IS 1364-1 (2002): Hexagon Head Bolts, Screws and Nuts of Product Grades A and B, Part 1: Hexagon Head Bolts (Size Range M 1.6 to M 64) [PGD 31: Bolts, Nuts and Fasteners Accessories]

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IS 1364 (Part 1) : 2002
ISO 4014 : 1999

भारतीय मानक

उत्पाद ग्रेड ए और बी के लिए षटकोणीय शीर्ष वाले काबले, पेंच और ढिबरियाँ

भाग 1 षटकोणीय शीर्ष वाले काबले (साइज रेंज एम 1.6 से एम 64 तक)

(चौथा पुनरीक्षण)

Indian Standard

HEXAGON HEAD BOLTS, SCREWS AND NUTS OF PRODUCT GRADES A AND B

PART 1 HEXAGON HEAD BOLTS (SIZE RANGE M 1.6 TO M 64)

(Fourth Revision)

ICS 21.060.10

BUREAU OF INDIAN STANDARDS
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November 2002

Price Group 6

Bolts, Nuts and Fasteners Accessories Sectional Committee, BP 33

NATIONAL FOREWORD

This Indian Standard (Part 1) (Fourth Revision) which is identical with ISO 4014:1999 'Hexagon head bolts—Product grades A and B' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Bolts, Nuts and Fasteners Accessories Sectional Committee and approval of the Basic and Production Engineering Division Council.

IS 1364 was originally published in 1960 and first revised in 1967. Subsequent to the publication of 1967 edition, many changes had been agreed upon at international level which have been reflected in IS 1367 series of standards covering 'Technical supply conditions for threaded steel fasteners'. Accordingly, second revision was published in 1983 splitting the standard into 5 parts covering hexagon head bolts, hexagon head screws, hexagon nuts, hexagon thin nuts (chamfered) and hexagon thin nuts (unchamfered).

The third revision of this standard was published in 1992 by adoption of ISO 4014:1988. This fourth revision has been prepared by adoption of latest version of ISO 4014 published in 1999. The remaining parts of the standard, that is, Part 2, Part 3, Part 4 and Part 5 have also been revised by adopting the corresponding latest editions of ISO Standards published in 1999.

The Committee also decided to publish Indian Standard on 'Hexagon nuts, style 2—Product grades A and B' as Part 6 of IS 1364. The Part 6 will supersede IS/ISO 4033:1979 on its publication.

In 1967 version of this standard, the widths across flat dimensions for M10 and M12 size fasteners were specified as 17 mm and 19 mm respectively. However, in the 1983 version, these widths across flat dimensions were brought in line with ISO 4014:1979 and specified as 16 mm and 18 mm respectively for M10 and M12 size fasteners. Recognizing the difficulty of immediate changeover to new width across flat dimensions, the Committee had decided to permit width across flat dimensions as per 1967 version, that is, 17 mm and 19 mm for M10 and M12 size fasteners till 31 December 1994. Now it is expected that the entire fastener industry would have switched over to new width across flat dimensions and from 1 January 1995, no old width across flat dimensions shall be permitted.

The text of ISO Standard has been approved as suitable for publication as Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is drawn especially to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 225 : 1983	IS 8536:1987 Fasteners—Bolts, screws, studs and nuts—Symbols and designation of dimensions (*first revision*)	Identical
ISO 724 : 1993	IS 4218 (Part 3):1999 ISO General purpose metric screw threads: Part 3 Basic dimensions (*second revision*)	do

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 888 : 1976	IS 4206:1987 Dimensions for nominal lengths and thread lengths for bolts, screws and studs (*first revision*)	Identical
ISO 898-1 : 1999	IS 1367(Part 3):2002 Technical supply conditions for threaded steel fasteners: Part 3 Mechanical properties of fasteners made of carbon steel and alloy steel—Bolts, screws and studs (*fourth revision*)	do
ISO 965-1 : 1998	IS 14962(Part 1): 2001 ISO General purpose metric screw threads—Tolerances: Part 1 Principles and basic data	do
ISO 3269:[1]	IS 1367 (Part 17):1996[2] Industrial fasteners—Threaded steel fasteners—Technical supply conditions : Part 17 Inspection, sampling and acceptance procedure (*third revision*)	do
ISO 3506-1:1997	IS 1367 (Part 14/Sec 1):2002 Technical supply conditions for threaded steel fasteners: Part 14 Mechanical properties of corrosion resistant stainless-steel fasteners, Section 1 Bolts, screws and studs (*third revision*)	do
ISO 4017:1999	IS 1364(Part 2):2002 Hexagon head bolts, screws and nuts of product grades A & B: Part 2 Hexagon head screws (size range (M 1.6 to M 64) (*fourth revision*)	do
ISO 4042:1999	IS 1367 (Part 11):2002 Technical supply conditions for threaded steel fasteners: Part 11 Electroplated coatings (*third revision*)	do
ISO 4759-1:—[3]	IS 1367 (Part 2):2002 Technical supply conditions for threaded steel fasteners: Part 2 Product grades and tolerances (*third revision*)	do
ISO 6157-1: 1988	1367(Part 9/Sec 1):1993 Technical supply conditions for threaded steel fasteners : Part 9 Surface discontinuities, Section 1 Bolts, screws and studs for general applications (*third revision*)	do
ISO 8992:1986	IS 1367 (Part 1):2002 Technical supply conditions for threaded steel fasteners: Part 1 Introduction and general information (*third revision*)	do

[1] To be published revision of (ISO 3269:1988).
[2] Identical with ISO 3269:1988.
[3] Since published in 2002.

The concerned Technical Committee has reviewed the provisions of the following ISO Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

ISO Standard	*Title*
ISO 8839:1986	Mechanical properties of fasteners — Bolts, screws, studs and nuts made of non-ferrous metals
ISO 16048:[1)]	Passivation of corrosion-resistant stainless steel fasteners — Passivation process and acceptance criteria

ALTERATION

In clause **5** the designation of hexagon head bolt shall be read as:

'Hexagon head bolt – IS 1364(Part 1)/ISO 4014 – M12 x 80—8.8' *in place of* **'Hexagon head bolt–ISO 4014–M12 x 80–8.8'**

CORRIGENDUM

(*Page* 4, *Table* 1, *col* 2, *row* 12)—Against dimension d_w , for Product grade A, size M 1.6 read '2.42' *in place of* ` 2.27'.

(*Page* 4, *Table* 1, *col* 7, *row* 20 & 21)—Against dimension k , for Product grade B, size M 5 read '3.74 max and 3.26 min' *in place of* ` 3.26 max and 2.35 min' respectively.

(*Page* 4, *Table* 1, *col* 7, *row* 22)—Against dimensions $k_w{}^e$, for Product grade A, size M 5 read '2.35' *in place of* '3.74'.

(*Page* 5, *Table* 1, *col* 6)—Read 'l_s min' *in place of* 'l_g min.'

(*Page* 9, *Table* 2, *col* 6,)—Read l_s min as '151.5' *in place of* '151.6' for nominal length 260.

PACKAGING

The packaging of hexagon head bolts shall be in accordance with IS 1367(Part 18):1996 'Industrial fasteners — Threaded steel fasteners — Technical supply conditions :Part 18 Packaging (*third revision*).

BIS CERTIFICATION MARKING

Details available with the Bureau of Indian Standards.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

[1)] To be published.
[2)] Since published in 2000.

Indian Standard

HEXAGON HEAD BOLTS, SCREWS AND NUTS OF PRODUCT GRADES A AND B

PART 1 HEXAGON HEAD BOLTS (SIZE RANGE M 1.6 TO M 64)

(Fourth Revision)

1 Scope

This International Standard specifies the characteristics of 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 724, ISO 888, ISO 898-1, ISO 965-1, ISO 3506-1, ISO 4753 and ISO 4759-1.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

ISO 724:1993, *ISO general-purpose metric screw threads — Basic dimensions.*

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

ISO 898-1:1999, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs.*

ISO 965-1:1998, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data.*

ISO 3269:—[1)], *Fasteners — Acceptance inspection.*

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

ISO 4017:1999, *Hexagon head screws — Product grades A and B.*

ISO 4042:1999, *Fasteners — Electroplated coatings.*

ISO 4753:—[2)], *Fasteners — Ends of parts with external metric ISO thread.*

[1)] To be published. (Revision of ISO 3269:1988)

[2)] To be published. (Revisioin of ISO 4753:1983)

ISO 4759-1:—[3], *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 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.*

ISO 10683:—[4], *Fasteners — Non-electrolytically applied zinc flake coatings.*

3 Dimensions

See Figure 1 and Tables 1 and 2

Symbols and description of dimensions are defined in ISO 225.

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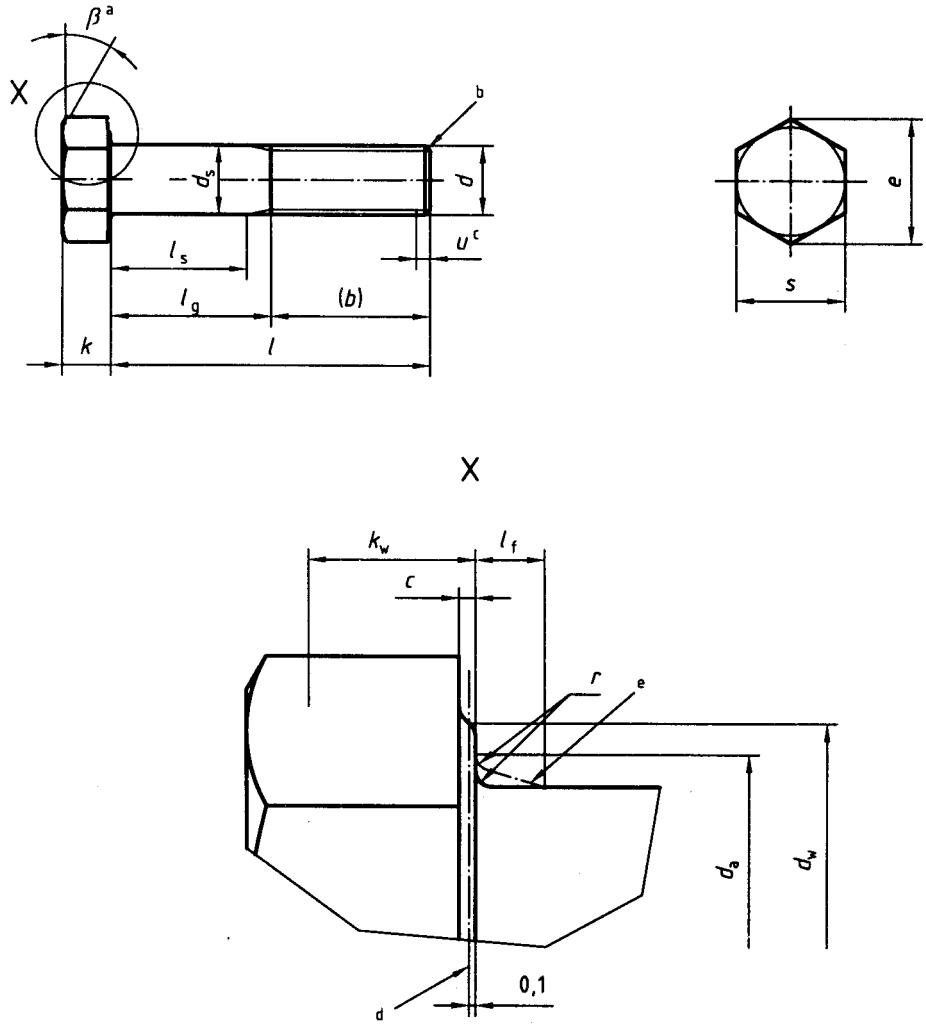
[3] To be published. (Revision of ISO 4759-1:1978)

[4] To be published.

Dimensions in millimetres



β = 15° to 30°

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

Incomplete thread $u \leq 2P$

Referee datum for d_w

Maximum underhead fillet

Figure 1

Table 1 — Preferred threads

Dimensions in millimetres

Thread (d)				M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10
P[a]				0,35	0,4	0,45	0,5	0,7	0,8	1	1,25	1,5
b ref.			b	9	10	11	12	14	16	18	22	26
			c	15	16	17	18	20	22	24	28	32
			d	28	29	30	31	33	35	37	41	45
c			max.	0,25	0,25	0,25	0,40	0,40	0,50	0,50	0,60	0,60
			min.	0,10	0,10	0,10	0,15	0,15	0,15	0,15	0,15	0,15
d_a			max.	2	2,6	3,1	3,6	4,7	5,7	6,8	9,2	11,2
d_s		nom. =	max.	1,60	2,00	2,50	3,00	4,00	5,00	6,00	8,00	10,00
	Product	A	min.	1,46	1,86	2,36	2,86	3,82	4,82	5,82	7,78	9,78
	grade	B		1,35	1,75	2,25	2,75	3,70	4,70	5,70	7,64	9,64
d_w	Product	A	min.	2,27	3,07	4,07	4,57	5,88	6,88	8,88	11,63	14,63
	grade	B		2,3	2,95	3,95	4,45	5,74	6,74	8,74	11,47	14,47
e	Product	A	min.	3,41	4,32	5,45	6,01	7,66	8,79	11,05	14,38	17,77
	grade	B		3,28	4,18	5,31	5,88	7,50	8,63	10,89	14,20	17,59
l_f			max.	0,6	0,8	1	1	1,2	1,2	1,4	2	2
k			nom.	1,1	1,4	1,7	2	2,8	3,5	4	5,3	6,4
	Product	A	max.	1,225	1,525	1,825	2,125	2,925	3,65	4,15	5,45	6,58
	grade		min.	0,975	1,275	1,575	1,875	2,675	3,35	3,85	5,15	6,22
	Product	B	max.	1,3	1,6	1,9	2,2	3,0	3,26	4,24	5,54	6,69
	grade		min.	0,9	1,2	1,5	1,8	2,6	2,35	3,76	5,06	6,11
k_w[e]	Product	A	min.	0,68	0,89	1,10	1,31	1,87	2,35	2,70	3,61	4,35
	grade	B		0,63	0,84	1,05	1,26	1,82	2,28	2,63	3,54	4,28
r			min.	0,1	0,1	0,1	0,1	0,2	0,2	0,25	0,4	0,4
s		nom. =	max.	3,20	4,00	5,00	5,50	7,00	8,00	10,00	13,00	16,00
	Product	A	min.	3,02	3,82	4,82	5,32	6,78	7,78	9,78	12,73	15,73
	grade	B		2,90	3,70	4,70	5,20	6,64	7,64	9,64	12,57	15,57

	Product grade				l_s and l_g [fg]																	
	A		B																			
	l				l_g	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.
12	11,65	12,35	—	—	1,2	3																		
16	15,65	16,35	—	—	5,2	7	4	6	2,75	5					For sizes above the solid, boldface stepped line ISO 4017 is recommended									
20	19,58	20,42	18,95	21,05			8	10	6,75	9	5,5	8												
25	24,58	25,42	23,95	26,05					11,75	14	10,5	13	7,5	11	5	9								
30	29,58	30,42	28,95	31,05							15,5	18	12,5	16	10	14	7	12						
35	34,5	35,5	33,75	36,25									17,5	21	15	19	12	17						
40	39,5	40,5	38,75	41,25									22,5	26	20	24	17	22	11,75	18				
45	44,5	45,5	43,75	46,25											25	29	22	27	16,75	23	11,5	19		
50	49,5	50,5	48,75	51,25											30	34	27	32	21,75	28	16,5	24		
55	54,4	55,6	53,5	56,5													32	37	26,75	33	21,5	29		
60	59,4	60,6	58,5	61,5													37	42	31,75	38	26,5	34		
65	64,4	65,6	63,5	66,5															36,75	43	31,5	39		
70	69,4	70,6	68,5	71,5															41,75	48	36,5	44		
80	79,4	80,6	78,5	81,5															51,75	58	46,5	54		
90	89,3	90,7	88,25	91,75																	56,5	64		
100	99,3	100,7	98,25	101,75																	66,5	74		
110	109,3	110,7	108,25	111,75																				
120	119,3	120,7	118,25	121,75																				

Table 1 (*continued*)

Dimensions in millimetres

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

	Product grade				l_s and l_g [g]																			
	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
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.
50	49,5	50,5	—	—	11,25	20																		
55	54,4	55,6	53,5	56,5	16,25	25																		
60	59,4	60,6	58,5	61,5	21,25	30																		
65	64,4	65,6	63,5	66,5	26,25	35	17	27																
70	69,4	70,6	68,5	71,5	31,25	40	22	32																
80	79,4	80,6	78,5	81,5	41,25	50	32	42	21,5	34														
90	89,3	90,7	88,25	91,75	51,25	60	42	52	31,5	44	21	36												
100	99,3	100,7	98,25	101,75	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	26,5	44										
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	47	72				
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
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	359	315,5	343	297	327
500	—	—	496,85	503,15																	335,5	363	317	347

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

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

— for product grade B, below this stepped line.

[a] P is the pitch of the thread.

[b] For lengths $l_{nom} \leq 125$ mm.

[c] For lengths 125 mm $< l_{nom} \leq 200$ mm.

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

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

[f] $l_{g,\,max} = l_{nom} - b$

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

[g] l_g is the minimum grip length.

Table 2 — Non-preferred threads

Dimensions in millimetres

Thread (d)				M3,5	M14	M18	M22	M27
P[a]				0,6	2	2,5	2,5	3
b ref.			b	13	34	42	50	60
			c	19	40	48	56	66
			d	32	53	61	69	79
c			max.	0,40	0,60	0,8	0,8	0,8
			min.	0,15	0,15	0,2	0,2	0,2
d_a			max.	4,1	15,7	20,2	24,4	30,4
d_s		nom. = max.		3,50	14,00	18,00	22,00	27,00
	Product	A	min.	3,32	13,73	17,73	21,67	—
	grade	B		3,20	13,57	17,57	21,48	26,48
d_w	Product	A	min.	5,07	19,64	25,34	31,71	—
	grade	B		4,95	19,15	24,85	31,35	38
e	Product	A	min.	6,58	23,36	30,14	37,72	—
	grade	B		6,44	22,78	29,56	37,29	45,2
l_f			max.	1	3	3	4	6
k			nom.	2,4	8,8	11,5	14	17
	Product	A	max.	2,525	8,98	11,715	14,215	—
	grade		min.	2,275	8,62	11,285	13,785	—
	Product	B	max.	2,6	9,09	11,85	14,35	17,35
	grade		min.	2,2	8,51	11,15	13,65	16,65
k_w[e]	Product	A	min.	1,59	6,03	7,9	9,65	—
	grade	B		1,54	5,96	7,81	9,56	11,66
r			min.	0,1	0,6	0,6	0,8	1
s		nom. = max.		6,00	21,00	27,00	34,00	41
	Product	A	min.	5,82	20,67	26,67	33,38	—
	grade	B		5,70	20,16	26,16	33,00	40

Product grade					l_s and l_g [fg]									
A			B											
l					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.
20	19,58	20,42	—	—	4	7								
25	24,58	25,42	—	—	9	12								
30	29,58	30,42	—	—	14	17								
35	34,5	35,5	—	—	19	22	For sizes above the dashed, boldface stepped line ISO 4017 is recommended.							
40	39,5	40,5	38,75	41,25										
45	44,5	45,5	43,75	46,25										
50	49,5	50,5	48,75	51,25										
55	54,4	55,6	53,5	56,5										
60	59,4	60,6	58,5	61,5			16	26						
65	64,4	65,6	63,5	66,5			21	31						
70	69,4	70,6	68,5	71,5			26	36	15,5	28				
80	79,4	80,6	78,5	81,5			36	46	25,5	38				
90	89,3	90,7	88,25	91,75			46	56	35,5	48	27,5	40		
100	99,3	100,7	98,25	101,75			56	66	45,5	58	37,5	50	25	40
110	109,3	110,7	108,25	111,75			66	76	55,5	68	47,5	60	35	50
120	119,3	120,7	118,25	121,75			76	86	65,5	78	57,5	70	45	60
130	129,2	130,8	128	132			80	90	69,5	82	61,5	74	49	64
140	139,2	140,8	138	142			90	100	79,5	92	71,5	84	59	74
150	149,2	150,8	148	152					89,5	102	81,5	94	69	84
160	—	—	158	162					99,5	112	91,5	104	79	94
180	—	—	178	182					119,5	132	111,5	124	99	114
200	—	—	197,7	202,3							131,5	144	119	134
220	—	—	217,7	222,3							138,5	151	126	141
240	—	—	237,7	242,3									146	161
260	—	—	257,4	262,6									166	181

Thread (d)				M33	M39	M45	M52	M60
P[a]				3,5	4	4,5	5	5,5
b ref			b	—	—	—	—	—
			c	78	90	102	116	—
			d	91	103	115	129	145
c			max.	0,8	1,0	1,0	1,0	1,0
			min.	0,2	0,3	0,3	0,3	0,3
d_a			max.	36,4	42,4	48,6	56,6	67
d_s			nom. = max.	33,00	39,00	45,00	52.00	60,00
	Product grade		A min.	—	—	—	—	—
			B	32,38	38,38	44,38	51,26	59,26
d_w	Product grade		A min.	—	—	—	—	—
			B	46,55	55,86	64,7	74,2	83,41
e	Product grade		A min.	—	—	—	—	—
			B	55,37	66,44	76,95	88,25	99,21
l_f			max.	6	6	8	10	12
k			nom.	21	25	28	33	38
	Product grade		A max.	—	—	—	—	—
			min.	—	—	—	—	—
	Product grade		B max.	21,42	25,42	28,42	33,5	38,5
			min.	20,58	24,58	27,58	32,5	37,5
k_w[e]	Product grade		A min.	—	—	—	—	—
			B	14,41	17,21	19,31	22,75	26,25
r			min.	1	1	1,2	1,6	2
s			nom. = max.	50	60,0	70,0	80,0	90,0
	Product grade		A min.	—	—	—	—	—
			B	49	58,8	68,1	78,1	87,8

Product grade					l_s and l_g[fg]									
A			B											
l					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.
130	129,2	130,8	128	132	34,5	52	For sizes above the solid, boldface stepped line ISO 4017 is recommended							
140	139,2	140,8	138	142	44,5	62								
150	149,2	150,8	148	152	54,5	72	40	60						
160	—	—	158	162	64,5	82	50	70						
180	—	—	178	182	84,5	102	70	90	55,5	78				
200	—	—	197,7	202,3	104,5	122	90	110	75,5	98	59	84		
220	—	—	217,7	222,3	111,5	129	97	117	82,5	105	66	91		
240	—	—	237,7	242,3	131,5	149	117	137	102,5	125	86	111	67,5	95
260	—	—	257,4	262,6	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
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 Popular lengths are defined in terms of l_s and l_g:
— for product grade A, above the dashed, stepped line;
— for product grade B, below this stepped line.

[a] P is the pitch of the thread.

[b] For lengths $l_{nom} \leq 125$ mm.

[c] For lengths 125 mm $< l_{nom} \leq 200$ mm.

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

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

[f] $l_{g,\,max} = l_{nom} - b$

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

[g] l_g is the minimum grip length.

4 Specifications and reference standards

See Table 3.

Table 3 — Specifications and reference standards

Material		Steel	Stainless steel	Non-ferrous metal
General requirements	International Standard	ISO 8992		
Thread	Tolerance	6g		
	International Standards	ISO 724, ISO 965-1		
Mechanical properties	Property class[a]	$d < 3$ mm: as agreed 3 mm $\leq d \leq$ 39 mm: 5.6, 8.8, 9.8, 10.9 $d >$ 39 mm: as agreed	$d \leq$ 24 mm: A2-70, A4-70 24 mm $< d \leq$ 39 mm: A2-50, A4-50 $d >$ 39 mm: as agreed	Materials specified in ISO 8839
	International Standards	3 mm $\leq d \leq$ 39 mm: ISO 898-1 $d < 3$ mm and $d >$ 39 mm: as agreed	$d \leq$ 39 mm: ISO 3506-1 $d >$ 39 mm: as agreed	
Tolerances	Product grade	For $d \leq$ 24 mm and $l \leq 10\,d$ or 150 mm[b]: A For $d >$ 24 mm or $l > 10\,d$ or 150 mm[b]: B		
	International Standard	ISO 4759-1		
Finish and/or coating		As processed Requirements for electroplating are covered in ISO 4042 Requirements for non-electrolytically applied zinc flake coatings are covered in ISO 10683	Plain	Plain 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		
Acceptability		For acceptance procedure, see ISO 3269.		

[a] For other property classes see ISO 898-1 for steel and ISO 3506-1 for stainless steel respectively.

[b] Whichever is shorter.

5 Designation

EXAMPLE

A hexagon head bolt with thread M12, nominal length l = 80 mm and property class 8.8 is designated as follows:

Hexagon head bolt ISO 4014 - M12 × 80 - 8.8

Bibliography

[1] ISO 4015:1979, *Hexagon head bolts — Product grade B — Reduced shank (shank diameter approximately equal to pitch diameter).*

[2] ISO 4016:1999, *Hexagon head bolts — Product grade C.*

[3] ISO 4017:1999, *Hexagon head screws — Product grades A and B.*

[4] ISO 4018:1999, *Hexagon head screws — Product grade C.*

[5] ISO 4032:1999, *Hexagon nuts, style 1 — Product grades A and B.*

[6] ISO 4033:1999, *Hexagon nuts, style 2 — Product grades A and B.*

[7] ISO 4034:1999, *Hexagon nuts — Product grade C.*

[8] ISO 4035:1999, *Hexagon thin nuts (chamfered) — Product grades A and B.*

[9] ISO 4036:1999, *Hexagon thin nuts (unchamfered) — Product grade B.*

[10] ISO 4161:1999, *Hexagon nuts with flange — Coarse thread.*

[11] ISO 4162:—[5)], *Hexagon bolts with flange — Small series — Product grade combination A/B.*

[12] ISO 4775:1984, *Hexagon nuts for high-strength structural bolting with large width across flats — Product grade B — Property classes 8 and 10.*

[13] ISO 7411:1984, *Hexagon bolts for high-strength structural bolting with large width across flats (thread lengths according to ISO 888) — Product grade C — Property classes 8.8 and 10.9.*

[14] ISO 7412:1984, *Hexagon bolts for high-strength structural bolting with large width across flats (short thread length) — Product grade C — Property classes 8.8 and 10.9.*

[15] ISO 7413:1984, *Hexagon nuts for structural bolting, style 1, hot-dip galvanize (oversize tapped) — Product grades A and B — Property classes 5, 6 and 8.*

[16] ISO 7414:1984, *Hexagon nuts for structural bolting with large width across flats, style 1 — Product grade B — Property class 10.*

[17] ISO 7417:1984, *Hexagon nuts for structural bolting, style 2, hot-dip galvanize (oversize tapped) — Product grade A — Property class 9.*

[18] ISO 8673:1999, *Hexagon nuts, style 1, with metric fine pitch thread — Product grades A and B.*

[19] ISO 8674:1999, *Hexagon nuts, style 2, with metric fine pitch thread — Product grades A and B.*

[20] ISO 8675:1999, *Hexagon thin nuts (chamfered) with metric fine pitch thread — Product grades A and B.*

[21] ISO 8676:1999, *Hexagon head screws with metric fine pitch thread — Product grades A and B.*

[5)] To be published. (Revision of ISO 4162:1990)

[22] ISO 8765:1999, *Hexagon head bolts with metric fine pitch thread — Product grades A and B.*

[23] ISO 10663:1999, *Hexagon nuts with flange — Fine pitch thread.*

[24] ISO 15071:1999, *Hexagon bolts with flange —Small series — Product grade A.*

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