INTERNATIONAL STANDARD

**ISO
4014**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Hexagon head bolts — Product grades A and B

Boulons à tête hexagonale — Grades A et B

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.

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 4014 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

This second edition cancels and replaces the first edition (ISO 4014 : 1979), to which the following major alterations have been made :

a) the range of threads has been extended to be M1,6 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 property class 8.8, the property classes 5.6 and 10.9 have been entered ;

e) for stainless steel bolts M20 up to M39, property class A2-50 has been specified.

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.

Hexagon head bolts — Product grades A and B

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 M1,6 up to and including M64, of product grade A for threads M1,6 to M24 and nominal lengths up to and including 10 d or 150 mm, whichever is shorter and product grade B for threads over M24 or nominal lengths over 10 d or 150 mm, whichever is shorter.

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 and ISO 4759-1.

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1)   These will form the subjects 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 3506, *Corrosion-resistant stainless steel fasteners — Specifications.*

ISO 4042, *Threaded components — Electroplated coatings.* [1]

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

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

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

ISO 6157-3, *Fasteners — Surface discontinuities — Part 3: Bolts, screws and studs for special requirements.* [1]

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

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

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1) At present at the stage of draft.

3 Dimensions

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

Dimension in millimetres

30°
15°

Point must be chamfered or for threads ≤ M4
may be as-rolled (sheared end)
(see ISO 4753)

X

d_s d

l_s $u^{1)}$
l_g (b)
k l

e s

X

k' l_f
c
r
Maximum underhead fillet
r

d_a d_w

Referee datum for d_w 0,1
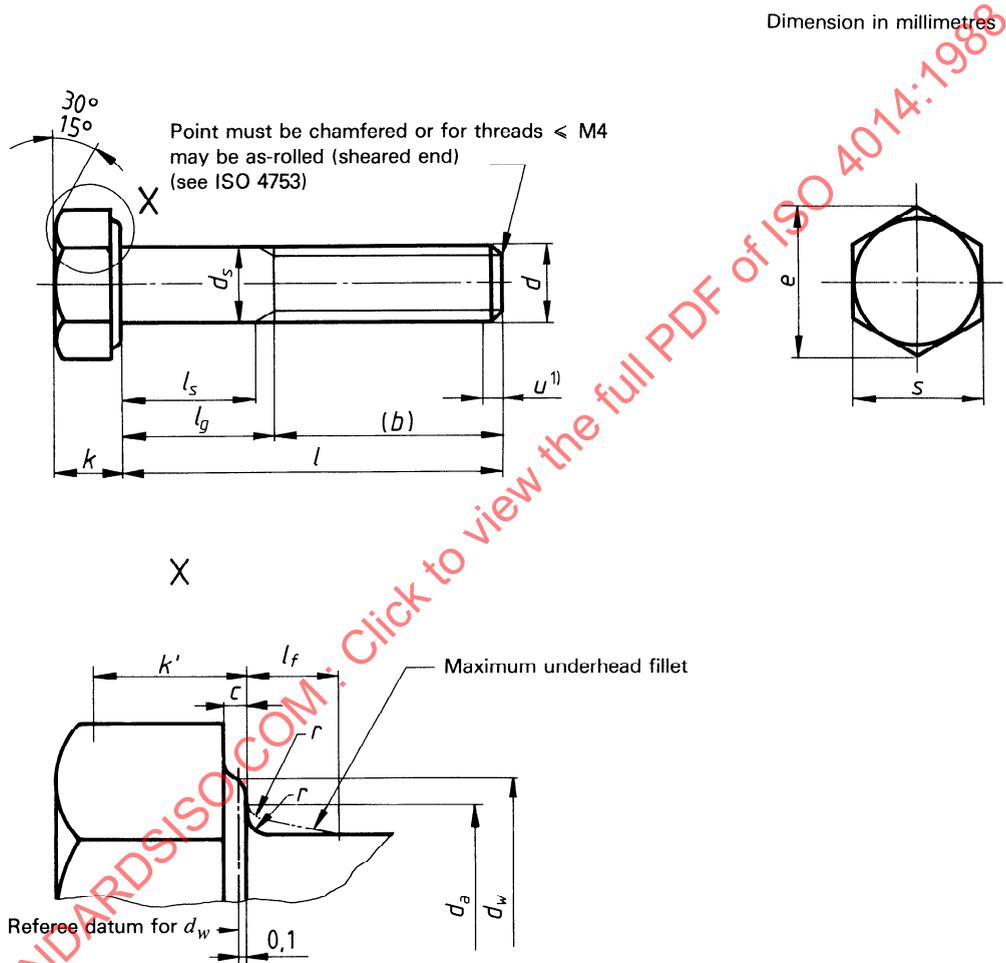
1) Incomplete thread $u \leqslant 2\,P$

Table 1 — Preferred threads

Dimensions in millimetres

Thread, d		M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64
P [1]		0,35	0,4	0,45	0,5	0,7	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]	9	10	11	12	14	16	18	22	26	30	38	46	54	66	78	90	102	118	134
	[3]	—	—	—	—	—	—	—	—	—	—	44	52	60	72	84	96	108	124	140
	[4]	—	—	—	—	—	—	—	—	—	—	—	—	73	85	97	109	121	137	153
c	min.	0,1	0,1	0,1	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,2	0,2	0,2	0,2	0,2	0,3	0,3	0,3	0,3
	max.	0,25	0,25	0,25	0,4	0,4	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.	2	2,6	3,1	3,6	4,7	5,7	6,8	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.	1,6	2	2,5	3	4	5	6	8	10	12	16	20	24	30	36	42	48	56	64
	Product grade A/B min.	1,46	1,86	2,36	2,86	3,82	4,82	5,82	7,78	9,78	11,73	15,73 / 15,57	19,67 / 19,48	23,67 / 23,48	29,48	35,38	41,38	47,38	55,26	63,26
d_w	Product grade A/B min.	2,27	3,07	4,07	4,57	5,88	6,88	8,88	11,63	14,63	16,63	22,49 / 22	28,19 / 27,7	33,61 / 33,25	42,75	51,11	59,95	69,45	78,66	88,16
e	Product grade A/B min.	3,41	4,32	5,45	6,01	7,66	8,79	11,05	14,38	17,77	20,03	26,75 / 26,17	33,53 / 32,95	39,98 / 39,55	50,85	60,79	71,3	82,6	93,56	104,86
l_f	max.	0,6	0,8	1	1	1,2	1,2	1,4	2	2	3	3	4	4	6	6	8	10	12	13
k	nom.	1,1	1,4	1,7	2	2,8	3,5	4	5,3	6,4	7,5	10	12,5	15	18,7	22,5	26	30	35	40
	Product grade A/B min.	0,975	1,275	1,575	1,875	2,675	3,35	3,85	5,15	6,22	7,32	9,82 / 9,71	12,285 / 12,15	14,785 / 14,65	18,28	22,08	25,58	29,58	34,5	39,5
	Product grade A/B max.	1,225	1,525	1,825	2,125	2,925	3,65	4,15	5,45	6,58	7,68	10,18 / 10,29	12,715 / 12,85	15,215 / 15,35	19,12	22,92	26,42	30,42	35,5	40,5
k' [5]	Product grade A/B min.	0,68	0,89	1,1	1,31	1,87	2,35	2,7	3,61	4,35	5,12	6,87 / 6,8	8,6 / 8,51	10,35 / 10,26	12,8	15,46	17,91	20,71	24,15	27,65
r	min.	0,1	0,1	0,1	0,1	0,2	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.	3,2	4	5	5,5	7	8	10	13	16	18	24	30	36	46	55	65	75	85	95
	Product grade A/B	3,02	3,82	4,82	5,32	6,78	7,78	9,78	12,73	15,73	17,73	23,67 / 23,16	29,67 / 29,16	35,38 / 35	45	53,8	63,1	73,1	82,8	92,8

l_s and l_g [6],[7]

Each thread cell below contains l_s min. / l_g max.

l nom.	min.	max.	M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10	M12	M16
12	11,65	12,35	1,25 / 3										
16	15,65	16,35	5,25 / 7	4 / 6	2,75 / 5	1,5 / 4							
20	19,58	20,42		8 / 10	6,75 / 9	5,5 / 8	2,5 / 6						
25	24,58	25,42			11,75 / 14	10,5 / 13	7,5 / 11	5 / 9	2 / 7				
30	29,58	30,42				15,5 / 18	12,5 / 16	10 / 14	7 / 12	1,75 / 8			
35	34,5	35,5					17,5 / 21	15 / 19	12 / 17	6,75 / 13	1,5 / 9		
40	39,5	40,5					22,5 / 26	20 / 24	17 / 22	11,75 / 18	6,5 / 14	1,25 / 10	
45	44,5	45,5						25 / 29	22 / 27	16,75 / 23	11,5 / 19	6,25 / 15	
50	49,5	50,5						30 / 34	27 / 32	21,75 / 28	16,5 / 24	11,25 / 20	2 / 12

For sizes above the stepped line, marked thus ——————, ISO 4017 is recommended.

Dimensions l_s (min) and l_g (max) — grip lengths.

(Thread-size column headings are not printed on this page; reading left→right the column pairs correspond to increasing thread diameters.)

l_{nom}	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
55	16,25	25	7	17																
60	21,25	30	12	22																
65	26,25	35	17	27																
70	31,25	40	22	32	11,5	24														
80	41,25	50	32	42	21,5	34														
90	51,25	60	42	52	31,5	44	21	36												
100	61,25	70	52	62	41,5	54	31	46												
110	71,25	80	62	72	51,5	64	41	56	26,5	44										
120	81,25	90	72	82	61,5	74	51	66	36,5	54										
130	85,25	94	76	86	65,5	78	55	70	40,5	58	26	46								
140	95,25	104	86	96	75,5	88	65	80	50,5	68	36	56								
150	105,25	114	96	106	85,5	98	75	90	60,5	78	46	66								
160			106	116	95,5	108	85	100	70,5	88	56	76	41,5	64						
180			126	136	115,5	128	105	120	90,5	108	76	96	61,5	84	47	72	28,5	56	14	44
200			146	156	135,5	148	125	140	110,5	128	96	116	81,5	104	67	92	48,5	76	34	64
220							132	147	117,5	135	103	123	88,5	111	74	99	55,5	83	37	67
240							152	167	137,5	155	123	143	108,5	131	94	119	75,5	103	57	87
260									157,5	175	143	163	128,5	151	114	139	95,5	123	77	107
280									177,5	195	163	183	148,5	171	134	159	115,5	143	97	127
300									197,5	215	183	203	168,5	191	154	179	135,5	163	117	147
320											203	223	188,5	211	174	199	155,5	183	137	167
340											223	243	208,5	231	194	219	175,5	203	157	187
360													228,5	251	214	239	195,5	223	177	207
380													248,5	271	234	259	215,5	243	197	227
400															254	279	235,5	263	217	247
420															274	299	255,5	283	237	267
440															294	319	275,5	303	257	287
460																	295,5	323	277	307
480																	315,5	343	297	327
500																	335,5	363	317	347

Length tolerances:

l_{nom}	product grade A		product grade B	
	min	max	min	max
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	108,25	111,75
120	119,3	120,7	118,25	121,75
130	129,2	130,8	128	132
140	139,2	140,8	138	142
150	149,2	150,8	148	152
160	—	—	158	162
180	—	—	178	182
200	—	—	197,7	202,3
220	—	—	217,7	222,3
240	—	—	237,7	242,3
260	—	—	257,4	262,6
280	—	—	277,4	282,6
300	—	—	297,4	302,6
320	—	—	317,15	322,85
340	—	—	337,15	342,85
360	—	—	357,15	362,85
380	—	—	377,15	382,85
400	—	—	397,15	402,85
420	—	—	416,85	423,15
440	—	—	436,85	443,15
460	—	—	456,85	463,15
480	—	—	476,85	483,15
500	—	—	496,85	503,15

1) P = pitch of 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 defined in terms of lengths l_s and l_g:
   — product grade A above the stepped line, marked thus — — —
   — product grade B below this stepped line.

Table 2 — Non-preferred threads

Dimensions in millimetres

Thread, d		M3.5	M14	M18	M22	M27	M33	M39	M45	M52	M60
P [1]		0,6	2	2,5	2,5	3	3,5	4	4,5	5	5,5
b ref.	[2]	13	34	42	50	60	78	90	102	116	—
	[3]	—	40	48	56	66	91	103	115	129	145
	[4]	—	—	—	69	79	—	—	—	—	—
c	min.	0,15	0,15	0,2	0,2	0,2	0,2	0,3	0,3	0,3	0,3
	max.	0,4	0,6	0,8	0,8	0,8	0,8	1	1	1	1
d_a	max.	4,1	15,7	20,2	24,4	30,4	36,4	42,4	48,6	56,6	67
d_s	nom. = max.	3,5	14	18	22	27	33	39	46	52	60
	Product grade A min.	3,32	13,73	17,73	21,67	—	—	—	—	—	—
	Product grade B min.	—	—	17,57	21,48	26,48	32,38	38,38	44,38	51,26	59,26
d_w	Product grade A min.	5,07	19,37	25,34	31,71	—	—	—	—	—	—
	Product grade B min.	—	—	24,85	31,35	38	46,55	55,86	64,7	74,2	83,41
e	Product grade A min.	6,58	23,36	30,14	37,72	—	—	—	—	—	—
	Product grade B min.	—	—	29,56	37,29	45,2	55,37	66,44	76,95	88,25	99,21
l_f	max.	1	3	3	4	6	6	6	8	10	12
k	nom.	2,4	8,8	11,5	14	17	21	25	28	33	38
	Product grade A min.	2,275	8,62	11,285	13,785	—	—	—	—	—	—
	Product grade A max.	2,525	8,98	11,715	14,215	—	—	—	—	—	—
	Product grade B min.	—	—	11,15	13,65	16,65	20,58	24,58	27,58	32,5	37,5
	Product grade B max.	—	—	11,85	14,35	17,35	21,42	25,42	28,42	33,5	38,5
k' [5]	Product grade A min.	1,59	6,03	7,9	9,65	11,66	14,41	17,21	19,31	22,75	26,25
	Product grade B min.	—	—	7,81	9,56	—	—	—	—	—	—
r	min.	0,1	0,6	0,6	0,8	1	1	1	1,2	1,6	2
s	nom. = max.	6	21	27	34	41	50	60	70	80	90
	Product grade A min.	5,82	20,67	26,67	33,38	—	—	—	—	—	—
	Product grade B min.	—	—	26,16	33	40	49	58,8	68,1	78,1	87,8

l_s and l_g [6],[7]

l			l_s min.	l_g max.
Product grade	A	B	M3.5	
nom.	min.	max.	min.	max.
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	—	—

l_s min. / l_g max. — M3.5: 4 / 7; 9 / 12; 14 / 17; 19 / 22. M14: 16 / 26.

For sizes above the stepped line, marked thus ——— ISO 4017 is recommended

Dimensions in millimetres

l_{nom}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
65																	31	21	64,4	65,6	—	—
70															28	15,5	36	26	69,4	70,6	—	—
80															38	25,5	46	36	79,4	80,6	—	—
90													40	27,5	48	35,5	56	46	89,3	90,7	—	—
100											40	25	50	37,5	58	45,5	66	56	99,3	100,7	98,25	101,75
110											50	35	60	47,5	68	55,5	76	66	109,3	110,7	108,25	111,75
120											60	45	70	57,5	78	65,5	86	76	119,3	120,7	118,25	121,75
130									52	34,5	64	49	74	61,5	82	69,5	90	80	129,2	130,8	128	132
140									62	44,5	74	59	84	71,5	92	79,5	100	90	139,2	140,8	138	142
150							60	40	72	54,5	84	69	94	81,5	102	89,5			149,2	150,8	148	152
160							70	50	82	64,5	94	79	104	91,5	112	99,5					158	162
180							90	70	102	84,5	114	99	124	111,5	132	119,5					178	182
200				59	78	55,5	110	90	122	104,5	134	119	144	131,5							197,7	202,3
220			84	66	105	82,5	117	97	129	111,5	161	126	151	138,5							217,7	222,3
240	95	67,5	91	86	125	102,5	137	117	149	131,5	181	146									237,7	242,3
260	115	87,5	111	106	145	122,5	157	137	169	151,5		166									257,4	262,6
280	135	107,5	131	126	165	142,5	177	157	189	171,5											277,4	282,6
300	155	127,5	151	146	185	162,5	197	177	209	191,5											297,4	302,6
320	175	147,5	171	166	205	182,5	217	197	229	211,5											317,15	322,85
340	195	167,5	191	186	225	202,5	237	217													337,15	342,85
360	215	187,5	211	206	245	222,5	257	237													357,15	362,85
380	235	207,5	231	226	265	242,5	277	257													377,15	382,85
400	255	227,5	251	246	285	262,5															397,15	402,85
420	275	247,5	271	266	305	282,5															416,85	423,15
440	295	267,5	291	286	325	302,5															436,85	443,15
460	315	287,5	311	306																	456,85	463,15
480	335	307,5	331	326																	476,85	483,15
500	355	327,5	351																		496,85	503,15

1) P = pitch of thread.

2) For lengths l_{nom} < 125 mm.

3) For lengths 125 mm < l_{nom} < 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 defined in terms of lengths l_s and l_g:
— product grade A above the stepped line, marked thus ———
— product grade B below this stepped line.