INTERNATIONAL STANDARD

ISO 8765

Third edition
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Hexagon head bolts with metric fine pitch thread — Product grades A and B

Vis à tête hexagonale à filetage métrique à pas fin partiellement filetées — Grades A et B

Reference number
ISO 8765:2011(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 8765 was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 10, *Product standards for fasteners*.

This third edition cancels and replaces the second edition (ISO 8765:1999), of which it constitutes a minor revision.

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).

Hexagon head bolts with metric fine pitch thread — Product grades A and B

1 Scope

This International Standard specifies the characteristics of hexagon head bolts with metric fine pitch thread with nominal thread diameters, d, from 8 mm to 64 mm, of product grade A for nominal thread diameters, d, from 8 mm to 24 mm and nominal lengths, l, up to and including $10d$ or 150 mm, whichever is the shorter, and of product grade B for nominal thread diameters, d, over 24 mm or nominal lengths, l, over $10d$ or 150 mm, whichever is the shorter.

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, ISO 3506-1, ISO 4753 and ISO 4759-1.

It is intended that coarse thread bolts according to ISO 4014 be the first choice.

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

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 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 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*

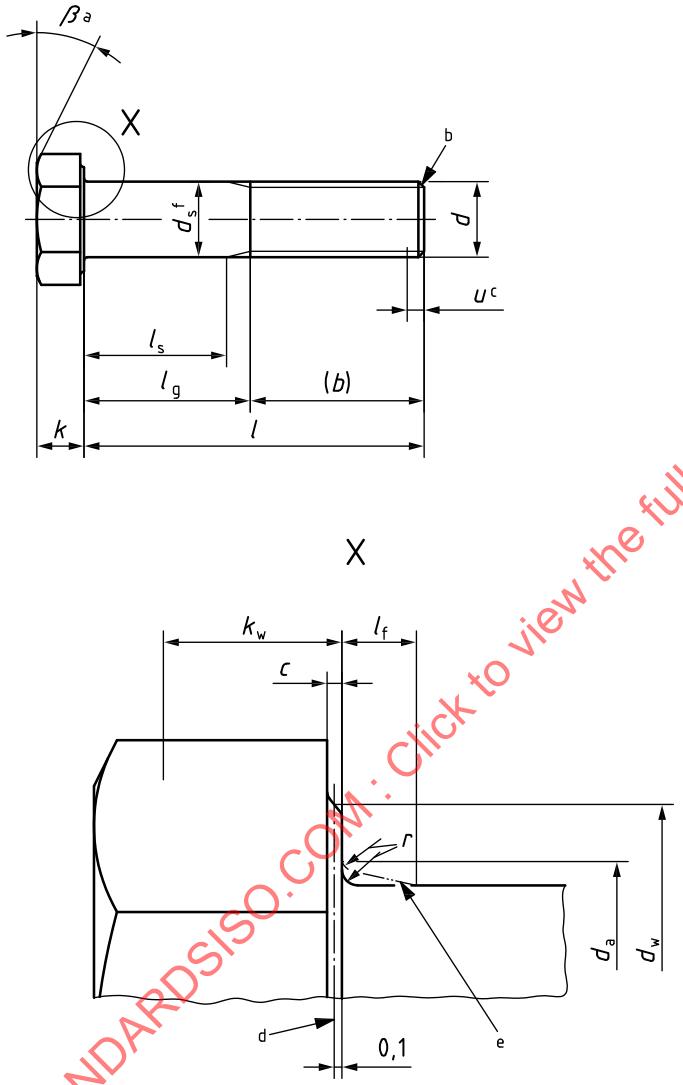
ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

3 Dimensions

See Figure 1 and Tables 1 and 2.

Symbols and descriptions of dimensions are specified in ISO 225.

Dimensions in millimetres



a $\beta = 15°$ to $30°$.

b Point shall be chamfered in accordance with ISO 4753.

c Incomplete thread $u \leqslant 2P$.

d Reference datum for d_w.

e Maximum underhead fillet.

f d_s applies if values of $l_{s,min}$ are specified.

Figure 1

Table 1 — Preferred threads

Dimensions in millimetres

Thread ($d \times P$)				M8 × 1	M10 × 1	M12 × 1,5	M16 × 1,5	M20 × 1,5	M24 × 2	M30 × 2	M36 × 3	M42 × 3	M48 × 3	M56 × 4	M64 × 4
b ref.			[a]	22	26	30	38	46	54	66	—	—	—	—	—
			[b]	28	32	36	44	52	60	72	84	96	108	—	—
			[c]	41	45	49	57	65	73	85	97	109	121	137	153
c			max.	0,60	0,60	0,60	0,8	0,8	0,8	0,8	0,8	1,0	1,0	1,0	1,0
			min.	0,15	0,15	0,15	0,2	0,2	0,2	0,2	0,2	0,3	0,3	0,3	0,3
d_a			max.	9,2	11,2	13,7	17,7	22,4	26,4	33,4	39,4	45,6	52,6	63	71
d_s			nom. = max.	8,00	10,00	12,00	16,00	20,00	24,00	30,00	36,00	42,00	48,00	56,00	64,00
	Product grade	A	min.	7,78	9,78	11,73	15,73	19,67	23,67	—	—	—	—	—	—
		B		7,64	9,64	11,57	15,57	19,48	23,48	29,48	35,38	41,38	47,38	55,26	63,26
d_w	Product grade	A	min.	11,63	14,63	16,63	22,49	28,19	33,61	—	—	—	—	—	—
		B		11,47	14,47	16,47	22	27,7	33,25	42,75	51,11	59,95	69,45	78,66	88,16
e	Product grade	A	min.	14,38	17,77	20,03	26,75	33,53	39,98	—	—	—	—	—	—
		B		14,20	17,59	19,85	26,17	32,95	39,55	50,85	60,79	71,3	82,6	93,56	104,86
l_f			max.	2	2	3	3	4	4	6	6	8	10	12	13
k			nom.	5,3	6,4	7,5	10	12,5	15	18,7	22,5	26	30	35	40
	Product grade A		max.	5,45	6,58	7,68	10,18	12,715	15,215	—	—	—	—	—	—
			min.	5,15	6,22	7,32	9,82	12,285	14,785	—	—	—	—	—	—
	Product grade B		max.	5,54	6,69	7,79	10,29	12,85	15,35	19,12	22,92	26,42	30,42	35,5	40,5
			min.	5,06	6,11	7,21	9,71	12,15	14,65	18,28	22,08	25,58	29,58	34,5	39,5
k_w[d]	Product grade	A	min.	3,61	4,35	5,12	6,87	8,6	10,35	—	—	—	—	—	—
		B		3,54	4,28	5,05	6,8	8,51	10,26	12,8	15,46	17,91	20,71	24,15	27,65
r			min.	0,4	0,4	0,6	0,6	0,8	0,8	1	1	1,2	1,6	2	2
s			nom. = max.	13,00	16,00	18,00	24,00	30,00	36,00	46	55,0	65,0	75,0	85,0	95,0
	Product grade	A	min.	12,73	15,73	17,73	23,67	29,67	35,38	—	—	—	—	—	—
		B		12,57	15,57	17,57	23,16	29,16	35	45	53,8	63,1	73,1	82,8	92,8

Table 1 (*continued*)

Dimensions in millimetres

Thread ($d \times P$)					**M8 × 1**		**M10 × 1**		**M12 × 1,5**		**M16 × 1,5**		**M20 × 1,5**		**M24 × 2**		**M30 × 2**		**M36 × 3**		**M42 × 3**		**M48 × 3**		**M56 × 4**		**M64 × 4**	
	Product grade				l_s and l_g[e]																							
	A		B																									
	l				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	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.	min.	max.	min.	max.	min.	max.
35	34,5	35,5	—	—																								
40	39,5	40,5	—	—	11,75	18																						
45	44,5	45,5	—	—	16,75	23	11,5	19																				
50	49,5	50,5	—	—	21,75	28	16,5	24	11,25	20																		
55	54,4	55,6	—	—	26,75	33	21,5	29	16,25	25																		
60	59,4	60,6	—	—	31,75	38	26,5	34	21,25	30																		
65	64,4	65,6	—	—	36,75	43	31,5	39	26,25	35	17	27																
70	69,4	70,6	—	—	41,75	48	36,5	44	31,25	40	22	32																
80	79,4	80,6	—	—	51,75	58	46,5	54	41,25	50	32	42	21,5	34														
90	89,3	90,7	88,25	91,75			56,5	64	51,25	60	42	52	31,5	44														
100	99,3	100,7	98,25	101,75			66,5	74	61,25	70	52	62	41,5	54	31	46												
110	109,3	110,7	108,25	111,75					71,25	80	62	72	51,5	64	41	56												
120	119,3	120,7	118,25	121,75					81,25	90	72	82	61,5	74	51	66	36,5	54										
130	129,2	130,8	128	132							76	86	65,5	78	55	70	40,5	58										
140	139,2	140,8	138	142							86	96	75,5	88	65	80	50,5	68	36	56								
150	149,2	150,8	148	152							96	106	85,5	98	75	90	60,5	78	46	66								
160	—	—	158	162							106	116	95,5	108	85	100	70,5	88	56	76	41,5	64						
180	—	—	178	182									115,5	128	105	120	90,5	108	76	96	61,5	84						
200	—	—	197,7	202,3									135,5	148	125	140	110,5	128	96	116	81,5	104	67	92				
220	—	—	217,7	222,3											132	147	117,5	135	103	123	88,5	111	74	99	55,5	83		
240	—	—	237,7	242,3											152	167	137,5	155	123	143	108,5	131	94	119	75,5	103		
260	—	—	257,4	262,6													157,5	175	143	163	128,5	151	114	139	95,5	123	77	107
280	—	—	277,4	282,6													177,5	195	163	183	148,5	171	134	159	115,5	143	97	127
300	—	—	297,4	302,6													197,5	215	183	203	168,5	191	154	179	135,5	163	117	147

For sizes above the solid, bold, stepped line, see ISO 8676.

Table 1 (*continued*)

Dimensions in millimetres

Thread ($d \times P$)					**M8 × 1**		**M10 × 1**		**M12 × 1,5**		**M16 × 1,5**		**M20 × 1,5**		**M24 × 2**		**M30 × 2**		**M36 × 3**		**M42 × 3**		**M48 × 3**		**M56 × 4**		**M64 × 4**	
	Product grade A		Product grade B		l_s and l_g[e]																							
	l				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	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.	min.	max.	min.	max.	min.	max.
320	—	—	317,15	322,85															203	223	188,5	211	174	199	155,5	183	137	167
340	—	—	337,15	342,85															223	243	208,5	231	194	219	175,5	203	157	187
360	—	—	357,15	362,85															243	263	228,5	251	214	239	195,5	223	177	207
380	—	—	377,15	382,85																	248,5	271	234	259	215,5	243	197	227
400	—	—	397,15	402,85																	268,5	291	254	279	235,5	263	217	247
420	—	—	416,85	423,15																	288,5	311	274	299	255,5	283	237	267
440	—	—	436,85	443,15																	308,5	331	294	319	275,5	303	257	287
460	—	—	456,85	463,15																			314	339	295,5	323	277	307
480	—	—	476,85	483,15																			334	259	315,5	343	297	327
500	—	—	496,85	503,15																					335,5	363	317	347

NOTE Preferred lengths are defined in terms of l_s and l_g:

— for product grade A, above the discontinuous, stepped line;

— for product grade B, below this stepped line.

[a] For $l_{nom} \leqslant 125$ mm.

[b] For 125 mm $< l_{nom} \leqslant 200$ mm.

[c] For $l_{nom} > 200$ mm.

[d] $k_{w,min} = 0{,}7\ k_{min}$.

[e] $l_{g,max} = l_{nom} - b$.

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

P is the pitch of the thread, specified in ISO 261.

Table 2 — Non-preferred threads

Dimensions in millimetres

Thread ($d \times P$)				**M10 × 1,25**	**M12 × 1,25**	**M14 × 1,5**	**M18 × 1,5**	**M20 × 2**	**M22 × 1,5**	**M27 × 2**	**M33 × 2**	**M39 × 3**	**M45 × 3**	**M52 × 4**	**M60 × 4**
b ref.			[a]	26	30	34	42	46	50	60	—	—	—	—	—
			[b]	32	36	40	48	52	56	66	78	90	102	116	—
			[c]	45	49	57	61	65	69	79	91	103	115	129	145
c			max.	0,60	0,60	0,60	0,8	0,8	0,8	0,8	0,8	1,0	1,0	1,0	1,0
			min.	0,15	0,15	0,15	0,2	0,2	0,2	0,2	0,2	0,3	0,3	0,3	0,3
d_a			max.	11,2	13,7	15,7	20,2	22,4	24,4	30,4	36,4	42,4	48,6	56,6	67
d_s			nom. = max.	10,00	12,00	14,00	18,00	20,00	22,00	27,00	33,00	39,00	45,00	52,00	60,00
	Product grade	A	min.	9,78	11,73	13,73	17,73	19,67	21,67	—	—	—	—	—	—
		B		9,64	11,57	13,54	17,57	19,48	21,48	26,48	32,38	38,38	44,38	51,26	59,26
d_w	Product grade	A	min.	14,63	16,63	19,37	25,34	28,19	31,71	—	—	—	—	—	—
		B		14,47	16,47	19,15	24,85	27,7	31,35	38	46,55	55,86	64,7	74,2	83,41
e	Product grade	A	min.	17,77	20,03	23,36	30,14	33,53	37,72	—	—	—	—	—	—
		B		17,59	19,85	22,78	29,56	32,95	37,29	45,2	55,37	66,44	76,95	88,25	99,21
l_f			max.	2	3	3	3	4	4	6	6	6	8	10	12
k			nom.	6,4	7,5	8,8	11,5	12,5	14	17	21	25	28	33	38
	Product grade A		max.	6,58	7,68	8,98	11,715	12,715	14,215	—	—	—	—	—	—
			min.	6,22	7,32	8,62	11,285	12,285	13,785	—	—	—	—	—	—
	Product grade B		max.	6,69	7,79	9,09	11,85	12,85	14,35	17,35	21,42	25,42	28,42	33,5	38,5
			min.	6,11	7,21	8,51	11,15	12,15	13,65	16,65	20,58	24,58	27,58	32,5	37,5
k_w[d]	Product grade	A	min.	4,35	5,12	6,03	7,9	8,6	9,65	—	—	—	—	—	—
		B		4,28	5,05	5,96	7,81	8,51	9,56	11,66	14,41	17,21	19,31	22,75	26,25
r			min.	0,4	0,6	0,6	0,6	0,8	0,8	1	1	1	1,2	1,6	2
s			nom. = max.	16,00	18,00	21,00	27,00	30,00	34,00	41	50	60,0	70,0	80,0	90,0
	Product grade	A	min.	15,73	17,73	20,67	26,67	29,67	33,38	—	—	—	—	—	—
		B		15,57	17,57	20,16	26,16	29,16	33	40	49	58,8	68,1	78,1	87,8

Table 2 (*continued*)

Dimensions in millimetres

Thread ($d \times P$)					**M10 × 1,25**		**M12 × 1,25**		**M14 × 1,5**		**M18 × 1,5**		**M20 × 2**		**M22 × 1,5**		**M27 × 2**		**M33 × 2**		**M39 × 3**		**M45 × 3**		**M52 × 4**		**M60 × 4**	
	Product grade				l_s and l_g[e]																							
	A		B																									
	l				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	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.	min.	max.	min.	max.	min.	max.
45	44,5	45,5	—	—	11,5	19																						
50	49,5	50,5	—	—	16,5	24	11,25	20																				
55	54,4	55,6	—	—	21,5	29	16,25	25																				
60	59,4	60,6	—	—	26,5	34	21,25	30	16	26																		
65	64,4	65,6	—	—	31,5	39	26,25	35	21	31																		
70	69,4	70,6	—	—	36,5	44	31,25	40	26	36	15,5	28																
80	79,4	80,6	—	—	46,5	54	41,25	50	36	46	25,5	38	21,5	34														
90	89,3	90,7	—	—	56,5	64	51,25	60	46	56	35,5	48	31,5	44	27,5	40												
100	99,3	100,7	—	—	66,5	74	61,25	70	56	66	45,5	58	41,5	54	37,5	50												
110	109,3	110,7	108,25	111,75			71,25	80	66	76	55,5	68	51,5	64	47,5	60	35	50										
120	119,3	120,7	118,25	121,75			81,25	90	76	86	65,5	78	61,5	74	57,5	70	45	60										
130	129,2	130,8	128	132					80	90	69,5	82	65,5	78	61,5	74	49	64	34,5	52								
140	139,2	140,8	138	142					90	100	79,5	92	75,5	88	71,5	84	59	74	44,5	62								
150	149,2	150,8	148	152							89,5	102	85,5	98	81,5	94	69	84	54,5	72	40	60						
160	—	—	158	162							99,5	112	95,5	108	91,5	104	79	94	64,5	82	50	70						
180	—	—	178	182							119,5	132	115,5	128	111,5	124	99	114	84,5	102	70	90	55,5	78				
200	—	—	197,7	202,3									135,5	148	131,5	144	119	134	104,5	122	90	110	75,5	98	59	84		
220	—	—	217,7	222,3											138,5	151	126	141	111,5	129	97	117	82,5	105	66	91		
240	—	—	237,7	242,3													146	161	131,5	149	117	137	102,5	125	86	111	67,5	95
260	—	—	257,4	262,6													166	181	151,5	169	137	157	122,5	145	106	131	87,5	115
280	—	—	277,4	282,6															171,5	189	157	177	142,5	165	126	151	107,5	135
300	—	—	297,4	302,6															191,5	209	177	197	162,5	185	146	171	127,5	155
320	—	—	317,15	322,85															211,5	229	197	217	182,5	205	166	191	147,5	175
340	—	—	337,15	342,85																	217	237	202,5	225	186	211	167,5	195

For sizes above the solid, bold, stepped line, see ISO 8676.

Table 2 (*continued*)

Dimensions in millimetres

Thread ($d \times P$)					**M10 × 1,25**		**M12 × 1,25**		**M14 × 1,5**		**M18 × 1,5**		**M20 × 2**		**M22 × 1,5**		**M27 × 2**		**M33 × 2**		**M39 × 3**		**M45 × 3**		**M52 × 4**		**M60 × 4**	
	Product grade				l_s and l_g[e]																							
	A		B																									
	l				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	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.	min.	max.	min.	max.	min.	max.
360	—	—	357,15	362,85																	237	257	222,5	245	206	231	187,5	215
380	—	—	377,15	382,85																	257	277	242,5	265	226	251	207,5	235
400	—	—	397,15	402,85																			262,5	285	246	271	227,5	255
420	—	—	416,85	423,15																			282,5	305	266	291	247,5	275
440	—	—	436,85	443,15																			302,5	325	286	311	267,5	295
460	—	—	456,85	463,15																					306	331	287,5	315
480	—	—	476,85	483,15																					326	351	307,5	335
500	—	—	496,85	503,15																							327,5	355

NOTE Preferred lengths are defined in terms of l_s and l_g:

— for product grade A, above the discontinuous, stepped line;

— for product grade B, below this stepped line.

[a] For $l_{nom} \leqslant 125$ mm.

[b] For 125 mm $< l_{nom} \leqslant 200$ mm.

[c] For $l_{nom} > 200$ mm.

[d] $k_{w,min} = 0{,}7\ k_{min}$.

[e] $l_{g,max} = l_{nom} - b$.

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

P is the pitch of the thread, specified in ISO 261.