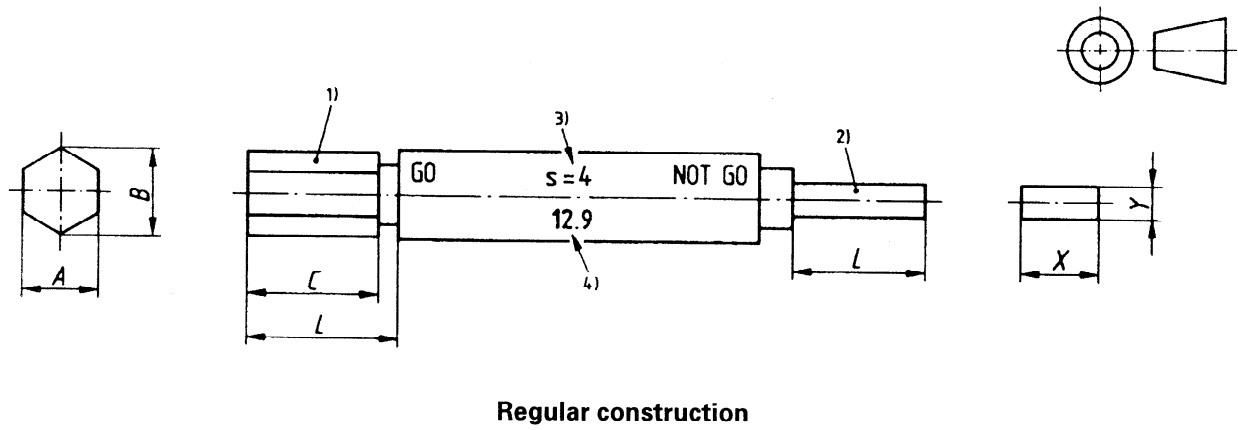
Hexagon socket head cap screw ISO 4762 – M5 × 20 – 12.9

Annex A
(normative)

Gauging of hexagon socket

A.1 Gauge dimensions

See figure A.1, table A.1 and table A.2.



Optional construction of GO members and NOT GO members for small sizes

- 1) GO member.
- 2) NOT GO member.
- 3) Socket size (width across flats).
- 4) Property classes, for which the gauge applies.
- 5) 5° chamfer optional.

Figure A.1