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 approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4016 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

This second edition cancels and replaces the first edition (ISO 4016 : 1979), to which the following major alterations have been made:

a) the range of threads has been extended to be M5 to M64;

b) the range of nominal lengths has been extended up to 500 mm;

c) non-preferred threads have been entered;

d) in addition to the property classes 4.6 and 4.8, property class 3.6 has been entered.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Hexagon head bolts — Product grade C

0 Introduction

This International Standard is part of the complete ISO product standard series on hexagon drive fasteners. The series comprises:

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 8673, ISO 8674 and ISO 8675);

d) hexagon flanged bolts (ISO 4162 and ISO 8102);

e) hexagon flanged screws;[1]

f) hexagon flanged nuts (ISO 4161, ISO 7043 and ISO 7044);

g) structural bolting (ISO 4775, ISO 7411 to ISO 7414 and ISO 7417).

1 Scope and field of application

This International Standard gives specifications for 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 should be selected from existing International Standards, for example ISO 261, ISO 888, ISO 898-1, ISO 965-2 and ISO 4759-1.

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[1] These will form the subject of future International Standards.

2 References

ISO 225, *Fasteners — Bolts, screws 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 and screws.*

ISO 898-1, *Mechanical properties of fasteners — Part 1: Bolts, screws and studs.*

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

ISO 3269, *Fasteners — Acceptance inspection.*

ISO 4042, *Threaded components — Electroplated coatings.* 1)

ISO 4759-1, *Tolerances for fasteners — Part 1: Bolts, screws and nuts with thread diameters* ⩾ 1,6 *and* ⩽ 150 mm *and product grades A, B and C.*

ISO 8992, *Fasteners — General requirements for bolts, screws, studs and nuts.* 1)

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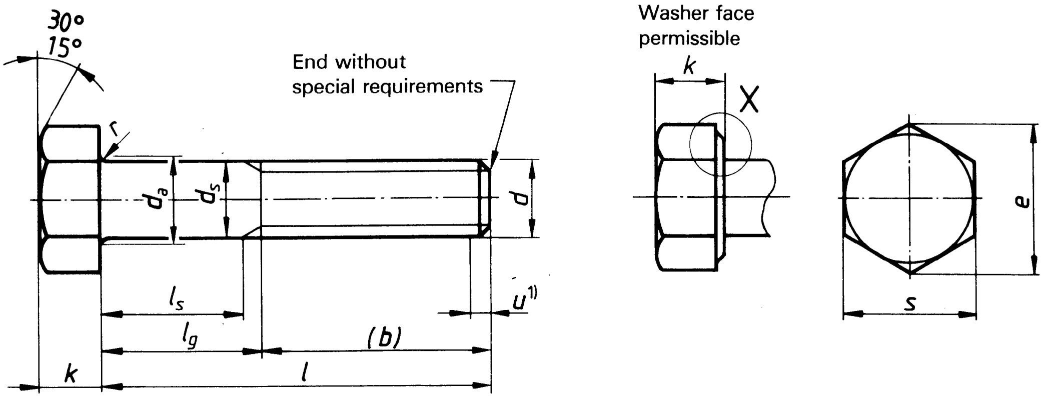
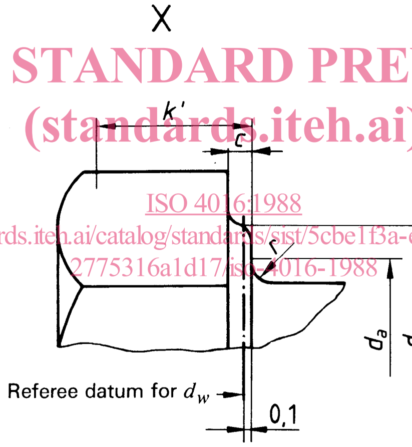
1) At present at the stage of draft.

3 Dimensions

NOTE — Symbols and designations of dimensions are specified in ISO 225.

Dimensions in millimetres





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1) Incomplete thread $u \leqslant 2\,P$.

Table 1 — Preferred threads

Dimensions in millimetres

Thread (d)		M5	M6	M8	M10	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64
P 1)		0,8	1	1,25	1,5	1,75	2	2,5	3	3,5	4	4,5	5	5,5	6
b ref	2)	16	18	22	26	30	38	46	54	66	—	—	—	—	—
	3)	—	—	—	—	—	44	52	60	72	84	96	108	—	—
	4)	—	—	—	—	—	—	—	73	85	97	109	121	137	153
c	max.	0,5	0,5	0,6	0,6	0,6	0,8	0,8	0,8	0,8	0,8	1	1	1	1
d_a	max.	6	7,2	10,2	12,2	14,7	18,7	24,4	28,4	35,4	42,4	48,6	56,6	67	75
d_s	max.	5,48	6,48	8,58	10,58	12,7	16,7	20,84	24,84	30,84	37	43	49	57,2	65,2
	min.	4,52	5,52	7,42	9,42	11,3	15,3	19,16	23,16	29,16	35	41	47	54,8	62,8
d_w	min.	6,74	8,74	11,47	14,47	16,47	22	27,7	33,25	42,75	51,11	59,95	69,45	78,66	88,16
e	min.	8,63	10,89	14,2	17,59	19,85	26,17	32,95	39,55	50,85	60,79	71,3	82,6	93,56	104,86
k	nom.	3,5	4	5,3	6,4	7,5	10	12,5	15	18,7	22,5	26	30	35	40
	min.	3,125	3,625	4,925	5,95	7,05	9,25	11,6	14,1	17,65	21,45	24,95	28,95	33,75	38,75
	max.	3,875	4,375	5,675	6,85	7,95	10,75	13,4	15,9	19,75	23,55	27,05	31,05	36,25	41,25
k' 5)	min.	2,19	2,54	3,45	4,17	4,94	6,48	8,12	9,87	12,36	15,02	17,47	20,27	23,63	27,13
r	min.	0,2	0,25	0,4	0,4	0,6	0,6	0,8	0,8	1	1	1,2	1,6	2	2
s	nom. = max.	8	10	13	16	18	24	30	36	46	55	65	75	85	95
	min.	7,64	9,64	12,57	15,57	17,57	23,16	29,16	35	45	53,8	63,1	73,1	82,8	92,8

l			l_s and l_g 6), 7)																											
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.	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.
25	23,95	26,05	5	9																										
30	28,95	31,05	10	14	7	12																								
35	33,75	36,25	15	19	12	17																								
40	38,75	41,25	20	24	17	22	11,75	18																						
45	43,75	46,25	25	29	22	27	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					36,75	43	31,5	39	26,25	35	17	27																
70	68,5	71,5					41,75	48	36,5	44	31,25	40	22	32																
80	78,5	81,5					51,75	58	46,5	54	41,25	50	32	42	21,5	34														
90	88,25	91,75							56,5	64	51,25	60	42	52	31,5	44														
100	98,25	101,75							66,5	74	61,25	70	52	62	41,5	54	31	46												
110	108,25	111,75									71,25	80	62	72	51,5	64	41	56												
120	118,25	121,75									81,25	90	72	82	61,5	74	51	66	36,5	54										

For sizes above the stepped line, marked thus ———, ISO 4018 is recommended.

130	128	132											76	86	65,5	78	55	70	40,5	58										
140	138	142											86	96	75,5	88	65	80	50,5	68	36	56								
150	148	152											96	106	85,5	98	75	90	60,5	78	46	66								
160	156	164											106	116	95,5	108	85	100	70,5	88	56	76								
180	176	184													115,5	128	105	120	90,5	108	76	96	61,5	84						
200	195,4	204,6													135,5	148	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

1) P = pitch of the thread.

2) For lengths $l_{nom} \leqslant 125$ mm.

3) For lengths 125 mm $< l_{nom} \leqslant 200$ mm.

4) For lengths $l_{nom} > 200$ mm.

5) $k'_{min} = 0,7\ k_{min}$

6) $l_{g\,max} = l_{nom} - b$
$l_{s\,min} = l_{g\,max} - 5\,P$

7) l_g is the minimum grip length.

NOTE — The popular lengths are marked by the shank lengths.

Table 2 — Non-preferred threads

Dimensions in millimetres

Thread (d)		M14	M18	M22	M27	M33	M39	M45	M52	M60
P 1)		2	2,5	2,5	3	3,5	4	4,5	5	5,5
b ref	2)	34	42	50	60	—	—	—	—	—
	3)	40	48	56	66	78	90	102	116	—
	4)	—	—	69	79	91	103	115	129	145
c	max.	0,6	0,8	0,8	0,8	0,8	1	1	1	1
d_a	max.	16,7	21,2	26,4	32,4	38,4	45,4	52,6	62,6	71
d_s	max.	14,7	18,7	22,84	27,84	34	40	46	53,2	61,2
	min.	13,3	17,3	21,16	26,16	32	38	44	50,8	58,8
d_w	min.	19,15	24,85	31,35	38	46,55	55,86	64,7	74,2	83,41
e	min.	22,78	29,56	37,29	45,2	55,37	66,44	76,95	88,25	99,21
k	nom.	8,8	11,5	14	17	21	25	28	33	38
	min.	8,35	10,6	13,1	16,1	19,95	23,95	26,95	31,75	36,75
	max.	9,25	12,4	14,9	17,9	22,05	26,05	29,05	34,25	39,25
k' 5)	min.	5,85	7,42	9,17	11,27	13,97	16,77	18,87	22,23	25,73
r	min.	0,6	0,6	0,8	1	1	1	1,2	1,6	2
s	nom. = max.	21	27	34	41	50	60	70	80	90
	min.	20,16	26,16	33	40	49	58,8	68,1	78,1	87,8

l			l_s and l_g 6), 7)																	
			M14		M18		M22		M27		M33		M39		M45		M52		M60	
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.	l_s min.	l_g max.
60	58,5	61,5	16	26																
65	63,5	66,5	21	31																
70	68,5	71,5	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	40	60						
160	156	164			99,5	112	91,5	104	79	94	64,5	82	50	70						

For sizes above the stepped line, marked thus ———, ISO 4018 is recommended.

180	176	184			119,5	132	111,5	124	99	114	84,5	102	70	90	55,5	78				
200	195,4	204,6					131,5	144	119	134	104,5	122	90	110	75,5	98	59	84		
220	215,4	224,6					138,5	151	126	141	111,5	129	97	117	82,5	105	66	91		
240	235,4	244,6							146	161	131,5	149	117	137	102,5	125	86	111	67,5	95
260	254,8	265,2							166	181	151,5	167	137	157	122,5	145	106	131	87,5	115
280	274,8	285,2									171,5	189	157	177	142,5	165	126	151	107,5	135
300	294,8	305,2									191,5	209	177	197	162,5	185	146	171	127,5	155
320	314,3	325,7									211,5	229	197	217	182,5	205	166	191	147,5	175
340	334,3	345,7											217	237	202,5	225	186	211	167,5	195
360	354,3	365,7											237	257	222,5	245	206	231	187,5	215
380	374,3	385,7											257	277	242,5	265	226	251	207,5	235
400	394,3	405,7											277	297	262,5	285	246	271	227,5	255
420	413,7	426,3													282,5	305	266	291	247,5	275
440	433,7	446,3													302,5	325	286	311	267,5	295
460	453,7	466,3															306	331	287,5	315
480	473,7	486,3															326	351	307,5	335
500	493,7	506,3															346	371	327,5	355

1) P = pitch of the thread.

2) For lengths $l_{\text{nom}} \leqslant 125$ mm.

3) For lengths 125 mm $< l_{\text{nom}} \leqslant 200$ mm.

4) For lengths $l_{\text{nom}} > 200$ mm.

5) $k'_{\text{min}} = 0{,}7\ k_{\text{min}}$

6) $l_{g\,\text{max}} = l_{\text{nom}} - b$
$l_{s\,\text{min}} = l_{g\,\text{max}} - 5\,P$

7) l_g is the minimum grip length.

NOTE — The popular lengths are marked by the shank lengths.