
Hexagon head bolts — Product grade C

Vis à tête hexagonale partiellement filetées — Grade C

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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 4016 was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 10, *Product standards for fasteners*.

This fourth edition cancels and replaces the third edition (ISO 4016:1999), of which it constitutes a minor revision.

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Introduction

This International Standard belongs to a complete group of product standards developed by ISO on external hexagon drive fasteners. It comprises the following:

- a) hexagon head bolts (ISO 4014, ISO 4015, ISO 4016 and ISO 8765);
- b) hexagon head screws (ISO 4017, ISO 4018 and ISO 8676);
- c) hexagon nuts (ISO 4032, ISO 4033, ISO 4034, ISO 4035, ISO 4036, ISO 7040, ISO 7041, ISO 7042, ISO 7719, ISO 7720, ISO 8673, ISO 8674, ISO 8675, ISO 10511, ISO 10512 and ISO 10513);
- d) hexagon bolts with flange (ISO 4162, ISO 15071 and ISO 15072);
- e) hexagon nuts with flange (ISO 4161, ISO 7043, ISO 7044, ISO 10663, ISO 12125, ISO 12126 and ISO 21670).

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Hexagon head bolts — Product grade C

1 Scope

This International Standard specifies the characteristics of hexagon head bolts with threads from M5 up to and including M64, of product grade C.

If, in special cases, specifications other than those listed in this International Standard are required, they can be selected from existing International Standards, for example ISO 724, ISO 888, ISO 898-1, ISO 965-1 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 descriptions of dimensions*

ISO 724, *ISO general-purpose metric screw threads — Basic dimensions*

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

ISO 965-1, *ISO general-purpose metric screw threads — Tolerances — Part 1: Principles and basic data*

ISO 3269, *Fasteners — Acceptance inspection*

ISO 4018, *Hexagon head screws — Product grade C*

ISO 4042, *Fasteners — Electroplated coatings*

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

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

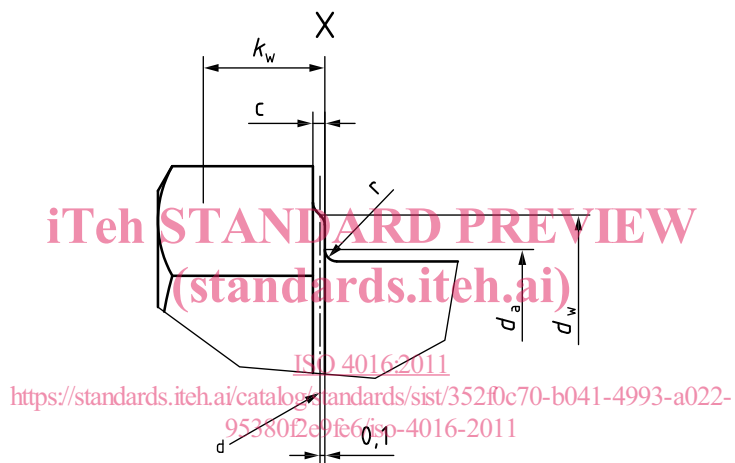
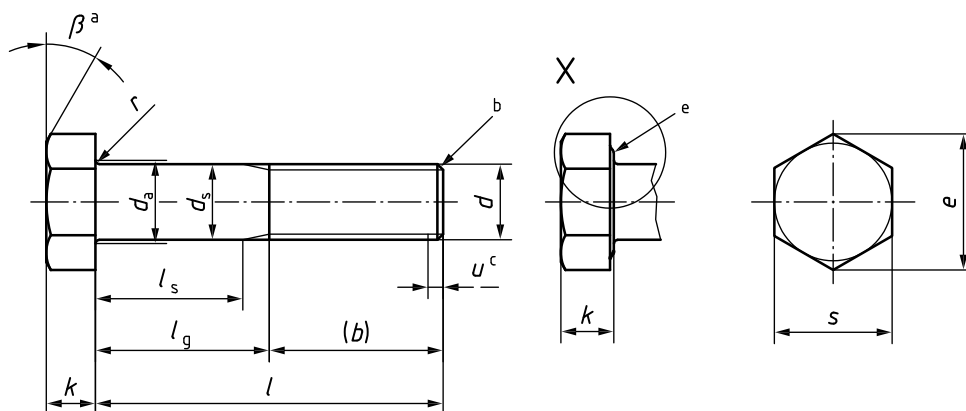
ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

3 Dimensions

See Figure 1 and Tables 1 and 2.

Symbols and descriptions of dimensions are specified in ISO 225.

Dimensions in millimetres



- a $\beta = 15^\circ$ to 30° .
- b End without special requirements.
- c Incomplete thread $u \leq 2P$.
- d Reference datum for d_w .
- e Washer face permissible.

Figure 1

Table 1 — Preferred threads

Dimensions in millimetres

Thread, <i>d</i>		M5	M6	M8	M10	M12	M16	M20								
<i>p</i> ^a		0,8	1	1,25	1,5	1,75	2	2,5								
<i>b</i> ref.	<i>b</i>	16	18	22	26	30	38	46								
	<i>c</i>	22	24	28	32	36	44	52								
	<i>d</i>	35	37	41	45	49	57	65								
<i>c</i>	max.	0,5	0,5	0,6	0,6	0,6	0,8	0,8								
<i>d_a</i>	max.	6	7,2	10,2	12,2	14,7	18,7	24,4								
<i>d_s</i>	max.	5,48	6,48	8,58	10,58	12,7	16,7	20,84								
	min.	4,52	5,52	7,42	9,42	11,3	15,3	19,16								
<i>d_w</i>	min.	6,74	8,74	11,47	14,47	16,47	22	27,7								
<i>e</i>	min.	8,63	10,89	14,2	17,59	19,85	26,17	32,95								
	nom.	3,5	4	5,3	6,4	7,5	10	12,5								
	max.	3,875	4,375	5,675	6,85	7,95	10,75	13,4								
<i>k</i>	min.	3,125	3,625	4,925	5,95	7,05	9,25	11,6								
	max.	2,19	2,54	3,45	4,17	4,94	6,48	8,12								
<i>k_w</i> ^e	min.	2,19	2,54	3,45	4,17	4,94	6,48	8,12								
<i>r</i>	min.	0,2	0,25	0,4	0,4	0,6	0,6	0,8								
<i>s</i>	nom. = max.	8,00	10,00	13,00	16,00	18,00	24,00	30,00								
	min.	7,64	9,64	12,57	15,57	17,57	23,16	29,16								
<i>l</i>			<i>l_s</i> and <i>l_g</i> ^f													
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.
25	23,95	26,05	5	9	For sizes above the solid, bold, stepped line, ISO 4018 is recommended.											
30	28,95	31,05	10	14												
35	33,75	36,25	15	19	7	12										
40	38,75	41,25	20	24	17	22	11,75	18								
45	43,75	46,25	25	29	27	32	16,75	23	11,5	19						
50	48,75	51,25	30	34	27	32	21,75	28	16,5	24						
55	53,5	56,5			32	37	26,75	33	21,5	29	16,25	25				
60	58,5	61,5			37	42	31,75	38	26,5	34	21,25	30				
65	63,5	66,5			37	42	31,75	38	26,5	34	21,25	30				
70	68,5	71,5			36,75	43	31,5	39	26,25	35	17	27				
80	78,5	81,5			41,75	48	36,5	44	31,25	40	22	32	21,5	34		
90	88,25	91,75			51,75	58	46,5	54	41,25	50	32	42	31,5	44		
100	98,25	101,75					56,5	64	51,25	60	42	52	41,5	54		
110	108,25	111,75					66,5	74	61,25	70	52	62	51,5	64		
120	118,25	121,75							71,25	80	62	72	61,5	74		
130	128	132							81,25	90	72	82	71,5	84		
140	138	142									76	86	75,5	88		
150	148	152									86	96	85,5	98		
160	156	164									96	106	95,5	108		
180	176	184									106	116	115,5	128		
200	195,4	204,6											135,5	148		
220	215,4	224,6														
240	235,4	244,6														
260	254,8	265,2														
280	274,8	285,2														
300	294,8	305,2														
320	314,3	325,7														
340	334,3	345,7														
360	354,3	365,7														
380	374,3	385,7														
400	394,3	405,7														
420	413,7	426,3														
440	433,7	446,3														
460	453,7	466,3														
480	473,7	486,3														
500	493,7	506,3														

Table 1 (continued)

Dimensions in millimetres

Thread, <i>d</i>		M24	M30	M36	M42	M48	M56	M64									
<i>p</i> ^a		3	3,5	4	4,5	5	5,5	6									
<i>b</i> ref.	<i>b</i>	54	66	—	—	—	—	—									
	<i>c</i>	60	72	84	96	108	—	—									
	<i>d</i>	73	85	97	109	121	137	153									
<i>c</i>	max.	0,8	0,8	0,8	1	1	1	1									
<i>d</i> _a	max.	28,4	35,4	42,4	48,6	56,6	67	75									
<i>d</i> _s	max.	24,84	30,84	37	43	49	57,2	65,2									
	min.	23,16	29,16	35	41	47	54,8	62,8									
<i>d</i> _w	min.	33,25	42,75	51,11	59,95	69,45	78,66	88,16									
<i>e</i>	min.	39,55	50,85	60,79	71,3	82,6	93,56	104,86									
<i>k</i>	nom.	15	18,7	22,5	26	30	35	40									
	max.	15,9	19,75	23,55	27,05	31,05	36,25	41,25									
	min.	14,1	17,65	21,45	24,95	28,95	33,75	38,75									
<i>k</i> _w ^e	min.	9,87	12,36	15,02	17,47	20,27	23,63	27,13									
<i>r</i>	min.	0,8	1	1	1,2	1,6	2	2									
<i>s</i>	nom. = max.	36	46	55,0	65,0	75,0	85,0	95,0									
	min.	35	45	53,8	63,1	73,1	82,8	92,8									
<i>l</i>		<i>l</i> _s and <i>l</i> _g ^f															
nom.	min.	max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	
25	23,95	26,05															
30	28,95	31,05	For sizes above the solid, bold, stepped line, ISO 4018 is recommended.														
35	33,75	36,25															
40	38,75	41,25															
45	43,75	46,25															
50	48,75	51,25															
55	53,5	56,5															
60	58,5	61,5															
65	63,5	66,5															
70	68,5	71,5															
80	78,5	81,5															
90	88,25	91,75															
100	98,25	101,75	31	46													
110	108,25	111,75	41	56													
120	118,25	121,75	51	66	36,5	54											
130	128	132	55	70	40,5	58											
140	138	142	65	80	50,5	68	36	56									
150	148	152	75	90	60,5	78	46	66									
160	156	164	85	100	70,5	88	56	76									
180	176	184	105	120	90,5	108	76	96	61,5	84							
200	195,4	204,6	125	140	110,5	128	96	116	81,5	104	67	92					
220	215,4	224,6	132	147	117,5	135	103	123	88,5	111	74	99					
240	235,4	244,6	152	167	137,5	155	123	143	108,5	131	94	119	75,5	103			
260	254,8	265,2			157,5	175	143	163	128,5	151	114	139	95,5	123	77	107	
280	274,8	285,2			177,5	195	163	183	148,5	171	134	159	115,5	143	97	127	
300	294,8	305,2			197,5	215	183	203	168,5	191	154	179	135,5	163	117	147	
320	314,3	325,7					203	223	188,5	211	174	199	155,5	183	137	167	
340	334,3	345,7					223	243	208,5	231	194	219	175,5	203	157	187	
360	354,3	365,7					243	263	228,5	251	214	239	195,5	223	177	207	
380	374,3	385,7							248,5	271	234	259	215,5	243	197	227	
400	394,3	405,7							268,5	291	254	279	235,5	263	217	247	
420	413,7	426,3							288,5	311	274	299	255,5	283	237	267	
440	433,7	446,3									294	319	275,5	303	257	287	
460	453,7	466,3									314	339	295,5	323	277	307	
480	473,7	486,3									334	359	315,5	343	297	327	
500	493,7	506,3											335,5	363	317	347	

NOTE Preferred lengths are defined in terms of *l*_s and *l*_g.

- a *P* is the pitch of the thread.
- b For *l*_{nom} ≤ 125 mm.
- c For 125 mm < *l*_{nom} ≤ 200 mm.
- d For *l*_{nom} > 200 mm.
- e *k*_{w,min} = 0,7 *k*_{min}.
- f *l*_{g,max} = *l*_{nom} - *b*.
*l*_{s,min} = *l*_{g,max} - 5 *P*.

Table 2 — Non-preferred threads

Dimensions in millimetres

Thread, <i>d</i>		M14	M18	M22	M27	M33						
<i>p</i> ^a		2	2,5	2,5	3	3,5						
<i>b</i> ref.	b	34	42	50	60	—						
	c	40	48	56	66	78						
	d	53	61	69	79	91						
<i>c</i>	max.	0,6	0,8	0,8	0,8	0,8						
<i>d</i> _a	max.	16,7	21,2	26,4	32,4	38,4						
<i>d</i> _s	max.	14,7	18,7	22,84	27,84	34						
	min.	13,3	17,3	21,16	26,16	32						
<i>d</i> _w	min.	19,15	24,85	31,35	38	46,55						
<i>e</i>	min.	22,78	29,56	37,29	45,2	55,37						
<i>k</i>	nom.	8,8	11,5	14	17	21						
	max.	9,25	12,4	14,9	17,9	22,05						
	min.	8,35	10,6	13,1	16,1	19,95						
<i>k</i> _w ^e	min.	5,85	7,42	9,17	11,27	13,97						
<i>r</i>	min.	0,6	0,6	0,8	1	1						
<i>s</i>	nom. = max.	21,00	27,00	34	41	50						
	min.	20,16	26,16	33	40	49						
<i>l</i>			<i>l</i> _s and <i>l</i> _g ^f									
nom.	min.	max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.	<i>l</i> _s min.	<i>l</i> _g max.
60	58,5	61,5	16	26	16	26						
65	63,5	66,5	21	31	21	31						
70	68,5	71,5	26	36	26	36						
80	78,5	81,5	36	46	25,5	38						
90	88,25	91,75	46	56	35,5	48	27,5	40				
100	98,25	101,75	56	66	45,5	58	37,5	50				
110	108,25	111,75	66	76	55,5	68	47,5	60	35	50		
120	118,25	121,75	76	86	65,5	78	57,5	70	45	60		
130	128	132	80	90	69,5	82	61,5	74	49	64	34,5	52
140	138	142	90	100	79,5	92	71,5	84	59	74	44,5	62
150	148	152			89,5	102	81,5	94	69	84	54,5	72
160	156	164			99,5	112	91,5	104	79	94	64,5	82
180	176	184			119,5	132	111,5	124	99	114	84,5	102
200	195,4	204,6					131,5	144	119	134	104,5	122
220	215,4	224,6					138,5	151	126	141	111,5	129
240	235,4	244,6							146	161	131,5	149
260	254,8	265,2							166	181	151,5	167
280	274,8	285,2									171,5	189
300	294,8	305,2									191,5	209
320	314,3	325,7									211,5	229
340	334,3	345,7										
360	354,3	365,7										
380	374,3	385,7										
400	394,3	405,7										
420	413,7	426,3										
440	433,7	446,3										
460	453,7	466,3										
480	473,7	486,3										
500	493,7	506,3										

For sizes above the solid, bold, stepped line, ISO 4018 is recommended.